

AIR PERMIT APPLICATION

for the

SMCC LIB RECYCLING FACILITY
Village of Endicott
Broome County, New York

Prepared for:

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Project No. 2018098

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1.0 INTRODUCTION

SMCC LIB Recycling Facility is a proposed lithium-ion battery (LIB) recycling facility to be located in the former IBM Building 259 on what is now known as the Huron Campus in the Village of Endicott. Refer to *Figure 1 – Site Location Map*. The facility will employ various processes to recover metals from spent LIBs from electric vehicles and power packs from phones and other electronic devices. The facility is patterned after a similar facility located in South Korea and will have an input capacity of approximately 2,200 pounds per hour. This application is for a State Facility Permit for the associated air emissions. Refer to *Attachment A – Air Permit Application Forms*. The proposed facility is also subject to State solid waste regulations. Therefore, an application for registration as a Solid Waste Management facility is concurrently being submitted to the New York State Department of Environmental Conservation (DEC).

2.0 PROCESS DESCRIPTION

The process steps include dismantling the battery cases to prepare the cells, heating the cells in a rotary kiln (RK) dryer, then cooling, shredding, grinding and separating the products. Products comprise the various metals including aluminum, cobalt, copper, iron, lithium, iron and nickel. Refer to *Attachment B – Process Flow Diagram* for additional information.

Process emissions are from the RK dryer, the Unloading Bin and the No. 2 Machines (two duplicate shredding and grinding processes). The RK dryer is natural gas-fired, with a maximum heat input of 4.0 MMBTU/hour. The RK dryer indirectly heats the spent LIBs and exhausts through EP 0001A. Emissions from the RK dryer LIB drying section will pass through an afterburner, waste heat boiler, heat exchanger, fabric filter baghouse followed by a wet scrubber, then exit through emission point 0001B. The dust from the Unloading Bin will be collected and passed through a fabric filter baghouse, then exit through emission point 00002. The dust from the No. 2 Machines will be collected and passed through a fabric filter baghouse, then exit

through emission points 00003 and 00004. Refer to *Attachment B – Process Flow Diagram* and *Figure 2 – Preliminary Layout* for additional information.

3.0 EMISSIONS ESTIMATES

Emissions estimates and other information were prepared. Refer to *Table 1 – Process, Controls and Emission Points Organization*, *Table 2A – RK Dryer Combustion Emissions Estimate*, *Table 2B – RK Dryer Aferburner Combustion Emissions Estimate*, *Table 2C – RK Dryer Emissions Estimate*, *Table 2D – RK Dryer – Exhaust Gas Analysis – Pilot Test (No Controls)*, *Table 2E – RK Dryer – Exhaust Gas Analysis – Full Scale Facility*, *Table 3A – Unloading Bin Emissions Estimate*, *Table 3B – No. 2 Machine Emissions Estimate*, *Table 3C – RK Dryer Output*, *Table 4 – Highly Toxic Air Contaminants Screening*, *Table 5 – Facility Emissions Summary* and *Table 6 – Dispersion Modeling Results* for additional information.

The RK dryer emissions estimates are based on test results from the process in South Korea, including an exhaust gas analyses of a pilot test of a dryer (before controls), a test of the full-scale system and an emissions test for polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF). Refer to *Attachment C1 – Rotary Dryer Flow Diagram*, *Attachment C2 – No. 2 Machine Flow Diagram*, *Attachment D – Pilot Exhaust Gas Analysis*, *Attachment E – Full Scale Exhaust Gas Analysis* and *Attachment F – Korea Dioxin Test Results Summary* for additional information. Published emissions factors were used for natural gas combustion emissions and other generally accepted mass-balance methods and estimated control efficiencies were used for the Unloading Bin and No. 2 Machines. Refer to the Tables for additional information.

Estimated emissions were compared to the thresholds for High Toxicity Air Contaminants (HTACs) and Persistent, Bioaccumulative and Toxic substances (PBTs). Emissions of these compounds were either shown not to be present in the test results or estimated to be less than the applicable thresholds (refer to Tables 4 and 5).

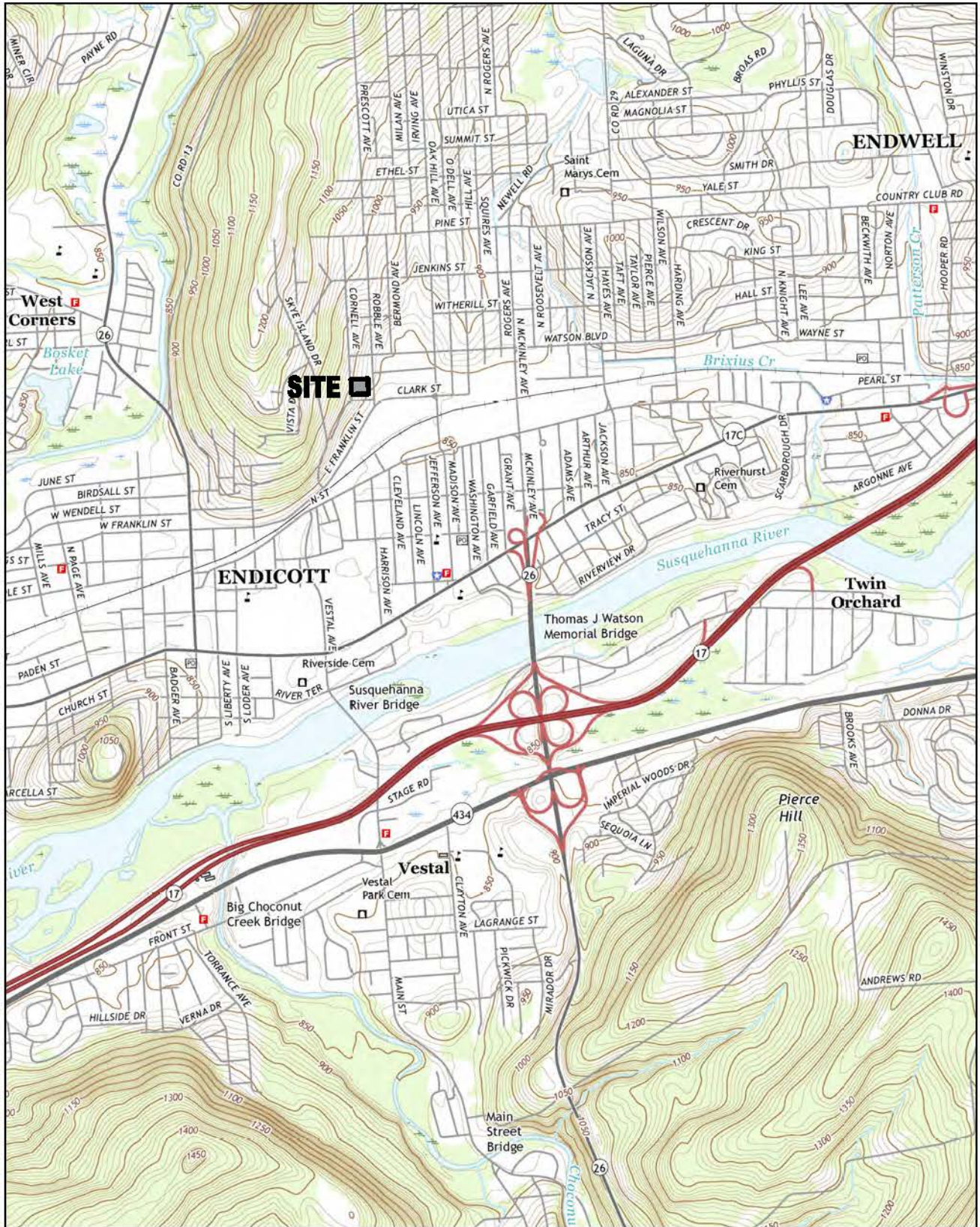
4.0 AIR QUALITY IMPACT ASSESSMENT

Air dispersion modelling was completed to assess air quality impacts. Results showed the predicted impacts to air quality are within acceptable levels. Refer to *Attachment G – AERSCREEN Dispersion Modeling Results* for additional information.

5.0 ENVIRONMENTAL ASSESSMENT FORM

A completed Full Environmental Assessment Form is included in the Solid Waste Management Facility registration application.

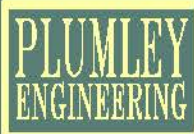
FIGURES



REF: U.S.G.S. ENDICOTT QUAD., 2016, 7.5 MIN., 1" = 2000 +/-

REF.: USGS - ENDICOTT QUAD., 2016, 7.5 MIN. SCALE: 1"=2000'

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Civil and Environmental Engineering

PROJECT:

SMCC LIB RECYCLING FACILITY

DWG. TITLE:

SITE LOCATION MAP

CLIENT:

SUNGEEL MCC AMERICAS, LLC

LOCATION:

VILLAGE OF ENDICOTT, BROOME COUNTY, NEW YORK

Note: No alteration permitted hereon except as provided under Section 7209 Subdivision 2 of the New York State Education Law.

PROJECT No.: 2018098

FILE NAME: FIGURE 1

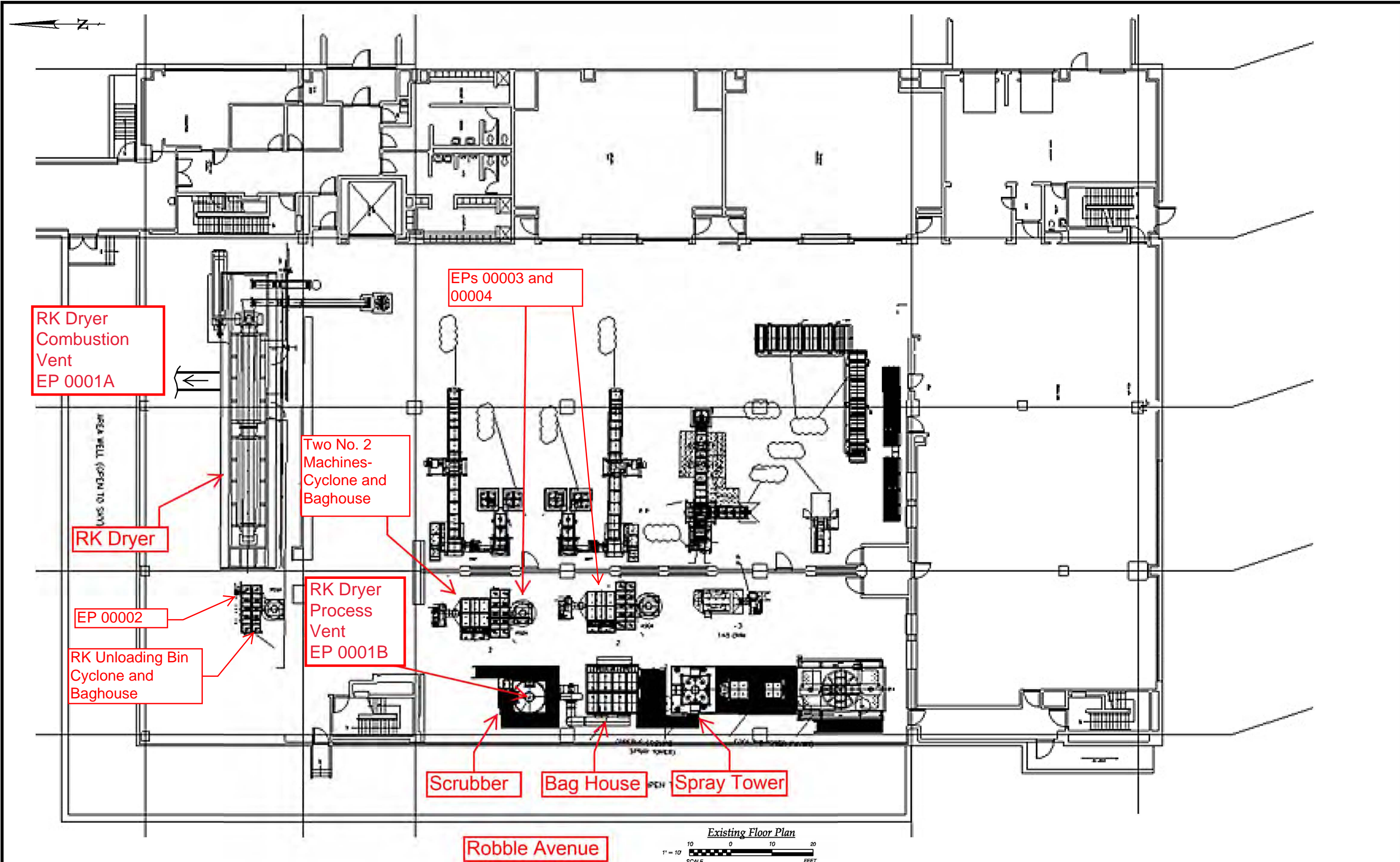
SCALE: AS NOTED

DATE: DEC. 2018

ENGRD BY: DRV

DRAWN BY: J.JL

CHECKED BY: DRV



RK Dryer
Combustion
Vent
EP 0001A

EPs 00003 and
00004

Two No. 2
Machines-
Cyclone and
Baghouse

RK Dryer

EP 00002

RK Dryer
Process
Vent
EP 0001B

RK Unloading Bin
Cyclone and
Baghouse

Scrubber

Bag House

Spray Tower

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REVISIONS:	DATE:	BY:

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PROJECT: **SMCC ENDICOTT FACTORY**
 CLIENT: SUNGEEL MCC AMERICAS, LLC
 LOCATION: VILLAGE OF ENDICOTT, BROOME COUNTY, NEW YORK

DWG. TITLE: **PRELIMINARY LAYOUT**

Note: No alteration permitted hereon except as provided under Section 7209 Subdivision 2 of the New York State Education Law.

PROJECT No.: 2018098
 FILE NAME: FIGURE 2
 SCALE: AS NOTED
 DATE: DEC. 2018
 ENGR BY: DRV
 DRAWN BY: JUL
 CHECKED BY: DRV

SHEET NO.: **FIG. 2**
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Key

— Lease Limit (Approximate)

● EP00002 Emission Points



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REVISIONS:	DATE:	BY:
STACKS MODIFICATION	8/21/19	DRV

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PROJECT: **SMCC LIB RECYCLING FACILITY**
CLIENT: **SUNGEEL MCC AMERICAS, LLC**
LOCATION: **VILLAGE OF ENDICOTT, BROOME COUNTY, NEW YORK**

DWG. TITLE: **AERIAL PHOTO PLAN**

Note: No alteration permitted herein except as provided under Section 7209 Subdivision 2 of the New York State Education Law.

PROJECT No.: 2018098
FILE NAME: FIGURE 3
SCALE: AS NOTED
DATE: AUG. 2019
ENGRD BY: DRV
DRAWN BY: JLL
CHECKED BY: DRV

SHEET NO.: **FIG. 3**

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ATTACHMENTS

ATTACHMENT A

AIR PERMIT
APPLICATION FORMS

New York State Department of Environmental Conservation
Air Permit Application



Department of Environmental Conservation

DEC ID									
0	-								

Application ID									
-							/		

Application Type	
<input checked="" type="checkbox"/> State Facility	<input type="checkbox"/> Title V

Section I - Certification

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information required to complete this application, I believe the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Responsible Official Danish Mir	Title President
Signature <i>[Signature]</i>	Date 8/13/19

Professional Engineer Certification

I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments as they pertain to the practice of engineering. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Professional Engineer Dale R. Vollmer, P.E.	NYS License No. 056798
Signature <i>[Signature]</i>	Date 08/12/2019

Section II - Identification Information

Type of Permit Action Requested

<input checked="" type="checkbox"/> New	<input type="checkbox"/> Renewal	<input type="checkbox"/> Significant Modification	<input type="checkbox"/> Administrative Amendment	<input type="checkbox"/> Minor Modification
<input checked="" type="checkbox"/> Application for the construction of a new facility		<input checked="" type="checkbox"/> Application involves the construction of new emission unit(s)		

Facility Information

Name SMCC LIB RECYCLING FACILITY	
Location Address 801 Clark Street	
City / <input type="checkbox"/> Town / <input checked="" type="checkbox"/> Village Endicott	Zip 13760

Owner/Firm Information

Name SUNGEEL MCC AMERICAS, LLC	Business Taxpayer ID			
Street Address 222 Bloomingdale Road				
City White Plains	State/Province New York	Country USA	Zip 10603	
Owner Classification: <input type="checkbox"/> Federal	<input type="checkbox"/> State	<input type="checkbox"/> Municipal	<input checked="" type="checkbox"/> Corporation/Partnership	<input type="checkbox"/> Individual

Owner/Firm Contact Information

Name Danish Mir	Phone 914-714-2541		
E-mail Address DANISH@SMCCRECYCLING.com	Fax NA		
Affiliation SMCC	Title President		
Street Address 222 Bloomingdale Road			
City White Plains	State/Province New York	Country USA	Zip 10603

Facility Contact Information

Name Danish Mir	Phone 914-714-2541		
E-mail Address DANISH@SMCCRECYCLING.com	Fax NA		
Affiliation SMCC	Title President		
Street Address 222 Bloomingdale Road			
City White Plains	State/Province New York	Country USA	Zip 10603

New York State Department of Environmental Conservation
Air Permit Application



Department of Environmental Conservation

DEC ID									
-									

Project Description		<input type="checkbox"/> Continuation Sheet(s)
<p>Sungeel MCC America, LLC (SMCC) is proposing to construct a lithium ion (Li-Ion) battery recycling facility to be located in the former IBM Building 259 on the Huron Campus in the Village of Endicott. Refer to Figure 1 – Site Location Map. The facility will employ various processes to recover metals from spent Li-Ion batteries from electric vehicles and power packs from phones and other electronic devices. The facility is patterned after a similar facility located in South Korea and will have an input capacity of approximately 2,200 pounds per hour.</p>		

Section III - Facility Information

Facility Classification					
<input type="checkbox"/> Hospital	<input type="checkbox"/> Residential	<input type="checkbox"/> Educational/Institutional	<input type="checkbox"/> Commercial	<input checked="" type="checkbox"/> Industrial	<input type="checkbox"/> Utility

Affected States (Title V Applications Only)					
<input type="checkbox"/> Vermont	<input type="checkbox"/> Massachusetts	<input type="checkbox"/> Rhode Island	<input type="checkbox"/> Pennsylvania	Tribal Land: _____	
<input type="checkbox"/> New Hampshire	<input type="checkbox"/> Connecticut	<input type="checkbox"/> New Jersey	<input type="checkbox"/> Ohio	Tribal Land: _____	

SIC Code(s)			NAICS Code(s)		
			495399		

Facility Description		<input type="checkbox"/> Continuation Sheet(s)
<p>The proposed facility will be located on the northeast corner of Robble Ave. and Clark Street in part of the Huron Campus. The building footprint is approximately 27,000 sq. ft., 4± stories in height and with a first floor elevation of 839 feet. The building will house all of the recycling equipment, a disassembly area and finished products.</p>		

Compliance Statements (Title V Applications Only)	
<p>I certify that as of the date of this application the facility is in compliance with all applicable requirements. Yes No</p> <p>If one or more emission units at the facility are not in compliance with all applicable requirements at the time of signing this application (the 'NO' box must be checked), the noncomplying units must be identified in the "Compliance Plan" block on page 8 of this form along with the compliance plan information required. For all emission units at the facility that are operating <u>in compliance</u> with all applicable requirements, complete the following:</p> <p><input type="checkbox"/> This facility will continue to be operated and maintained in such a manner as to assure compliance for the duration of the permit, except those emission units referenced in the compliance plan portion of this application.</p> <p><input type="checkbox"/> For all emission units subject to any applicable requirements that will become effective during the term of the permit, this facility will meet such requirements on a timely basis.</p> <p><input type="checkbox"/> Compliance certification reports will be submitted at least once per year. Each report will certify compliance status with respect to each applicable requirement, and the method used to determine the status.</p>	

Facility Applicable Federal Requirements										<input checked="" type="checkbox"/> Continuation Sheet(s)
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause	
6	NYCRR	200		6						
6	NYCRR	200		7						
6	NYCRR	201		4						
6	NYCRR	201		5						

Facility State Only Requirements										<input type="checkbox"/> Continuation Sheet(s)
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause	
6	NYCRR	201	1	4						
6	NYCRR	211		1						

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Department of Environmental Conservation

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-									

Facility Compliance Certification x Continuation Sheet(s)

Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212		2.4					
* Applicable Federal Requirement					CAS Number		Contaminant Name		
State Only Requirement			<input type="checkbox"/> Capping		0NY075-00-5		Particulate		

Monitoring Information

* Work Practice Involving Specific Operations Ambient Air Monitoring Record Keeping/Maintenance Procedures

Compliance Activity Description

No owner or operator shall allow or cause emissions of particulate in excess of 0.05 grains per dry standard cubic foot. This applies to emission points 00001 - 00004.

Work Practice Type Code	Process Material		Reference Test Method		
	Code	Description			
			EPA Method 5		
Monitored Parameter			Manufacturer's Name/Model Number		
Code	Description				
Limit		Limit Units			
Upper	Lower	Code	Description		
0.05		391	grains/dscf		
Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description
	Per test method	17	once per term		once per occurrence

Facility Emissions Summary Continuation Sheet(s)

CAS Number	Contaminant Name	Potential to Emit (tons/yr)	Actual Emissions (pounds/yr)
0NY075 - 00 - 5	PM-10	See Table 5	
0NY750 - 02 - 5	PM-2.5		
007446 - 09 - 5	Sulfur Dioxide		
0NY210 - 00 - 0	Oxides of Nitrogen		
000630 - 08 - 0	Carbon Monoxide		
007439 - 92 - 1	Lead (elemental)		
0NY998 - 00 - 0	Total Volatile Organic Compounds		
0NY100 - 00 - 0	Total Hazardous Air Pollutants		
0NY750 - 00 - 0	Carbon Dioxide Equivalents		

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DEC ID									
-									

Section III - Facility Information

Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212		1.6					
<input checked="" type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement			<input type="checkbox"/> Capping		CAS No.	Contaminant Name			
					Opacity				
Monitoring Information									
<input type="checkbox"/> Continuous Emission Monitoring <input type="checkbox"/> Intermittent Emission Testing <input type="checkbox"/> Ambient Air Monitoring					<input type="checkbox"/> Monitoring of Process or Control Device Parameters as a Surrogate <input checked="" type="checkbox"/> Work Practice Involving Specific Operations <input type="checkbox"/> Record Keeping/Maintenance Procedures				
Description									
No owner or operator shall allow or cause emissions of opacity in excess of 20%. This applies to emission points 00001 - 00004.									
Work Practice		Process Material				Reference Test Method			
Type	Code	Description							
						EPA Method 9			
Parameter		Manufacturer Name/Model No.							
Code	Description								
Limit				Limit Units					
Upper		Lower		Code	Description				
20				01	% Opacity				
Averaging Method			Monitoring Frequency			Reporting Requirements			
Code	Description		Code	Description		Code	Description		
	Per test method		17	once per term			once per occurrence		

New York State Department of Environmental Conservation
Air Permit Application Form



DEC ID									
-									

Section III - Facility Information

Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212		2.2					
<input checked="" type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement			<input type="checkbox"/> Capping		CAS No.	Contaminant Name			
						High Toxicity Air Contaminants (HTACs)			
Monitoring Information									
<input type="checkbox"/> Continuous Emission Monitoring <input type="checkbox"/> Intermittent Emission Testing <input type="checkbox"/> Ambient Air Monitoring			<input type="checkbox"/> Monitoring of Process or Control Device Parameters as a Surrogate <input checked="" type="checkbox"/> Work Practice Involving Specific Operations <input type="checkbox"/> Record Keeping/Maintenance Procedures						
Description									
No owner or operator shall allow or cause emissions of any HTACs in excess of the respective mass emission limits of 6 NYCRR 212-2.2 - Table 2. This applies to emission points 00001 - 00004.									
Work Practice		Process Material				Reference Test Method			
Type	Code	Description							
						Various EPA Methods			
Parameter		Manufacturer Name/Model No.							
Code	Description								
Limit				Limit Units					
Upper		Lower		Code	Description				
HTAC Table				1	pounds per year				
Averaging Method			Monitoring Frequency			Reporting Requirements			
Code	Description		Code	Description		Code	Description		
	Per test method		17	once per term			once per occurrence		

New York State Department of Environmental Conservation
Air Permit Application Form



DEC ID									
-									

Section III - Facility Information

Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212		1.5					
<input checked="" type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement			<input type="checkbox"/> Capping		CAS No.		Contaminant Name		
					Air Toxics				
Monitoring Information									
<input type="checkbox"/> Continuous Emission Monitoring <input type="checkbox"/> Intermittent Emission Testing <input type="checkbox"/> Ambient Air Monitoring					<input type="checkbox"/> Monitoring of Process or Control Device Parameters as a Surrogate <input checked="" type="checkbox"/> Work Practice Involving Specific Operations <input type="checkbox"/> Record Keeping/Maintenance Procedures				
Description									
No owner or operator shall allow or cause emissions of air contaminants that results in a predicted ambient concentration in excess of the respective annual guidance concentration (AGC) or short-term guidance concentration (SGC). This applies to emission points 00001 - 00004.									
Work Practice		Process Material				Reference Test Method			
Type	Code	Description							
						AerScreen Dispersion Modeling			
Parameter		Manufacturer Name/Model No.							
Code	Description								
Limit				Limit Units					
Upper		Lower		Code	Description				
					Show No Exceedances of AGC or SGC				
Averaging Method			Monitoring Frequency			Reporting Requirements			
Code	Description		Code	Description		Code	Description		
				once per application		16	once per occurrence		

New York State Department of Environmental Conservation
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DEC ID									
-									

Section III - Facility Information

Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212							
<input checked="" type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement			<input type="checkbox"/> Capping		CAS No.	Contaminant Name			
					Air Toxics				
Monitoring Information									
<input type="checkbox"/> Continuous Emission Monitoring <input type="checkbox"/> Intermittent Emission Testing <input type="checkbox"/> Ambient Air Monitoring					<input type="checkbox"/> Monitoring of Process or Control Device Parameters as a Surrogate <input checked="" type="checkbox"/> Work Practice Involving Specific Operations <input type="checkbox"/> Record Keeping/Maintenance Procedures				
Description									
No owner or operator shall allow or cause an emission rate potential (ERP) in excess of 0.10 pounds per hour (lbs/hr) for A-rated contaminants or 10.0 lbs/hr for all other contaminants. A-rated contaminants are those identified in DAR-1 Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212 with a high toxicity rating and any other contaminants A-rated by the Department. This applies to emission points 00001 - 00004.									
Work Practice		Process Material				Reference Test Method			
Type	Code	Description							
						AerScreen Dispersion Modeling			
Parameter		Manufacturer Name/Model No.							
Code	Description								
Limit				Limit Units					
Upper		Lower		Code	Description				
					Show No Exceedances of AGC or SGC				
Averaging Method			Monitoring Frequency			Reporting Requirements			
Code	Description		Code	Description		Code	Description		
				once per application		16	once per occurrence		

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-									

Section IV - Emission Unit Information

Emission Unit Description										<input checked="" type="checkbox"/> Continuation Sheet(s)
Emission Unit	1	-	R	E	C	Y	C			
<p>The 1-RECYC emission unit incorporates all the recycling processes that have potential air emissions as follows: Rotary kiln drying, dried cells collection bin and dried cells grinding.</p>										

Building Information					<input type="checkbox"/> Continuation Sheet(s)
Building ID	Building Name		Length (ft)	Width (ft)	Orientation
SMCC	SMCC		219±	144±	N-S-0°

Emission Unit	Emission Unit Emissions Summary										<input type="checkbox"/> Continuation Sheet(s)
1	-	R	E	C	Y	C					
CAS Number		Contaminant Name									
		See Table 5 Attached									
ERP (lbs/yr)	Potential to Emit					Actual Emissions					
	(lbs/hr)		(lbs/yr)			(lbs/hr)		(lbs/yr)			
CAS Number		Contaminant Name									
ERP (lbs/yr)	Potential to Emit					Actual Emissions					
	(lbs/hr)		(lbs/yr)			(lbs/hr)		(lbs/yr)			
CAS Number		Contaminant Name									
ERP (lbs/yr)	Potential to Emit					Actual Emissions					
	(lbs/hr)		(lbs/yr)			(lbs/hr)		(lbs/yr)			
CAS Number		Contaminant Name									
ERP (lbs/yr)	Potential to Emit					Actual Emissions					
	(lbs/hr)		(lbs/yr)			(lbs/hr)		(lbs/yr)			

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**Department of
Environmental
Conservation**

DEC ID									
-									

Emission Point Information							<input type="checkbox"/> Continuation Sheet(s)
Emission Point		RK Dryer Wet Scrubber Exhaust					
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	
Emission Point		RK Dryer Unloading Bin Baghouse					
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	
Emission Point		No. 2A Machine Baghouse					
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	

Emission Source/Control Information							<input type="checkbox"/> Continuation Sheet(s)
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number
ID	Type				Code	Description	
Design Capacity		Design Capacity Units		Waste Feed		Waste Type	
		Code	Description	Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number
ID	Type				Code	Description	
Design Capacity		Design Capacity Units		Waste Feed		Waste Type	
		Code	Description	Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number
ID	Type				Code	Description	
Design Capacity		Design Capacity Units		Waste Feed		Waste Type	
		Code	Description	Code	Description	Code	Description

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Emission Point Information							<input type="checkbox"/> Continuation Sheet(s)
Emission Point	0	0	0	1	A		
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
839±	111	59	30	600			
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	
20.4	6000	42.107399	-73.053459	SMCC	55		
Emission Point							
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	
Emission Point							
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	

Emission Source/Control Information								<input type="checkbox"/> Continuation Sheet(s)
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units			Waste Feed		Waste Type		
	Code	Description		Code	Description	Code	Description	
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units			Waste Feed		Waste Type		
	Code	Description		Code	Description	Code	Description	
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model Number	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units			Waste Feed		Waste Type		
	Code	Description		Code	Description	Code	Description	

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Section IV - Emission Unit Information

Emission Source/Control (continuation)										
Emission Unit		-								
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.			
ID	Type				Code	Description				
Design Capacity	Design Capacity Units				Waste Feed		Waste Type			
	Code	Description			Code	Description	Code	Description		
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.			
ID	Type				Code	Description				
Design Capacity	Design Capacity Units				Waste Feed		Waste Type			
	Code	Description			Code	Description	Code	Description		
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.			
ID	Type				Code	Description				
Design Capacity	Design Capacity Units				Waste Feed		Waste Type			
	Code	Description			Code	Description	Code	Description		
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.			
ID	Type				Code	Description				
Design Capacity	Design Capacity Units				Waste Feed		Waste Type			
	Code	Description			Code	Description	Code	Description		
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.			
ID	Type				Code	Description				
Design Capacity	Design Capacity Units				Waste Feed		Waste Type			
	Code	Description			Code	Description	Code	Description		

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Section IV - Emission Unit Information

Emission Source/Control (continuation)								
Emission Unit		1	-	R	E	C	Y	C
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
2MC-B	C	11/2019	12/2019	NA	NA	NA	Korean Crusher & Tech., Inc.	
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
1323	3	No. 2B Machine-Grinding			NA	NA	NA	NA
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
2MCBF	K	11/2019	12/2019	NA	117	Fabric Filter	TBD	
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
2825	118	No. 2B Machine Dust Collector			NA	NA	NA	NA
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
2MCBC	K	11/2019	12/2019	NA	007	Cyclone	TBD	
Design Capacity	Design Capacity Units				Waste Feed		Waste Type	
	Code	Description			Code	Description	Code	Description
2825	118	No. 2B Machine-Cyclone			NA	NA	NA	NA

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Process Information									
Emission Unit								<input type="checkbox"/> Continuation Sheet(s)	
-								Process	
Process Description									
Source Classification Code (SCC)		Total Throughput		Throughput Quantity Units					
		Quantity/Hr	Quantity/Yr	Code	Description				
<input type="checkbox"/> Confidential <input type="checkbox"/> Operating at Maximum Capacity		Operating Schedule		Building	Floor/Location				
		Hours/Day	Days/Year						
Emission Point Identifier(s)									
Emission Source/Control Identifier(s)									
Emission Unit									
-								Process	
Process Description									
Source Classification Code (SCC)		Total Throughput		Throughput Quantity Units					
		Quantity/Hr	Quantity/Yr	Code	Description				
<input type="checkbox"/> Confidential <input type="checkbox"/> Operating at Maximum Capacity		Operating Schedule		Building	Floor/Location				
		Hours/Day	Days/Year						
Emission Point Identifier(s)									
Emission Source/Control Identifier(s)									

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Section IV - Emission Unit Information

Process Information (continuation)									
Emission Unit	1	-	R	E	C	Y	C	Process	G R D
Description									
After drying, spent battery cells are ground in the two grinding machines (No. 2 Machines). This ground material contains the recovered metals. Dust from the grinding machines is collected in a cyclone and further treated by a fabric filter before exhausting. See Attachment C-2									
Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units						
	Quantity/Hr	Quantity/Yr	Code	Description					
31401101	2200		0138	Pounds per hour of batteries processed					
<input type="checkbox"/> Confidential <input type="checkbox"/> Operating at Maximum Capacity		Operating Schedule		Building	Floor/Location				
		Hrs/Day	Days/Yr						
		12	365	SMCC	1st				
Emission Point Identifier(s)									
00003	00004								
Emission Source/Control Identifier(s)									
2MC-A	2MCAC	2MCAF							
2MC-B	2MCBC	2MCBF							
Emission Unit	-							Process	
Description									
Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units						
	Quantity/Hr	Quantity/Yr	Code	Description					
<input type="checkbox"/> Confidential <input type="checkbox"/> Operating at Maximum Capacity		Operating Schedule		Building	Floor/Location				
		Hrs/Day	Days/Yr						
Emission Point Identifier(s)									
Emission Source/Control Identifier(s)									

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Process Emissions Summary										<input type="checkbox"/> Continuation Sheet(s)		
Emission Unit	1 - R E C Y C					See Table 2A				Process	D R Y	
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						
Emission Unit	1 - R E C Y C					See Table 3A				Process	B I N	
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						
Emission Unit	1 - R E C Y C					See Table 3B				Process	G R D	
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						

Emission Source Emissions Summary										<input type="checkbox"/> Continuation Sheet(s)		
Emission Source										Process		
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						
Emission Source										Process		
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						
Emission Source										Process		
CAS Number	Contaminant Name				% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined			
Potential to Emit			Standard Units	Potential to Emit How Determined	Actual Emissions							
(lbs/hr)	(lbs/yr)	(standard units)			(lbs/hr)	(lbs/yr)						

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Emission Unit	Emission Point	Process	Emission Source	Emission Unit Applicable Federal Requirements							<input type="checkbox"/> Continuation Sheet(s)		
				Title	Type	Part	Subpart	Section	Subdiv.	Parag.	Subparag.	Cl.	Subcl.

Emission Unit	Emission Point	Process	Emission Source	Emission Unit State Only Requirements							<input type="checkbox"/> Continuation Sheet(s)		
				Title	Type	Part	Subpart	Section	Subdiv.	Parag.	Subparag.	Cl.	Subcl.

Emission Unit Compliance Certification Continuation Sheet(s)

Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

Applicable Federal Requirement State Only Requirement Capping

Emission Unit	Emission Point	Process	Emission Source	CAS Number	Contaminant Name

Monitoring Information

Continuous Emission Monitoring Monitoring of a Process or Control Device Parameters as a Surrogate
 Intermittent Emission Testing Work Practice Involving Specific Operations
 Ambient Air Monitoring Record Keeping/Maintenance Procedures

Compliance Activity Description

Work Practice Type Code	Process Material		Reference Test Method
	Code	Description	

Monitored Parameter		Manufacturer's Name/Model Number
Code	Description	

Limit		Limit Units	
Upper	Lower	Code	Description

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description

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Section IV - Emission Unit Information

Emission Unit Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	212							
<input checked="" type="checkbox"/> Applicable Federal Requirement						<input type="checkbox"/> State Only Requirement		<input type="checkbox"/> Capping	
Emission Unit	Emission Point	Process	Emission Source	CAS No.	Contaminant Name				
1-RECYC	00002	BIN							
Monitoring Information									
<input type="checkbox"/> Continuous Emission Monitoring			<input checked="" type="checkbox"/> Monitoring of Process or Control Device Parameters as a Surrogate						
<input type="checkbox"/> Intermittent Emission Testing			<input type="checkbox"/> Work Practice Involving Specific Operations						
<input type="checkbox"/> Ambient Air Monitoring			<input type="checkbox"/> Record Keeping/Maintenance Procedures						
Description									
Facility will monitor and record baghouse pressure drop.									
Work Practice		Process Material				Reference Test Method			
Type	Code	Description							
Parameter		Manufacturer Name/Model No.							
Code	Description								
Limit			Limit Units						
Upper	Lower	Code	Description						
Averaging Method			Monitoring Frequency			Reporting Requirements			
Code	Description		Code	Description		Code	Description		

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Not Required

Request for Emission Reduction Credits Continuation Sheet(s)

Emission Source					
-----------------	--	--	--	--	--

Emission Reduction Description

--

Contaminant Emission Reduction Data

Baseline Period ____/____/____ to ____/____/____		Reduction	
		Date	Method
CAS Number	Contaminant Name	ERC (lbs/yr)	
		Netting	Offset

Facility to Use Future Reduction

Name		Application ID			
		-		-	/
Location Address					
City/ Town / Village			State		Zip

Use of Emission Reduction Credits Continuation Sheet(s)

Emission Source					
-----------------	--	--	--	--	--

Proposed Project Description

--

Contaminant Emissions Increase Data

CAS Number	Contaminant Name	Project Emission Potential (lbs/yr)

Statement of Compliance

All facilities under the ownership of this "owner/firm" are operating in compliance with all applicable requirements and state regulations including any compliance certification requirements under Section 114(a)(3) of the Clean Air Act Amendments of 1990, or are meeting the schedule of a consent order.

Source of Emission Reduction Credit - Facility

Name		Permit ID			
		-		-	/
Location Address					
City/ Town / Village			State		Zip

Emission Source	CAS Number	Contaminant Name	ERC (lbs/yr)	
			Netting	Offset

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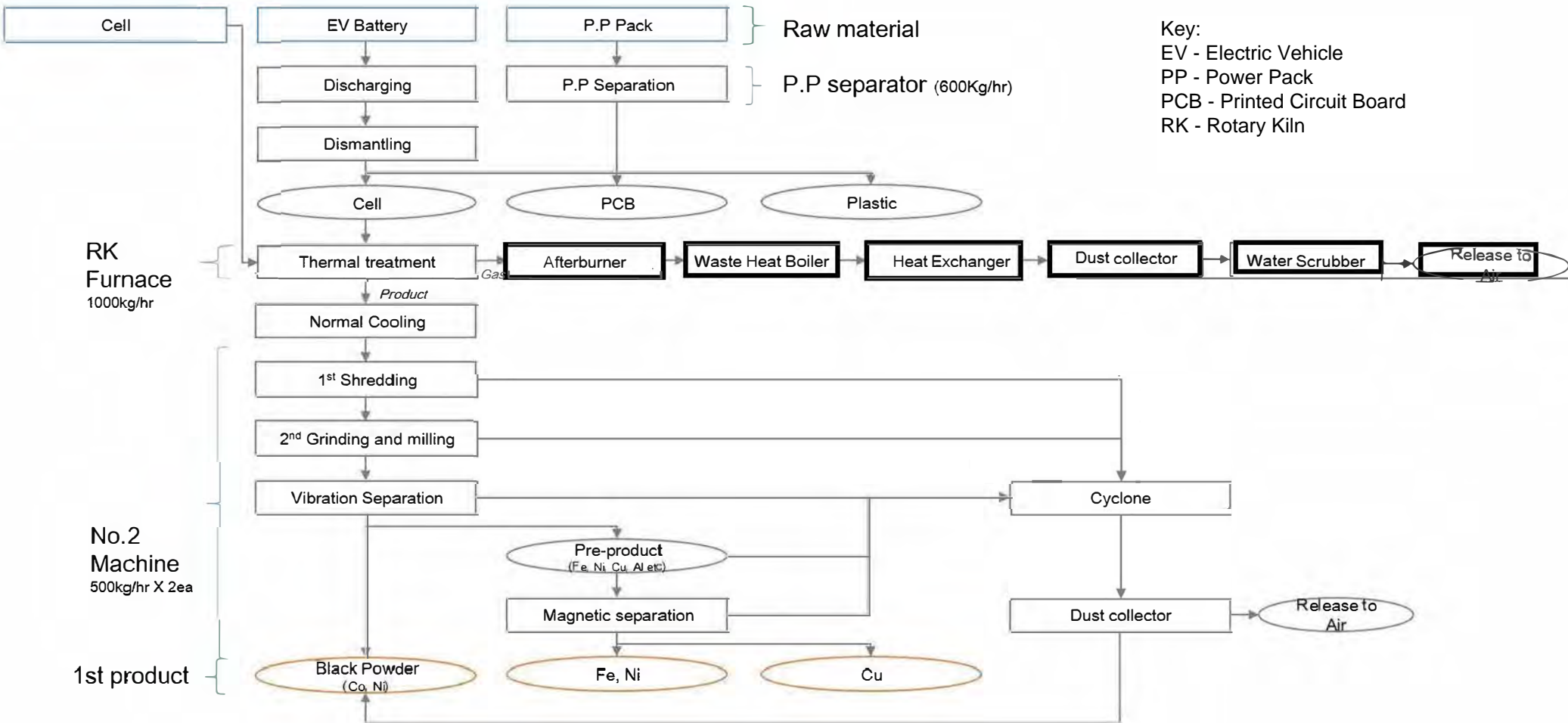
DEC ID									
-									

Supporting Documentation and Attachments	
Required Supporting Documentation	Date of Document
<input type="checkbox"/> List of Exempt Activities (attach form)	
<input type="checkbox"/> Plot Plan <u>Figures 1, 2 and 3</u>	
<input type="checkbox"/> Process Flow Diagram <u>Attachments C1 and C2</u>	
<input type="checkbox"/> Methods Used to Determine Compliance (attach form)	
<input type="checkbox"/> Emissions Calculations <u>Tables 1-6</u>	
Optional Supporting Documentation	Date of Document
<input type="checkbox"/> Air Quality Model	
<input type="checkbox"/> Confidentiality Justification	
<input type="checkbox"/> Ambient Air Quality Monitoring Plan or Reports	
<input type="checkbox"/> Stack Test Protocol	
<input type="checkbox"/> Stack Test Report	
<input type="checkbox"/> Continuous Emissions Monitoring Plan	
<input type="checkbox"/> Lowest Achievable Emission Rate (LAER) Demonstration	
<input type="checkbox"/> Best Available Control Technology (BACT) Demonstration	
<input type="checkbox"/> Reasonably Available Control Technology (RACT) Demonstration	
<input type="checkbox"/> Toxic Impact Assessment (TIA)	
<input type="checkbox"/> Environmental Rating Demonstration	
<input type="checkbox"/> Operational Flexibility Protocol/Description of Alternate Operating Scenarios	
<input type="checkbox"/> Title IV Permit Application	
<input type="checkbox"/> Emission Reduction Credit (ERC) Quantification (attach form)	
<input type="checkbox"/> Baseline Period Demonstration	
<input type="checkbox"/> Use of Emission Reduction Credits (attach form)	
<input type="checkbox"/> Analysis of Contemporaneous Emissions Increase/Decrease	
Other Supporting Documentation	Date of Document

ATTACHMENT B

PROCESS FLOW DIAGRAM

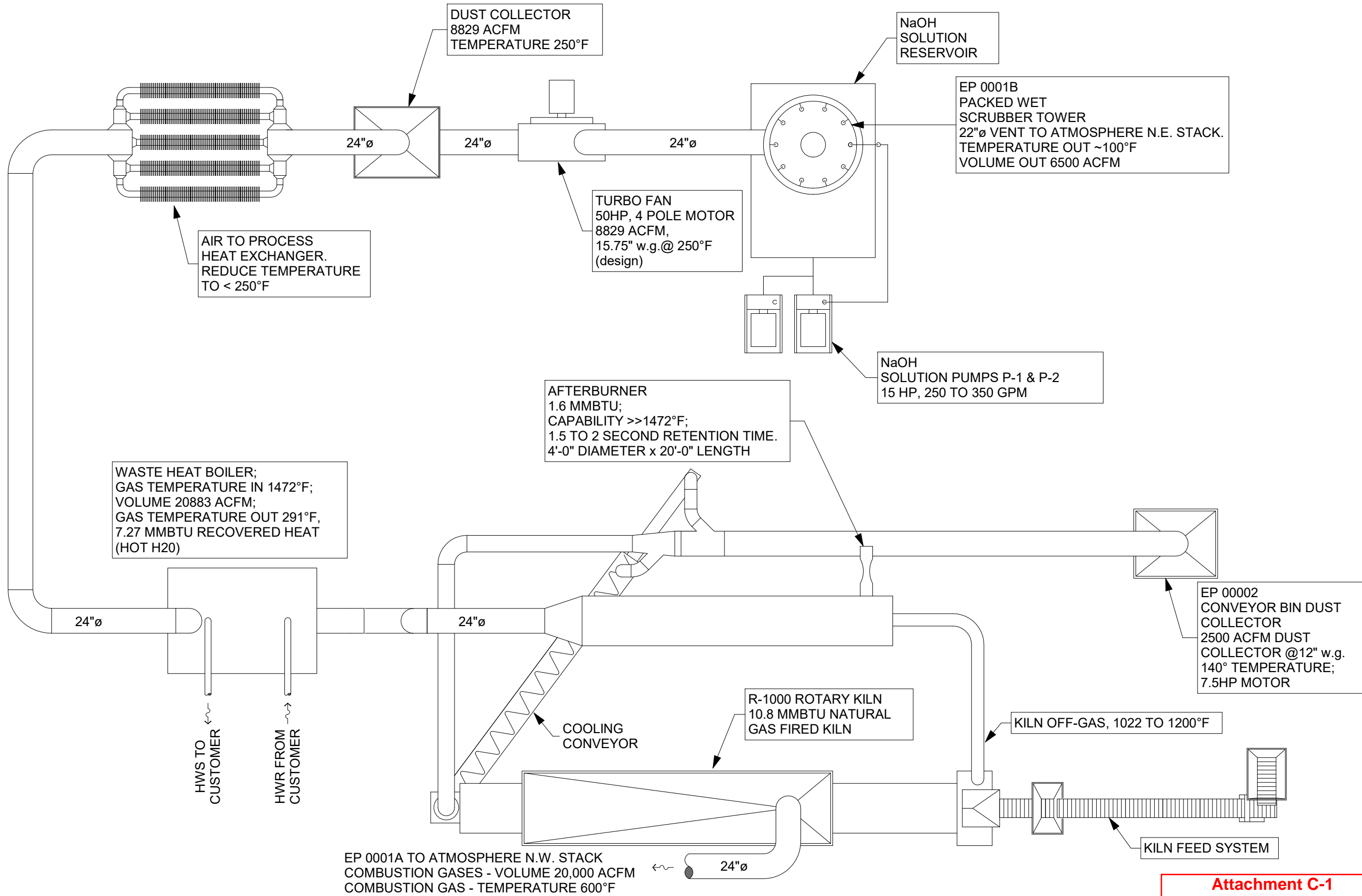
PROCESS FLOW DIAGRAM - SMCC ENDICOTT



**Attachment B
 Process Flow Diagram**

ATTACHMENT C1

ROTARY DRYER FLOW DIAGRAM



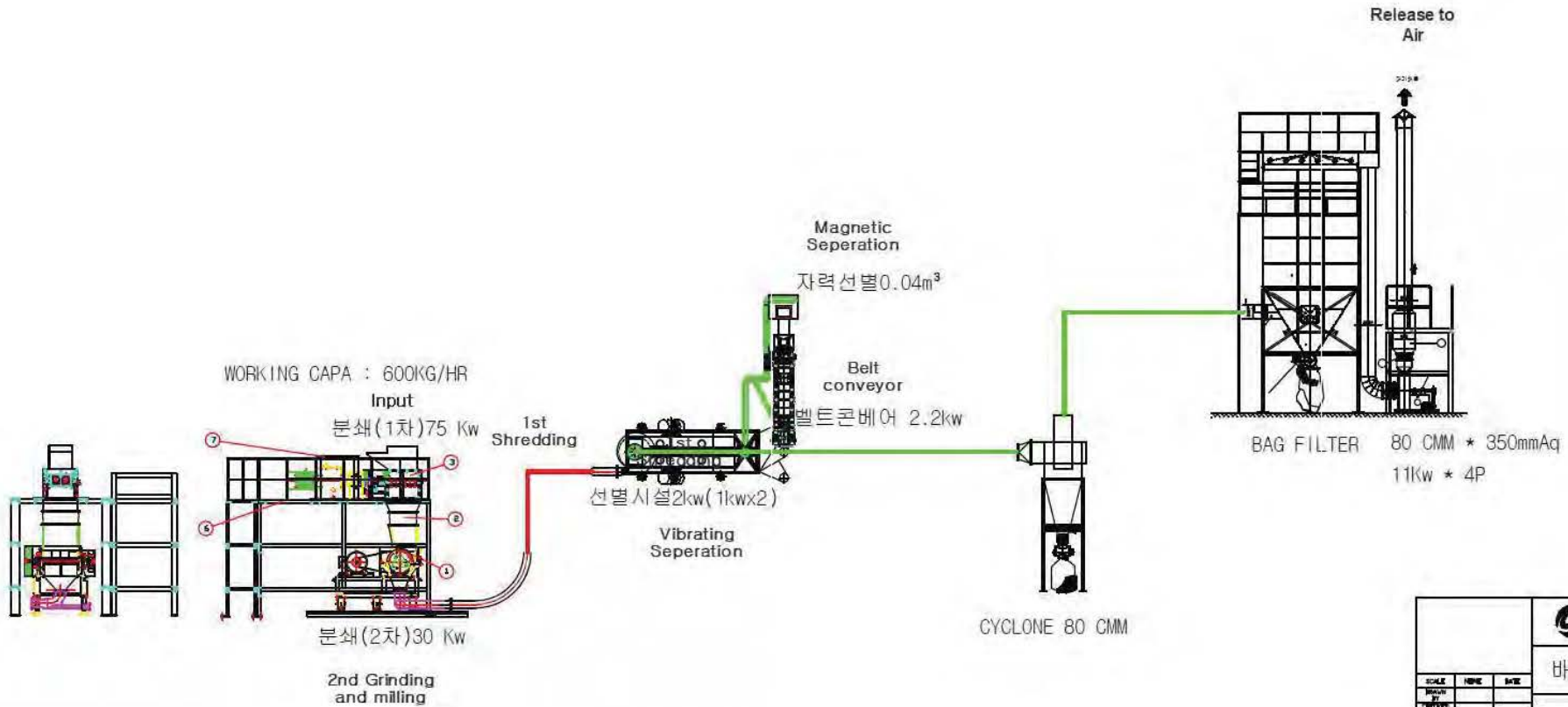
1 Process Flow Diagram
M404D Scale: NTS


**Attachment C-1
Rotary Dryer Flow Diagram**

CLIENT PROJECT NO. XX-XX-XX-XX-XX-XX-XX	IBI PROJECT 120024	PROJECT TITLE SUNGEEL MCC AMERICAS, LLC SMCC LIB RECYCLING FACILITY	SHEET TITLE Process Flow Diagram
REFERENCE DRAWING	DRAWN BY WH	HURON CAMPUS BUILDING 259	HURON CAMPUS BUILDING 259
DATE 09/03/19	SCALE 1/8" = 1'-0"	SHEET NO. M404D	ISSUE
DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING AND VERIFYING ALL THE DIMENSIONS AND CONDITIONS TO THE PROJECT IN WRITING BEFORE PROCEEDING WITH THE WORK.			
IBI GROUP 8000 South Street, Suite 400 Bldg Count, NY 13090 USA Tel: (607)772-0007 Fax: (607)772-4121 ibigroup.com			

ATTACHMENT C2

NO. 2 MACHINE FLOW DIAGRAM



 배터리 파쇄공정		
DATE 2024	DRAWN BY CHECKED BY APPROVAL EUDY	DATE 2024

Attachment C2
No. 2 Machine Flow Diagram

ATTACHMENT D

PILOT EXHAUST GAS ANALYSIS

Exhaust gas quality analysis by product type

Item	unit	Cylindrical LI-ion battery cell	Polymer LI-ion Battery cell	Prismatic LI-ion Battery Cell
Dust/먼지	mg/Sm3	N.D	N.D	N.D
Sulfuric acid/황산화물(SOx)	ppm	N.D	N.D	N.D
Nitrogen oxide/질소산화물(NOx)	ppm	N.D	N.D	N.D
Carbon monoxide /일산화탄소(CO)	ppm	N.D	N.D	N.D
Smoke concentration/ 매연	Level	N.D	N.D	N.D
Ammonia /암모니아(NH ₃)	ppm	37.27	155.92	42.19
Fluoride compound /불소화물	ppm	N.D	N.D	N.D
Hydrogen chloride /염화수소	ppm	24.3	N.D	N.D
Hydrocarbon/ 탄화수소	ppm	N.D	N.D	N.D
Formaldehyde/ 포름알데히드	ppm	1.268	0.073	N.D
Benzene/벤젠	ppm	N.D	N.D	N.D
Mercury (Hg)수은	mg/Sm3	N.D	N.D	N.D
Cadmium (Cd) 카드뮴	mg/Sm3	0.153	0.092	N.D
Copper (Cu) 구리	mg/Sm3	0.08	1.21	N.D
Lead (Pb) 납	mg/Sm3	N.D	N.D	N.D
Nickel (Ni) 니켈	mg/Sm3	0.22	3.632	0.113

ATTACHMENT E

FULL SCALE
EXHAUST GAS ANALYSIS

Exhaust gas quality analysis from RK Dryer system

: Tested actual operating condition with various Lithium ion battery cells : Nov 19, 2018

Item	unit	Amount	Remark
PM-2.5 Dust/먼지	mg/Sm3	0.4	Dust measurement method
PM-10 Dust/먼지	mg/Sm3	0.9	Dust measurement method
Sulfuric acid/황산화물(SOx)	ppm	1.0	Optima7(MRU)
Nitrogen oxide/질소산화물(NOx)	ppm	9.0	Optima7(MRU)
Hydrocarbon/ 탄화수소	ppm	34.59	FID
Ammonia /암모니아(NH3)	ppm	N.D	Titration method
Fluoride compound /불소화물	ppm	0.10	Titration method
Hydrogen chloride /염화수소	ppm	N.D	Ultraviolet Visible Spectroscopy, UV-Vis (Mercuric Thiocyanate method)
Mercury (Hg)수은	mg/Sm3	N.D	Ultraviolet Visible Spectroscopy, UV-Vis
Formaldehyde/ 포름알데히드	ppm	0.054	High-performance liquid chromatography-HPLC
Aluminum(Al) 알루미늄	mg/Sm3	N.D	Inductively coupled plasma atomic emission spectroscopy -ICP
Arsenic (As) 비소	mg/Sm3	N.D	
Beryllium (Be)베릴륨	mg/Sm3	N.D	
Cadmium (Cd) 카드뮴	mg/Sm3	N.D	
Chromium (Cr) 크로뮴	mg/Sm3	0.0002	
Cobalt (Co) 코발트	mg/Sm3	N.D	
Copper (Cu) 구리	mg/Sm3	N.D	
hexavalent chromium 6가크롬	mg/Sm3	0.0002	
Lead (Pb) 납	mg/Sm3	N.D	
Lithium (Li) 리튬	mg/Sm3	N.D	
Manganese (Mn) 망간	mg/Sm3	N.D	
Nickel (Ni) 니켈	mg/Sm3	N.D	
Vanadium (V) 바나듐	mg/Sm3	N.D	

시험 성적서							
① 의뢰인	상 호(기관명)	성일하이텍(주)		대표(의뢰인)	대 표 이 사		
	소 재 지(주소)	군산시 군산산단로 143-20		환경 기술인	환경 담당자		
	업 종	기타기초무기화합물질제조업(20129)		사업장 종	2종(특)		
② 의뢰내용	측 정 용 도	자가측정 시험용					
	시 설 별	건조시설 (10.8m)					
	대상의 환경 (측정지점)	흡수예의한시설 (200m ³ /min)			배출구별 종	5종(특)	
의뢰 항목	PM-2.5, PM-10, 황산화물, 질소산화물, 탄화수소, 암모니아, 불소, 염화수소, 수은, 포름알데히드, 알루미늄, 비소, 베릴륨, 카드뮴, 크롬, 코발트, 구리, 6가크롬, 납, 리튬, 망간, 니켈, 바나듐						
③ 시료채취	현장 기상	기상	기온	습도	기압	풍향	
		맑음	8.6 °C	71.5 %	760mmHg	서북서	1.0 m/s
	배출 가스	배출가스 유형		산소농도	기타		
		128.16 Sm ³ /분	해당없음		배출가스 온도	유 속	수분량
	채취자의견	-					
채취 일시	2018년 11월 19일	시료채취자		산 실 권 의 1 (서명)			
④ 측정분석 결과	측정항목	관련 기준	측정분석 값	측정시간 (환경질에만 해당함)	측정분석방법 (기기명)	비 고	
	- 별 도 첨 부 -						
	분석기간	2018.11.19 ~ 2018.11.21	분석책임자		안 석 환 (서명)		
⑤ 종합 의견	※ 측정항목 중 미세먼지(PM10, PM2.5)는 대기오염공정시험기준의 배출가스 중 미세먼지 측정법(ES01317.1)에 따라 측정함 같으므로, 습식 방식시설을 사용하는 경우 배출가스가 포화 수증기 상태에서는 수분의 영향으로 측정오차가 클 수 있음.						
위와 같이 측정분석결과를 사실대로 기록합니다. 2018년 11월 23일 상 호 주식회사 새롬에너지 소재지 및 연락처 전북 전주시 덕진구 오성동 139(안평동) T : 063)276-7586 F : 063)276-7587 대표자 성명 이길용 (서명)							

210mm×297mm[일반용지 60g/m²(재활용품)]

[별첨]

측정항목	관련 기준	측정분석 값	측정시간 (환경질에만 해당함)	측정분석방법 (기기명)	비 고
PM-2.5 (mg/Sm ³)	- 이하	0.4	~	미세먼지측정법	
PM-10 (mg/Sm ³)	- 이하	0.9	~	미세먼지측정법	
황산화물 (ppm)	400 이하	1.0	~	전기화학식 Optima7(MRU)	
질소산화물 (ppm)	200 이하	9.0	~	전기화학식 Optima7(MRU)	
탄화수소 (ppm)	- 이하	34.59	~	FID	
암모니아 (ppm)	50 이하	불검출	~	적정법	
불소화물 (ppm)	3 이하	0.10	~	적정법	
염화수소 (ppm)	6 이하	불검출	~	자외선가시선분광법 (싸이오시안산제이수은법)	
수은 (mg/Sm ³)	2 이하	불검출	~	자외선가시선분광법	
포름알데히드 (ppm)	10 이하	0.054	~	고성능액체크로마토그래프법 (HPLC)	
알루미늄 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
비소 (mg/Sm ³)	2 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
베릴륨 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
카드뮴 (mg/Sm ³)	0.5 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
크롬 (mg/Sm ³)	0.5 이하	0.0002	~	우도갈철플라즈마 원자발광광도법(ICP)	
코발트 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
구리 (mg/Sm ³)	5 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
6가크롬 (mg/Sm ³)	- 이하	0.0002	~	우도갈철플라즈마 원자발광광도법(ICP)	
납 (mg/Sm ³)	1 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
리튬 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
망간 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
니켈 (mg/Sm ³)	2 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	
바나듐 (mg/Sm ³)	- 이하	불검출	~	우도갈철플라즈마 원자발광광도법(ICP)	

Attachment E
Full-Scale Exhaust Gas Analysis

ATTACHMENT F

KOREA DIOXIN TEST RESULTS SUMMARY

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SMCC LIB Recycling Facility State Facility Permit Application

Korea Dioxin Emission Test Results June 2019

An emissions test for dioxins was conducted on April 30, 2019 at the SungEel HiTech facility in Yi Kangmyung, Korea. The Korean facility is an operating Lithium-Ion (Li-Ion) battery recycling facility that was the prototype and model for the proposed SMCC LIB Recycling Facility. The purpose of the test was to assess the potential for dioxin emissions at the proposed facility.

The emissions sample was collected from the process at the scrubber stack after the emission controls including the afterburner, baghouse and wet scrubber, the same as proposed for the Endicott facility. The products processed and rotary kiln operating parameters during the test were recorded at SungEel HiTech and are shown on Attachment A. The facility processed several types of Li-Ion batteries during the test at an average feed rate of 2,070 pounds per hour, similar to the maximum feed rate of 2,200 pounds proposed for Endicott. The rotary kiln operated in a range of 640°C to 657°C and the afterburner in a range from 781°C to 844°C, similar to the operating temperatures proposed for Endicott of 550°C to 600°C for the rotary kiln and 800°C for the afterburner.

The sample was analyzed by Europhins Laboratory for polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF), and results were reported for individual compounds and the International Toxic Equivalency Factor (I-TEF). The total PCDD/PCDF concentration was reported at 0.016 nanograms I-TEQ per standard cubic meter (ng/I-TEQ/Sm³.) The individual compounds detected and the I-TEQ calculations are shown in Attachment C.

For evaluation purposes only, these results were compared to 40CFR 60 Subpart CCCC-Emission Limitations for Incinerators, which is not applicable to the proposed facility. The EPA emission limit for incinerators is 0.13 ng/I-TEQ/Sm³ compared to the results from the SungEel facility in Korea of 0.016 ng/I-TEQ/Sm³. These results indicate the emissions of PCDD/PCDF from the proposed facility would be approximately 12% of the EPA incinerator limit.

The PCDD/PCDF emission concentration will be included on the State facility permit application. Based on these findings, no further evaluation of dioxin emissions from the proposed facility appears to be warranted.

ATTACHMENT A

Dioxin test RK process parameters (4/30/2019)

Cell type	Input time	Input weight(kg)	RK temperature		2nd bunner temp(Avg)
			Setting	Monitoring(Avg)	
Cylindrical cell	10:18	656	600°C	610.2°C	844.8°C
	10:53	500			
Prismatic cell	11:35	230	600°C	603.5°C	800.3°C
Prismatic cell (Can type)	11:55	1474			
Prismatic cell without case(Jelly roll)	13:25	354			
Pouch cell (EV)	13:51	424			
Polymer cell (Smartphone)	14:24	231	650°C	657.2°C	780.9°C
	14:32	202			
	14:53	240			
Total	4hr 35min	4311			

성적서 번호 : S190430-00204

기술책임자 : 강윤석 



시험 성적서 [TESTING REPORT]

시험의뢰목적 <small>Testing Purpose</small>	일반 연구용 <small>General Purpose</small>			
시험 기관 <small>Testing Company</small>	(주)한국유로핀즈 분석서비스(경기도 안양시 동안구 안양천동로 60)			
의뢰인 <small>Client</small>	기관명 <small>Company Name</small>	성일하이텍(주) <small>SungEel HiTech</small>	대표자(의뢰자) <small>Name</small>	이강명 <small>Yi Kangmyung</small>
	주소 <small>Address</small>	전라북도 군산시 군산산단로 143-20(비응도동)		
시료 채취일 <small>Date of measurement</small>	2019년 4월 30일	시설 용량 <small>Capacity of facility</small>	-	
시료 분석기간 <small>Analysis period</small>	2019. 04. 30 ~ 2019. 05. 23	시험종료일 <small>End date</small>	2019. 05. 23	
시험 방법 <small>Analysis method</small>	10902.1 배출가스 시료 중 비의도적 잔류성유기오염물질(LUPOPs) 동시 시험기준(HRGC/HRMS)			
기기 조건 <small>Condition</small>	HRGC/HRMS (Jeol-800D) Resolution : 10000 이상, SIM Mode			
시설명(시료명) <small>Name of facility</small>	로타리 킬른 <small>Rotary Kiln</small>			

귀하가 당사에 시험 의뢰한 결과는 다음과 같습니다.

분석 항목 <small>Analysis item</small>	기준	결과 <small>Result</small>	비고
PCDDs/DFs	-	0.016 ng I-TEQ/Sm ³	-

- 본 시험성적서는 의뢰한 시료에 한하며, 잔류성유기오염물질관리법 제19조 규정에 의한 분석결과서 및 기타 선전, 소송 등의 목적으로 사용할 수 없음.

2019년 5월 23일

(주)한국유로핀즈 분석서비스



본 시험성적서는 잔류성유기오염물질관리법 시행규칙 제14조제1항제4호에 의거한 잔류성유기오염물질측정기관이 측정/분석한 결과입니다.

8. 2,3,7,8-치환이성체 다이옥신 농도

업체명	성일하이텍(주)	시료명	로타리 킬른		
시료채취일	2019. 04. 30	접수번호	S190430-00204		
표준산소농도(%)	비소각 -	실측산소농도(%)	-		
시료채취량(Sm ³)	3.16	회석배수	5		
		분석결과			
		실측농도 (pg/Sm ³)	산소농도 환산농도 (C) ¹⁾	독성등가 환산계수 ²⁾ (I-TEF)	독성등가 환산농도 ³⁾ (ng I-TEQ/Sm ³)
다이옥신류 (PCDDs)	2378-T4CDD	0.000	0.000	1	0.0000
	12378-P5CDD	0.000	0.000	0.5	0.0000
	123478-H6CDD	0.000	0.000	0.1	0.0000
	123678-H6CDD	0.000	0.000	0.1	0.0000
	123789-H6CDD	0.000	0.000	0.1	0.0000
	1234678-H7CDD	8.792	8.792	0.01	0.0001
	O8CDD	9.605	9.605	0.001	0.0000
	Total PCDDs	18.396	18.396		0.0001
퓨란류 (PCDFs)	2378-T4CDF	55.330	55.330	0.1	0.0055
	12378-P5CDF	13.244	13.244	0.05	0.0007
	23478-P5CDF	19.922	19.922	0.5	0.0100
	123478-H6CDF	0.000	0.000	0.1	0.0000
	123678-H6CDF	0.000	0.000	0.1	0.0000
	234678-H6CDF	0.000	0.000	0.1	0.0000
	123789-H6CDF	0.000	0.000	0.1	0.0000
	1234678-H7CDF	17.392	17.392	0.01	0.0002
	1234789-H7CDF	0.000	0.000	0.01	0.0000
	O8CDF	16.108	16.108	0.001	0.0000
	Total PCDFs	121.997	121.997		0.0163
Total (PCDDs+PCDFs)	140.394	140.394		0.016	

1) 산소농도 환산계수: 산소농도를 12%로 환산한 다이옥신 농도 (pg/sm³ as O₂=12%)

$$\text{계산식 : } \quad \text{실측농도} \times \frac{(21 - \text{표준산소농도 \%})}{(21 - \text{실측산소농도 \%})}$$

2) I-TEF : The international toxicity equivalency factor

3) 산소농도 보정농도에 독성등가계수를 적용하여 환산한 농도 (ng I-TEQ/Sm³ as 2,3,7,8-T4CDD)

ATTACHMENT G

AERSCREEN DISPERSION MODELING RESULTS

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SMCC LIB Recycling Facility State Facility Permit Application

AERSCREEN Dispersion Modeling Results September 2019

Air dispersion modeling was completed to evaluate potential impacts to ambient air quality from the emissions from the proposed SMCC LIB Recycling Facility. Modeling was completed for air contaminants with emissions greater than 100 pounds per year, as requested by the New York State Department of Environmental Conservation (DEC), using their AERSCREEN dispersion model. AERSCREEN is a screen-level air quality model based on the United States Environmental Protection Agency (EPA) air dispersion model AERMOD. AERSCREEN uses conservative meteorological parameters to predict ambient air concentrations attributed to a single source. Results are compared to the DEC's Annual Guidance Concentration (AGCs) and Short-Term Guidance Concentrations (SGCs) included in *DAR-1 Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212*.

Emissions of five air contaminants are estimated to exceed 100 pounds per year, including Carbon Dioxide, Carbon Monoxide, Hydrocarbons, Nitrogen Oxide and Sulfuric Acid (refer to *Table 5 – Facility Emissions Summary*). Modeling of Carbon Dioxide and Carbon Monoxide is not required by the DEC. The modeling was completed for Nitrogen Oxide and Sulfuric Acid emissions. Hydrocarbon emissions were not modeled since emissions are relatively low and there are no AGCs or SGCs for non-specific hydrocarbons.

The modeled emissions are from the rotary kiln (RK) dryer combustion and process emission points 0001A and 0001B, respectively. Both emission points are existing stacks with a stack height of 111 feet and diameter of 30 inches. Emissions of Sulfuric Acid are from EP 0001B at

0.094 pounds per hour. Emissions of Nitrogen Oxide are from both emission points with total emissions of 2.06 pounds per hour. The Nitrogen Oxide emissions were modeled as if they were all from emission point 0001B to simplify the modeling. This method would overestimate impacts and is considered a conservative estimate of the impacts.

The main building dimensions at roof level are approximately 219 feet (north-south) by 144 feet (east-west) and the roof height is 52 feet. The stack for EP 0001B is located at an angle of 15° from the long side of the building and 70 feet from the building center. The location of the stacks and project area are shown on *Figure 3 – Aerial Photo Plan*.

The model was run with localized terrain features without including Nitrogen Oxide conversion to Nitrous Oxide adjustment as a conservative initial screening of the impacts. The results of the AERSCREEN modeling showed that emissions of Nitrogen Oxide would result in impacts of 34% and 6% of the SGC and AGC, respectively. Similarly, the sulfuric acid emission would result in impacts of 2% and 29% of the SGC and AGC, respectively. The *AERSCREEN Model Output Reports* are attached and the results are summarized in *Table 6 – Dispersion Modeling Results*.

Based on these results, the predicted impacts to air quality are within acceptable levels and no further air quality impact assessment is recommended.

TITLE: SMCC3_H2SO4_new

***** STACK PARAMETERS *****

```

SOURCE EMISSION RATE:      0.0110 g/s           0.087 lb/hr
STACK HEIGHT:              33.83 meters        111.00 feet
STACK INNER DIAMETER:     0.762 meters         30.00 inches
PLUME EXIT TEMPERATURE:  310.9 K              100.0 Deg F
PLUME EXIT VELOCITY:     6.727 m/s           22.07 ft/s
STACK AIR FLOW RATE:      6500 ACFM
STACK BASE LONGITUDE:    -76.0534 deg         412903. Easting
STACK BASE LATITUDE:     42.1074 deg         4662236. Northing
STACK BASE UTM ZONE:     18
REFERENCE DATUM (NADA):  4
STACK BASE ELEVATION:    259.99 meters        853.00 feet
RURAL OR URBAN:         RURAL

FLAGPOLE RECEPTOR HEIGHT:  9.14 meters        30.00 feet

DIGITAL ELEVATION MAP(S)   "C:\AERSCREEN\NLCD_files\img1.tif"
                           "C:\AERSCREEN\NLCD_files\grdn42w077_131.tif"
                           "C:\AERSCREEN\NLCD_files\grdn43w076_11.tif"
                           "C:\AERSCREEN\NLCD_files\grdn44w076_11.tif"
                           "C:\AERSCREEN\NLCD_files\grdn44w077_11.tif"

INITIAL PROBE DISTANCE =   10000. meters        32808. feet
    
```

***** BUILDING DOWNWASH PARAMETERS *****

```

BUILDING HEIGHT:          15.8 meters        52.0 feet
MAX BUILDING DIMENSION:  57.3 meters        188.0 feet
MIN BUILDING DIMENSION:  43.9 meters        144.0 feet
BUILDING ORIENTATION TO NORTH:  0. degrees
STACK DIRECTION FROM CENTER:  15. degrees
STACK DISTANCE FROM CENTER: 21.3 meters        70.0 feet
    
```

***** FLOW SECTOR ANALYSIS *****

25 meter receptor spacing: 1. meters - 5000. meters
50 meter receptor spacing: 5050. meters - 10000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAXIMUM 1-HR CONC (ug/m3)	IMPACT DIST (m)	RECEPTOR HEIGHT (m)	TEMPORAL PERIOD
10	53.17	64.05	-53.28	1.86	1.326	25.0	-4.16	SUM
20	60.84	68.86	-55.68	-1.86	2.171	50.0	-3.52	SUM

30	66.66	71.57	-56.40	-5.52	1.809	25.0	-4.20	SUM
40	70.45	72.11	-55.39	-9.02	1.921	25.0	-4.22	SUM
50	72.11	70.45	-52.71	-12.24	2.018	25.0	-4.23	SUM
60	71.57	66.66	-48.42	-15.09	2.033	25.0	-4.23	SUM
70	68.86	60.84	-42.66	-17.48	1.976	25.0	-4.23	SUM
80	64.05	53.17	-35.61	-19.34	1.035	3775.0	26.39	WIN
90	57.30	43.89	-27.47	-20.61	0.8490	300.0	-3.87	WIN
100	64.05	53.17	-28.45	-21.26	0.9373	25.0	-4.23	SUM
110	68.86	60.84	-28.56	-21.26	1.530	50.0	-4.23	SUM
120*	71.57	66.66	-27.81	-20.61	2.684	75.0	-4.23	SUM
130	72.11	70.45	-26.21	-19.34	1.922	50.0	-4.23	SUM
140	70.45	72.11	-23.82	-17.48	1.950	50.0	-4.23	SUM
150	66.66	71.57	-20.70	-15.09	1.952	75.0	-4.23	AUT
160	60.84	68.86	-16.95	-12.24	1.925	75.0	-4.23	WIN
170	53.17	64.05	-12.69	-9.02	1.840	75.0	-4.23	SUM
180	43.89	57.30	-8.04	-5.52	1.065	3900.0	26.55	WIN
190	53.17	64.05	-10.77	-1.86	1.910	75.0	-4.23	SUM
200	60.84	68.86	-13.17	1.86	1.943	75.0	-4.23	AUT
210	66.66	71.57	-15.17	5.52	1.988	75.0	-4.23	AUT
220	70.45	72.11	-16.71	9.02	2.054	75.0	-4.23	WIN
230	72.11	70.45	-17.75	12.24	2.076	75.0	-4.21	AUT
240	71.57	66.66	-18.24	15.09	2.040	50.0	-3.83	AUT
250	68.86	60.84	-18.18	17.48	1.756	50.0	-3.26	WIN
260	64.05	53.17	-17.57	19.34	1.688	250.0	24.90	WIN
270	57.30	43.89	-16.42	20.61	1.838	225.0	23.32	WIN
280	64.05	53.17	-24.72	21.26	1.828	225.0	24.18	WIN
290	68.86	60.84	-32.28	21.26	1.785	225.0	24.17	WIN
300	71.57	66.66	-38.85	20.61	2.206	25.0	-3.91	SUM
310	72.11	70.45	-44.24	19.34	2.288	25.0	-4.01	SUM
320	70.45	72.11	-48.29	17.48	2.224	25.0	-4.15	SUM
330	66.66	71.57	-50.87	15.09	1.990	25.0	-4.07	SUM
340	60.84	68.86	-51.91	12.24	1.659	25.0	-4.12	SUM
350	53.17	64.05	-51.36	9.02	1.620	2300.0	26.90	WIN
360	43.89	57.30	-49.26	5.52	1.041	475.0	26.91	WIN

* = worst case flow sector

 ***** MAKEMET METEOROLOGY PARAMETERS *****

MIN/MAX TEMPERATURE: 249.8 / 310.9 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
 DOMINANT CLIMATE TYPE: Average Moisture
 DOMINANT SEASON: Summer

ALBEDO: 0.16
 BOWEN RATIO: 2.00
 ROUGHNESS LENGTH: 1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADJUSTED

 METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR
 -- -- -- -- --
 10 03 06 6 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
62.33	0.238	0.600	0.020	132.	267.	-20.7	1.000	2.00	0.16	1.00

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 1.4 m/s
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 33.8 meters
 ESTIMATED FINAL PLUME RISE (non-downwash): 5.1 meters
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 39.0 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR
 -- -- -- -- --
 10 03 18 6 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
178.22	0.269	1.200	0.020	370.	321.	-10.5	1.000	2.00	0.16	1.00

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 1.4 m/s
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 33.8 meters
 ESTIMATED FINAL PLUME RISE (non-downwash): 11.4 meters
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 45.2 meters

***** AERSCREEN AUTOMATED DISTANCES *****
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	RECEPTOR HEIGHT (m)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	RECEPTOR HEIGHT (m)
1.00	1.538	-4.23	3775.00	1.035	26.39
25.00	2.288	-4.01	3800.00	0.8180	21.59
50.00	2.171	-3.52	3825.00	0.5478	53.86
75.00	2.684	-4.23	3850.00	0.6836	20.71
100.00	1.433	4.12	3875.00	1.030	23.53
125.00	1.543	6.37	3900.00	1.065	26.55
150.00	1.565	9.31	3925.00	0.8573	28.66
175.00	1.657	16.37	3950.00	0.5603	30.94
200.00	1.764	19.69	3975.00	0.5320	31.15
225.00	1.838	23.32	4000.00	0.5238	31.19
250.00	1.783	28.08	4025.00	1.034	26.17
275.00	1.592	28.18	4050.00	1.036	24.90

300.00	1.458	31.95	4075.00	1.023	24.71
325.00	1.347	31.27	4100.00	1.023	25.05
350.00	1.254	25.59	4125.00	1.017	25.51
375.00	1.191	29.16	4150.00	0.9719	26.72
400.00	1.127	31.41	4175.00	0.7427	29.20
425.00	1.069	22.63	4200.00	0.9142	23.38
450.00	1.028	25.98	4225.00	0.9801	26.00
475.00	1.041	26.91	4250.00	0.8045	28.51
500.00	0.9848	28.60	4275.00	0.5232	31.03
525.00	0.9520	29.43	4300.00	0.5421	20.11
550.00	0.9204	29.70	4325.00	0.8381	22.86
575.00	0.9223	29.62	4350.00	0.9409	24.71
600.00	0.9385	29.63	4375.00	0.9449	25.41
625.00	0.8377	30.60	4400.00	0.8700	27.36
650.00	0.8101	31.86	4425.00	0.5808	30.38
675.00	0.8474	21.91	4450.00	0.4816	53.81
700.00	0.9409	23.05	4475.00	0.4293	47.90
725.00	1.033	24.64	4500.00	0.4693	50.40
750.00	1.049	25.02	4525.00	0.8983	24.93
775.00	1.063	26.14	4550.00	0.5138	30.92
800.00	1.061	26.14	4575.00	0.4771	19.76
825.00	1.057	25.94	4600.00	0.4934	19.94
850.00	1.049	25.80	4625.00	0.5147	20.17
875.00	1.042	26.16	4650.00	0.5755	20.79
900.00	0.9964	27.76	4675.00	0.8543	24.64
925.00	0.8830	29.50	4700.00	0.7991	27.43
950.00	0.8073	30.35	4725.00	0.8478	24.89
975.00	0.8778	27.80	4750.00	0.8128	23.98
1000.00	0.8246	23.43	4775.00	0.8389	25.08
1025.00	0.8759	45.84	4800.00	0.8194	26.50
1050.00	0.9138	46.85	4825.00	0.7851	27.22
1075.00	0.9268	47.45	4850.00	0.7324	28.04
1100.00	0.9504	48.73	4875.00	0.6422	29.18
1125.00	0.9539	50.18	4900.00	0.7907	26.73
1150.00	0.9321	51.59	4925.00	0.7678	23.82
1175.00	0.9067	52.28	4950.00	0.7344	23.28
1200.00	0.8863	52.60	4975.00	0.7061	22.90
1225.00	0.8614	53.04	5000.00	0.7697	24.25
1250.00	0.8067	54.47	5050.00	0.7715	26.34
1275.00	0.8060	22.99	5100.00	0.6451	22.32
1300.00	0.8209	22.91	5150.00	0.7379	26.86
1325.00	0.8896	23.32	5200.00	0.7224	24.02
1350.00	1.007	24.91	5250.00	0.7391	25.10
1375.00	1.003	25.85	5300.00	0.7292	25.05
1400.00	0.9285	26.85	5350.00	0.4109	31.53
1425.00	0.7719	50.00	5400.00	0.2882	44.47
1450.00	0.7440	48.40	5450.00	0.4967	20.92
1475.00	0.7067	28.73	5500.00	0.6936	26.10
1500.00	0.7049	24.16	5550.00	0.3860	54.60
1525.00	0.7119	25.35	5600.00	0.5047	29.98
1550.00	0.7005	48.43	5650.00	0.6524	26.97
1575.00	0.7034	49.76	5700.00	0.3008	33.02
1600.00	0.9208	26.91	5750.00	0.6440	26.72
1625.00	0.6824	50.97	5800.00	0.4371	20.52
1650.00	0.7136	26.27	5850.00	0.3904	19.88
1675.00	0.7434	25.88	5900.00	0.5155	21.91
1700.00	0.7624	25.64	5950.00	0.4946	29.66
1725.00	0.7847	25.20	6000.00	0.4757	21.40
1750.00	0.7905	25.27	6050.00	0.5705	27.87
1775.00	1.108	27.07	6100.00	0.5644	27.88
1800.00	1.009	22.32	6150.00	0.5669	27.64
1825.00	1.356	25.16	6200.00	0.3545	52.11
1850.00	1.370	24.63	6250.00	0.3440	50.37

1875.00	1.332	23.91	6300.00	0.3451	50.96
1900.00	1.278	23.40	6350.00	0.3644	31.49
1925.00	1.271	23.27	6400.00	0.3410	53.79
1950.00	1.285	23.27	6450.00	0.3358	31.94
1975.00	1.317	23.39	6500.00	0.5091	28.27
2000.00	1.400	23.88	6550.00	0.5187	23.59
2025.00	1.385	23.68	6600.00	0.3287	50.78
2050.00	1.363	23.46	6650.00	0.3309	52.33
2075.00	1.494	24.58	6700.00	0.5330	26.17
2100.00	1.417	26.39	6750.00	0.5291	25.69
2125.00	1.211	27.59	6800.00	0.5024	27.53
2150.00	1.062	21.69	6850.00	0.4755	23.15
2175.00	1.595	24.45	6900.00	0.4558	28.81
2200.00	1.559	26.09	6950.00	0.2494	61.70
2225.00	1.383	27.20	7000.00	0.2461	62.06
2250.00	1.347	27.40	7050.00	0.2858	48.21
2275.00	1.476	26.76	7100.00	0.3090	51.72
2300.00	1.620	26.90	7150.00	0.3640	20.88
2325.00	1.386	22.35	7200.00	0.4201	22.37
2350.00	1.198	22.39	7250.00	0.4559	23.72
2375.00	1.522	25.71	7300.00	0.4650	27.17
2400.00	1.351	27.47	7350.00	0.2992	52.40
2425.00	0.8675	24.74	7400.00	0.2970	52.13
2450.00	1.718	24.47	7450.00	0.2951	52.40
2475.00	0.8370	24.24	7500.00	0.2913	51.35
2500.00	0.7370	22.52	7550.00	0.3514	21.13
2525.00	0.5313	20.59	7600.00	0.4470	26.64
2550.00	0.7129	51.12	7650.00	0.3182	31.30
2575.00	0.8920	21.13	7700.00	0.2832	53.77
2600.00	1.352	26.87	7750.00	0.2830	51.93
2625.00	0.7787	23.16	7800.00	0.2815	52.24
2650.00	0.8039	23.66	7850.00	0.2769	51.01
2675.00	1.109	28.22	7900.00	0.2552	48.18
2700.00	1.419	24.05	7950.00	0.3076	31.28
2725.00	1.163	22.35	8000.00	0.4180	25.20
2750.00	1.440	26.37	8050.00	0.2497	19.02
2775.00	1.332	23.19	8100.00	0.1794	68.22
2800.00	1.395	23.58	8150.00	0.1885	66.63
2825.00	1.487	25.04	8200.00	0.1958	64.89
2850.00	0.8961	21.09	8250.00	0.3219	30.50
2875.00	1.014	21.52	8300.00	0.3928	24.64
2900.00	1.183	22.33	8350.00	0.2718	31.94
2925.00	1.016	21.69	8400.00	0.2551	54.71
2950.00	1.016	21.71	8450.00	0.2541	54.58
2975.00	1.001	21.66	8500.00	0.2482	32.54
3000.00	0.9603	21.48	8550.00	0.3011	30.80
3025.00	1.199	22.60	8600.00	0.3380	29.34
3050.00	1.338	26.88	8650.00	0.3245	29.80
3075.00	1.232	23.05	8700.00	0.2905	30.98
3100.00	1.339	23.99	8750.00	0.2599	31.96
3125.00	1.379	24.75	8800.00	0.2989	21.38
3150.00	1.361	25.88	8850.00	0.3313	22.81
3175.00	1.266	26.92	8900.00	0.3379	23.28
3200.00	1.176	27.56	8950.00	0.3341	23.21
3225.00	1.021	28.50	9000.00	0.3315	23.20
3250.00	0.8581	29.41	9050.00	0.3419	24.03
3275.00	0.6648	30.52	9100.00	0.3487	24.98
3300.00	0.9145	21.53	9150.00	0.3492	25.74
3325.00	1.093	24.60	9200.00	0.3436	26.98
3350.00	1.318	25.01	9250.00	0.3245	28.49
3375.00	1.188	23.55	9300.00	0.3076	29.34
3400.00	1.240	24.26	9350.00	0.3321	27.50
3425.00	1.263	25.29	9400.00	0.2540	31.53

3450.00	1.235	26.01	9450.00	0.1842	45.24
3475.00	1.242	25.45	9500.00	0.2283	53.12
3500.00	1.229	24.67	9550.00	0.2105	48.20
3525.00	1.247	25.65	9600.00	0.2258	51.91
3550.00	1.214	25.40	9650.00	0.2695	21.52
3575.00	1.205	25.20	9700.00	0.2227	32.48
3600.00	1.179	26.07	9750.00	0.2702	30.39
3625.00	1.077	27.32	9800.00	0.3150	27.05
3650.00	1.166	24.51	9850.00	0.3147	26.64
3675.00	1.167	24.79	9900.00	0.3033	27.98
3700.00	0.7538	29.68	9950.00	0.2948	28.54
3725.00	0.7823	28.85	10000.00	0.3089	25.76
3750.00	0.9127	27.76			

 ***** AERSCREEN MAXIMUM IMPACT SUMMARY *****

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
ELEVATED TERRAIN	2.684	2.684	2.416	1.610	0.2684

DISTANCE FROM SOURCE 75.00 meters directed toward 120 degrees
 RECEPTOR HEIGHT -4.23 meters

IMPACT AT THE
 AMBIENT BOUNDARY 1.538 1.538 1.385 0.9230 0.1538

DISTANCE FROM SOURCE 1.00 meters directed toward 50 degrees
 RECEPTOR HEIGHT -4.23 meters

TABLES

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

Table 1 - Process, Controls and Emission Points Organization

Process Equipment	Emission Source/Controls	Emission Point No.	Process	Emission Unit
RK Furnace (NG-fired rotary kiln drying)	RKDRY	0001A	DRY	1-RECYC
RK Afterburner (NG-fired afterburner)	RKAFB	0001B		
RK Baghouse Filter	RKBGF			
RK Wet Scrubber	RKSCR			
RK Unloading Bin (conveyor bin for dried cells)	RKBIN	00002	BIN	
RK Unloading Bin (dust control fabric filter)	BINFF			
No. 2A Machine (shredding, grinding and separation)	2MC-A	00003	GRD	
No. 2A Machine (cyclone separator)	2MCAC			
No. 2A Machine (dust control fabric filter)	2MCAF			
No. 2B Machine (shredding, grinding and separation)	2MC-B	00004		
No. 2B Machine (cyclone separator)	2MCBC			
No. 2B Machine (dust control fabric filter)	2MCBF			

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

**Table 2A - RK Dryer Combustion Emissions Estimate
EP# 0001A**

PROCESS DESCRIPTION:

Lithium-Ion Battery Cell Dryer

Natural Gas-Fired Rotary Dryer that indirectly heats spent LIB units prior to grinding.
Exhaust gases do not contact LIB units.

NG Burner Heat Input:		
	10,800,000	BTU/hr
	10.800	MMBTU/hr
NG Firing Rate:	10,547	cf per hour
Hours of operation:	12	hours per day
	7	days per week
	50	weeks per year
	4200	hours per year
	99.9%	Control efficiency of bag house
	90.0%	Control efficiency of wet scrubber

EMISSIONS ESTIMATE:

USEPA AP-42-Compilation of Emission Factors
Tables 1.4.1 and 1.4.2 - Natural Gas Combustion

CALCULATIONS:

Emissions are equal to emission factor times heat input.

CAS Number	Contaminant Name	Comustion Emission Factors		EMISSIONS		
				ACTUAL (lbs/hr)	PTE (lbs/yr)	ACTUAL (lbs/yr)
NY075-00-0	PM-Total	7.6	lbs per 10 ⁶ scf	0.000008	0.07	0.03
NY075-00-5	PM-10 (Filterable)	1.9	lbs per 10 ⁶ scf	0.000008	0.07	0.03
	Sulfur Dioxide	0.6	lbs per 10 ⁶ scf	0.0063	55	27
	NO _x (Uncontrolled)	170	lbs per 10 ⁶ scf	1.79	15,706	7,530
	Carbon Monoxide	24	lbs per 10 ⁶ scf	0.25	2,217	1,063
	Carbon Dioxide	120000	lbs per 10 ⁶ scf	1,266	11,086,875	5,315,625
	Hydrocarbons	11	lbs per 10 ⁶ scf	0.116	1,016	487

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

**Table 2B - RK Dryer Afterburner Combustion Emissions Estimate
EP# 0001B**

PROCESS DESCRIPTION: **Lithium-Ion Battery Cell Dryer**
Emissions below are from afterburner combustion

NG Burner Heat Input:		
Total		
	1,600,000	BTU/hr
	1.600	MMBTU/hr
NG Firing Rate:	1,563	cf per hour
Hours of operation:	12	hours per day
	7	days per week
	50	weeks per year
	4200	hours per year
	99.9%	Control efficiency of bag house
	90.0%	Control efficiency of wet scrubber

EMISSIONS ESTIMATE: USEPA AP-42-Compilation of Emission Factors
Tables 1.4.1 and 1.4.2 - Natural Gas Combustion

CALCULATIONS: Emissions are equal to emission factor times heat input.

CAS Number	Contaminant Name	Comustion Emission Factors		EMISSIONS		
				ACTUAL (lbs/hr)	PTE (lbs/yr)	ACTUAL (lbs/yr)
NY075-00-0	PM-Total	7.6	lbs per 10 ⁶ scf	0.000001	0.01	0.005
NY075-00-5	PM-10 (Filterable)	1.9	lbs per 10 ⁶ scf	0.000001	0.01	0.005
	Sulfur Dioxide	0.6	lbs per 10 ⁶ scf	0.0009	8	4
	NO _x (Uncontrolled)	170	lbs per 10 ⁶ scf	0.27	2,327	1,116
	Carbon Monoxide	24	lbs per 10 ⁶ scf	0.04	329	158
	Carbon Dioxide	120000	lbs per 10 ⁶ scf	188	1,642,500	787,500
	Hydrocarbons	11	lbs per 10 ⁶ scf	0.017	151	72

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

**Table 2C - RK Dryer Emissions Estimate
EP# 0001A**

PROCESS DESCRIPTION:

Lithium-Ion Battery Cell Dryer

Batteries are electrically discharged, dismantled to remove case, printed circuit boards and plastic, then dried to remove residual charge and promote separation.

Emissions controlled by an Afterburner, Fabric Filter Bag House and Wet Scrubber

Throughput	1,000	kilograms per hour
	2,205	pounds per hour
Hours of operation:	12	hours per day
	5	days per week
	50	weeks per year
	3,000	hours per year

EMISSIONS ESTIMATE:

Process air flow rate:	6,500	acfm @ 38°C (100°F)
	6,124	scfm @ 20°C

CALCULATIONS:

Emissions = Full Scale Test Exhaust Concentration x Process Air Flow Rate

CAS Number	Contaminant Name	Pilot Test Emissions - No Controls (Table 2D)	Full Scale Test Emissions (Table 2E)	Actual Emissions	Potential to Emit (PTE)	Actual Emissions
		(lbs/scf)	(lbs/scf)	(lbs/hr)	(lbs/yr)	(lbs/yr)
NY075-00-0	PARTICULATE	0	5.62E-08	0.0206	180.8	61.9
NY075-00-5	PM-10	NA	5.62E-08	0.0206	180.8	61.9
	Ammonia	6.90E-06	0	0	0	0
	Benzene	0	NA	0	0	0
	Carbon Dioxide*	NA	NA	188	1,642,500	787,500
	Carbon Monoxide*	0	NA	0.04	329	158
	Fluoride Compounds	0	4.93E-09	0.001813	15.88	5.44
	Formaldehyde	9.90E-08	3.90E-09	0.0014	13	4.3
	Hydrocarbons*	0	7.01E-06	0.0172	151	51.6
	Hydrogen Chloride	2.30E-06	0	0	0	0
	Nitrogen Oxides*	0	4.93E-09	0.27	2,327	1,116
	Sulfur Dioxide*	0	0.00000017	0.0009	8	4
	Sulfuric Acid	NA	2.54E-07	0.0935	819	280.5
	Aluminum	NA	0	0	0	0
	Arsenic compounds	NA	0	0	0	0
	Beryllium compounds	NA	0	0	0	0
	Cadmium compounds	9.36E-09	0	0	0	0
	Chromium compounds	NA	1.2486E-11	0.000005	0.04	0.014
	Chromium (VI) compounds	NA	1.2486E-11	0.000005	0.04	0.014
	Cobalt	NA	0	0	0	0
	Copper	7.55E-08	0	0	0	0
	Graphite	NA	NA	NA	NA	NA
	Lead	0	0	0	0	0
	Lithium	NA	0	0	0	0
	Manganese compounds	NA	0	0	0	0
	Mercury compounds	NA	0	0	0	0
	Nickel compounds	2.27E-07	0	0	0	0
	Vanadium	NA	0	0	0	0
	TCDD/DFs	NA	9.9888E-16	0.0000000004	0.0000032	0.00000110

* RK Dryer Afterburner Combustion Emissions Estimate from Table 2B

NA Not analyzed

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

Table 2D - RK Dryer - Exhaust Gas Analysis - Pilot Test* (No Controls)

Contaminant Name	Units	Cylindrical Li-Ion Battery Cell	Polymer Li-Ion Battery Cell	Prismatic Li-Ion Battery Cell	Maximum Concentration	Units	Maximum Concentration
Dust	mg/Sm3	ND	ND	ND	0	lbs/scf	0
Ammonia	ppm	37.27	155.92	42.19	155.92	lbs/scf	6.90E-06
Benzene	ppm	ND	ND	ND	0	lbs/scf	0
Carbon Monoxide	ppm	ND	ND	ND	0	lbs/scf	0
Fluoride Compounds	ppm	ND	ND	ND	0	lbs/scf	0
Formaldehyde	ppm	1.27	0.07	ND	1.27	lbs/scf	9.90E-08
Hydrocarbons	ppm	ND	ND	ND	0.00	lbs/scf	0
Hydrogen Chloride	ppm	24.30	ND	ND	24.30	lbs/scf	2.30E-06
Nitrogen Oxide	ppm	ND	ND	ND	0	lbs/scf	0
Sulfur Dioxide	ppm	ND	ND	ND	0	lbs/scf	0
Cadmium	mg/Sm3	0.15	0.09	ND	0.15	lbs/scf	9.36E-09
Copper	mg/Sm3	0.08	1.21	ND	1.21	lbs/scf	7.55E-08
Lead	mg/Sm3	ND	ND	ND	0	lbs/scf	0
Mercury	mg/Sm3	ND	ND	ND	0	lbs/scf	0
Nickel	mg/Sm3	0.22	3.63	0.11	3.63	lbs/scf	2.27E-07

*Pilot test of same process on pilot scale performed in South Korea. Data is for exhaust emissions from furnace before baghouse and

ND Not

mg/Sm3 Milligrams per

ppm parts per million by

lbs/scf pounds per standard cubic foot

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

Table 2E - RK Dryer - Exhaust Gas Analysis - Full Scale Facility*

Contaminant Name	Molecular Weight	Units	Various Li-Ion Battery Cell 11/19/2018	Units	Maximum Concentration
Dust-PM-2.5	NA	mg/Sm ³	0.4	lbs/scf	2.50E-08
Dust-PM-10	NA	mg/Sm ³	0.9	lbs/scf	5.62E-08
Ammonia	NA	ppm	ND	lbs/scf	0.00E+00
Fluoride Compounds	19	ppm	0.10	lbs/scf	4.93E-09
Formaldehyde	30	ppm	0.05	lbs/scf	3.90E-09
Hydrocarbons	78	ppm	34.59	lbs/scf	7.01E-06
Hydrogen Chloride	NA	ppm	ND	lbs/scf	0.00E+00
Nitrogen Oxide	46	ppm	9.0	lbs/scf	1.08E-06
Sulfur Dioxide	64	ppm	1.0	lbs/scf	1.66E-07
Sulfuric Acid	98	ppm	1.0	lbs/scf	2.54E-07
Aluminum	NA	mg/Sm ³	ND	lbs/scf	0E+00
Arsenic	NA	mg/Sm ³	ND	lbs/scf	0E+00
Beryllium	NA	mg/Sm ³	ND	lbs/scf	0E+00
Cadmium	NA	mg/Sm ³	ND	lbs/scf	0E+00
Chromium	NA	mg/Sm ³	0.0002	lbs/scf	1.25E-11
Chromium, Hexavalent	NA	mg/Sm ³	0.0002	lbs/scf	1.25E-11
Cobalt	NA	mg/Sm ³	ND	lbs/scf	0E+00
Copper	NA	mg/Sm ³	ND	lbs/scf	0E+00
Lead	NA	mg/Sm ³	ND	lbs/scf	0E+00
Lithium	NA	mg/Sm ³	ND	lbs/scf	0E+00
Manganase	NA	mg/Sm ³	ND	lbs/scf	0E+00
Mercury	NA	mg/Sm ³	ND	lbs/scf	0E+00
Nickel	NA	mg/Sm ³	ND	lbs/scf	0E+00
Vanadium	NA	mg/Sm ³	ND	lbs/scf	0E+00
PCDD/DFs	NA	ng/Sm ³	0.016	lbs/scf	9.99E-16

*Test of same process performed in South Korea. Data is for exhaust emissions from furnace after afterburner, baghouse and scrubber.

ND Not detected
mg/Sm³ Milligrams per standard cubic meter
ppm parts per million by volume
lbs/scf pounds per standard cubic foot

**SMCC LIB Recycling Facility
Village of Endicott, Broome County**

**Table 3A - Unloading Bin Emissions Estimate
EP# 00002**

PROCESS DESCRIPTION: **Dried cells drop into collection bin**
Dust emissions controlled by Cyclone and Fabric Filter Bag House
Product drops into a bin and the air is exhausted.

Pounds of Throughput:	1,000	kilograms per hour
	2205	pounds per hour
Hours of operation:	12	hours per day
	7	days per week
	50	weeks per year
	4200	hours per year

EMISSIONS ESTIMATE:

Estimated Dust Production	2.20	lbs/hr-Assume 0.1% of production
Control efficiency of cyclone	95.0%	
Control efficiency of baghouse	99.9%	
Percent of particulate is PM-10	100%	

CALCULATIONS: Particulate emissions are equal to dust load times 1 minus combined control efficiency
E = Dust * (1-cyclone efficiency)*(1-baghouse efficiency)
Metals emissions are based on measured percentage in dryer output - Table 3C

CAS Number	Contaminant Name	Dryer Output	Throughput	ACTUAL	PTE	ACTUAL
		%	(lbs/hr)	(lbs/hr)	(lbs/yr)	(lbs/yr)
NY075-00-0	PARTICULATE	100%	2.20	0.0001	1	0.5
NY075-00-5	PM-10	100%	2.20	0.0001	1	0.5
	Aluminum	8%	2.20	0.00001	0.1	0.04
	Arsenic compounds	0%	2.20	0	0	0
	Beryllium compounds	0%	2.20	0	0	0
	Cadmium compounds	0%	2.20	0	0	0
	Chromium (VI) compounds	0%	2.20	0	0	0
	Chromium compounds	0%	2.20	0	0	0
	Cobalt	15%	2.20	0.00002	0.1	0.1
	Copper	14%	2.20	0.00002	0.1	0.1
	Graphite	25%	2.20	0.00003	0.2	0.1
	Lead compounds	0%	2.20	0	0	0
	Lithium	5%	2.20	0.00001	0.05	0.02
	Manganese compounds	3%	2.20	0.000003	0.03	0.01
	Mercury compounds	0%	2.20	0	0	0
	Nickel compounds	4%	2.20	0.000004	0.04	0.02
	Vanadium compounds	0%	2.20	0	0	0

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**Table 3B - No. 2 Machine Emissions Estimate
EPs# 00003 and 00004**

PROCESS DESCRIPTION: **Product Shredding, Grinding and Vibration Separation**
Dust emissions controlled by Cyclone and Fabric Filter Bag House
Product drops into a bin and the air is exhausted.
There are two No. 2 Machines with identical process trains
Emissions per machine are estimated below.

Pounds of Throughput:	600	kilograms per hour
	1323	pounds per hour
Hours of operation:	12	hours per day
	7	days per week
	50	weeks per year
	4200	hours per year

EMISSIONS ESTIMATE:

Estimated Dust Production	13.23	lbs/hr-Assume 1% of production
Control efficiency of cyclone	95.0%	
Control efficiency of baghouse	99.9%	
Percent of particulate is PM-10	100%	

CALCULATIONS: Particulate emissions are equal to dust load times 1 minus combined control efficiency
 $E = \text{Dust} * (1 - \text{cyclone efficiency}) * (1 - \text{baghouse efficiency})$
 Metals emissions are based on measured percentage in dryer output - Table 3C

CAS Number	Contaminant Name	Dryer Output	Throughput	ACTUAL	PTE	ACTUAL
		%	(lbs/hr)	(lbs/hr)	(lbs/yr)	(lbs/yr)
NY075-00-0	PARTICULATE	100%	13.23	0.001	6	3
NY075-00-5	PM-10	100%	13.23	0.001	6	3
	Aluminum	8%	13.23	0.00005	0.5	0.2
	Arsenic compounds	0%	13.23	0	0	0
	Beryllium compounds	0%	13.23	0	0	0
	Cadmium compounds	0%	13.23	0	0	0
	Chromium (VI) compounds	0%	13.23	0	0	0
	Chromium compounds	0%	13.23	0	0	0
	Cobalt	15%	13.23	0.00010	0.9	0.4
	Copper	14%	13.23	0.00009	0.8	0.4
	Graphite	25%	13.23	0.00017	1.4	0.7
	Lead compounds	0%	13.23	0	0	0
	Lithium	5%	13.23	0.00003	0.3	0.1
	Manganese compounds	3%	13.23	0.000020	0.2	0.1
	Mercury compounds	0%	13.23	0	0	0
	Nickel compounds	4%	13.23	0.00003	0.2	0.1
	Vanadium compounds	0%	13.23	0	0	0

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**Table 3C - RK Dryer Output
Product Makeup After Drying and Before Separation**

Element	Range Weight %	Average
	% by weight	% by weight
Cobalt	5 to 30%	15%
Nickel	0 to ~10%	4%
Manganese	0 to ~6%	3%
Lithium	~5%	5%
Metal Oxides	15 to 20%	16%
Aluminum	6 to ~10%	8%
Copper	10 to ~20%	14%
Graphite	~25%	25%
Iron or Other Metal Case	0 to ~20%	10%

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Table 4 - Highly Toxic Air Contaminants Screening

CAS Number	Contaminant Name	Mass Emission Limit (pounds per year)	PB Trigger Applicable	Potentially Present
000050-00-0	Formaldehyde	100		Y
000056-23-5	Carbon tetrachloride	100		No
000062-53-3	Aniline	1000		No
000064-07-5	Diethyl sulfate	250		No
000067-66-3	Chloroform	100		No
000071-43-2	Benzene	100		No
000074-90-8	Hydrogen cyanide	100		No
000075-01-4	Vinyl chloride	100		No
000075-07-0	Acetaldehyde	1000		No
000075-21-8	Ethylene oxide	25		No
000075-44-5	Phosgene	500		No
000077-78-1	Dimethyl sulfate	250		No
000078-87-5	Propylene dichloride	1000		No
000079-00-5	1,1,2-trichloroethane	100		No
000079-01-6	Trichloroethylene	500		No
000079-06-1	Acrylamide	10		No
000079-11-8	Chloroacetic acid	1000		No
000079-34-5	1,1,2,2-tetrachloroethane	1000		No
000079-46-9	2-nitropropane	5000		No
000091-94-1	3,3'-dichlorobenzidine	5		No
000092-87-5	Benzidine	0.1		No
000095-53-4	0-toluidine	5000		No
000096-45-7	Ethylene thiourea	100		No
000100-44-7	Benzyl chloride	25		No
000106-93-4	1,2-dibromoethane	5		No
000106-99-0	1,3-butadiene	25		No
000107-02-8	Acrolein	25		No
000107-06-2	1,2-dichloroethane	100		No
000107-13-1	Acrylonitrile	25		No
000107-18-6	Allyl alcohol	500		No
000109-89-4	2-methoxy ethanol	5000		No
000118-74-1	Hexachlorobenzene	5	Yes	No
000122-66-7	Diphenyl hydrazine	10		No
000127-18-4	Perchloroethylene	1000		No
000302-01-2	Hydrazine	0.1		No
000542-75-6	1,3-dichloropropene	500		No
000593-60-2	Vinyl bromide	500		No
000625-31-0	4-penten-2-ol	500		No
001336-36-3	Polychlorinated biphenyls (PCBs)	1	Yes	No
001395-21-7	Subtilisin	NA*		No
001746-01-6	2,3,7,8 TCDD TEF	0.0001	Yes	Y
002465-27-2	Auramine	0.1		No
007440-62-2	Vanadium	25		Y
007550-45-0	Titanium tetrachloride	0.1		No
007784-42-1	Arsine	10		No
009014-01-1	Subtilisin, fermentation product	NA*		No
029082-74-4	Octachlorostyrene	NA*	Yes	No
	Arsenic compounds	1		Y
	Beryllium compounds	1		Y
	Brominated Flame Retardants**	100	Yes	No
	Cadmium compounds	25	Yes	Y
	Chromium compounds	250		Y
	Chromium (VI) compounds	0.1		Y
	Diisocyanate compounds	100		No
	Lead compounds	5	Yes	Y
	Manganese compounds	10		Y
	Mercury compounds	5	Yes	Y
	Nickel compounds	10		Y
	Pesticide, herbicide, rodenticide, insecticide***	NA*	Yes	No
	Polycyclic organic matter (POM)	1	Yes	No
	Polytetrafluoroethylene (decomposition)	NA*		No

Key	Y - Potentially Present
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*These HTACs are not eligible for demonstrating compliance with a mass emission limit

**Including but not limited to Polybrominated diphenyl ethers (PBDEs), TetrabromobisphenolA (TBBPA), Hexabromocyclododecane (HBCD)

***Aldrin/Dieldrin (000309-00-2), Chlordane (000057-74-9 and 012789-03-6), DDE (000072-55-9), DDT (0000529-3), Heptachlor (000076-44-8), Isodrin (000465 73-6), Methoxychlor (000072-43-5), Pendimethalin (040487-42-1), Pentachlorobenzene (000608-93-5), (000079-94-7), Toxaphene (008001-35-2), Trifluralin (001582-09-8)

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Table 5 - Facility Emissions Summary

CAS Number	Contaminant Name	RK Dryer Combustion (EP 0001A, Table 2A)		RK Dryer Process (EP 0001B-Table 2C)		RK Unloading Bin (EP 00002)		No. 2 Machine (2) (EP 00003 and 00004)		Total		HTAC Threshold (lbs/yr)	HAP? Y/N
		PTE	ACTUAL	PTE	ACTUAL	PTE	ACTUAL	PTE	ACTUAL	PTE	ACTUAL		
		(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)		
NY075-00-0	PARTICULATE	0.07	0.03	181	62	1	0.5	12	6	193	68	NA	N
NY075-00-5	PM-10	0.07	0.03	181	62	1	0.5	12	6	193	68	NA	N
	Ammonia	NA	NA	0	0	0	0	0	0	0	0	NA	N
	Benzene	NA	NA	0	0	0	0	0	0	0	0	100	Y
	Carbon Dioxide	11,086,875	5,315,625	1,642,500	787,500	0	0	0	0	12,729,375	6,103,125	NA	N
	Carbon Monoxide	2,217	1,063	329	158	0	0	0	0	2,546	1,221	NA	N
	Fluoride Compounds	NA	NA	15.88	5.44	0	0	0	0	15.88	5.44	NA	N
	Formaldehyde	NA	NA	13	4	0	0	0	0	13	4	100	Y
	Hydrocarbons	1,016	487	151	52	0	0	0	0	1,167	539	NA	N
	Hydrogen Chloride	NA	NA	0	0	0	0	0	0	0	0	NA	N
	Nitrogen Oxide	15,706	7,530	2,327	1,116	0	0	0	0	18,033	8,646	NA	N
	Sulfur Dioxide	55	27	8	4	0	0	0	0	64	31	NA	N
	Sulfuric Acid	NA	NA	819	281	0	0	0	0	819	281	NA	N
	Aluminum	NA	NA	0	0	0.000009	0.1	0.9	0.4	0.9	0.5	NA	N
	Arsenic compounds	NA	NA	0	0	0	0	0	0	0	0	1	Y
	Beryllium compounds	NA	NA	0	0	0	0	0	0	0	0	1	Y
	Cadmium compounds	NA	NA	0	0	0	0	0	0	0	0	25	Y
	Chromium (VI) compounds	NA	NA	0.04	0.014	0	0	0	0	0.040	0.014	0.10	Y
	Chromium compounds	NA	NA	0.04	0.014	0	0	0	0	0.040	0.014	250	Y
	Cobalt	NA	NA	0	0	0.00002	0.14	1.7	0.8	1.7	1.0	NA	N
	Copper	NA	NA	0	0	0.00002	0.14	1.6	0.8	1.6	0.9	NA	N
	Graphite	NA	NA	NA	NA	0.00003	0.24	2.9	1.4	2.9	1.6	NA	N
	Lead	NA	NA	0	0	0	0	0	0	0	0	5	Y
	Lithium	NA	NA	0	0	0.000006	0.05	0.6	0.3	0.6	0.3	NA	N
	Manganese compounds	NA	NA	0	0	0.000003	0.03	0.3	0.2	0.3	0.2	10	Y
	Mercury compounds	NA	NA	0	0	0	0	0	0	0	0	5	Y
	Nickel compounds	NA	NA	0	0	0.000004	0.04	0.5	0.2	0.5	0.3	10	Y
	Vanadium compounds	NA	NA	0	0	0	0	0	0	0	0	25	Y
	TCDD/DFs	NA	NA	0.0000032	0.0000011	0	0	0	0	0.0000032	0.0000011	0.0001	Y
	Max Individual HAP									0.5	0.3		20,000*
	Total HAPs									13.4	4.8		50,000*

PTE-Potential to Emit (24/7/365 operation)

HTAC-Highly Toxic Air Contaminants

HAP-Hazardous Air Pollutant

*HAP Thresholds - Potential Emissions of 10 tons per year for individual HAPs, 25 TPY combined HAPs.

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Table 6 - Dispersion Modeling Results

CAS Number	Contaminant Name	RK Dryer Process (EP 00001)			SGC	AGC	Toxicity	Aerscreen Maximum Impact Concentration					
		ERP		ACTUAL	Short-Term Guidance Concentration	Annual Guidance Concentration		1-hr	Annual-ERP	Annual-Actual	%SGC	%AGC	%AGC
		(lbs/hr)	(lbs/yr)	(lbs/yr)	(µg/m3)	(µg/m3)		(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	%	%
10102-43-9	Nitrogen Oxide	2.06	18,033	1,116	188.1	100	Low	63.55	6.36	6.36	34%	6%	6%
07664-93-9	Sulfuric Acid	0.094	819	281	120	1	Moderate	2.90	0.29	0.29	2%	29%	29%

Notes:

Aerscreen modeling included evaluation of elevated terrain

lbs/hr pounds per hour

µg/m3 micrograms per cubic meter

SGC DEC Short-term Guidance Concentration

AGC DEC Annual Guidance Concentration

Model Outputs	ERP	1-hr	Annual
Modeled Value	0.087	2.684	0.2684
Prorated Impact	0.094	2.90	0.29
Prorated Impact	2.06	63.55	6.36