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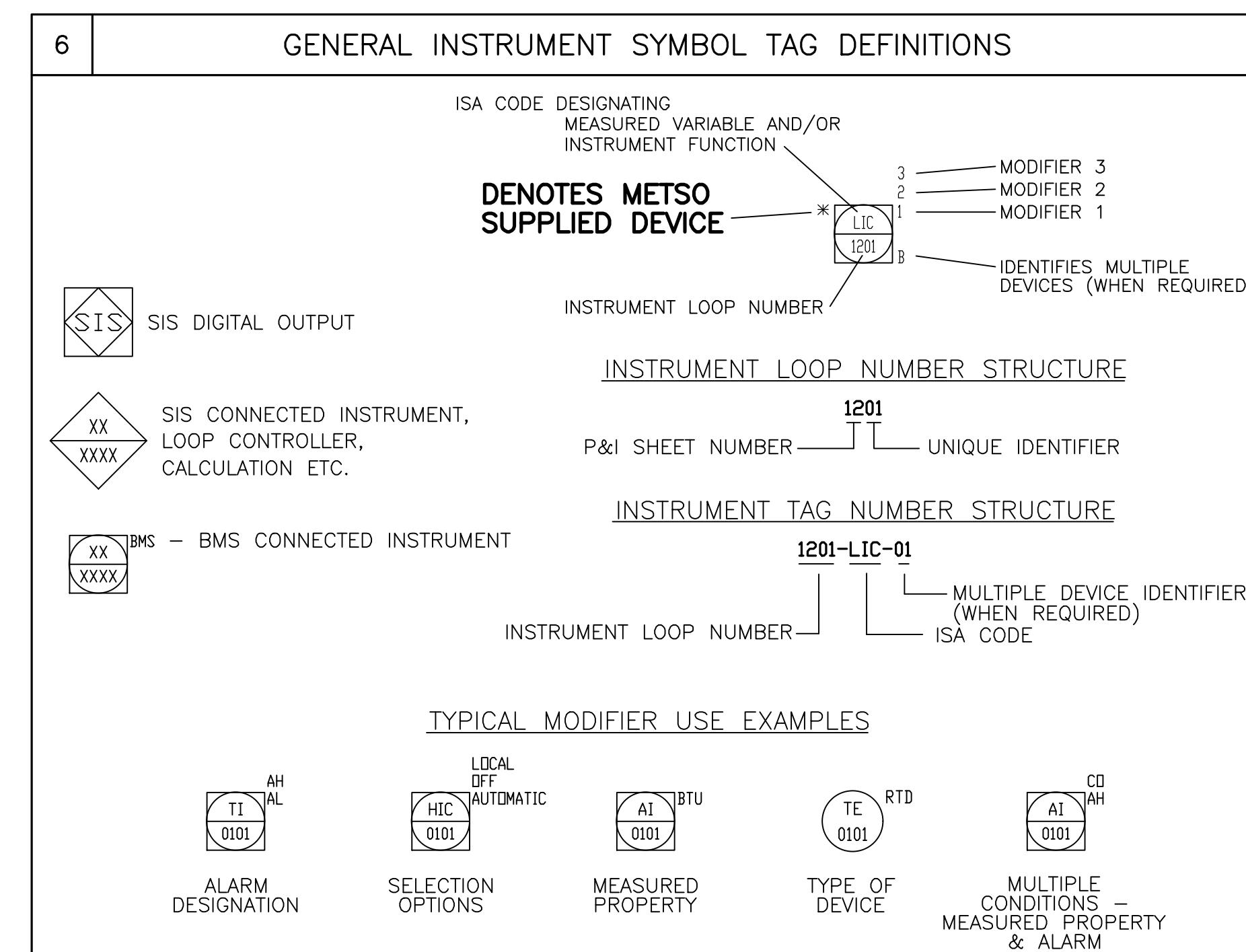
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to8811...	.54
to8820...	.55
to8830...	.56

INSTRUMENT IDENTIFICATION				
FIRST LETTER		SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A ANALYSIS		ALARM		
B BURNER FLAME				CLOSED
C CONDUCTIVITY		CONTROL		
D DENSITY OR SPECIFIC GRAVITY	DIFFERENTIAL			
E VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F FLOW	RATIO			
G GAGING		GLASS, VIEWING DEVICE		
H HAND OPERATED				HIGH
I CURRENT		INDICATE		
J POWER	SCAN			
K TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L LEVEL		LIGHT		LOW
M MOISTURE OR HUMIDITY	MOMENTARY			MIDDLE OR INTERMEDIATE
N USER'S CHOICE				
O USER'S CHOICE	OPERATED	ORIFICE, RESTRICTION		OPEN
P PRESSURE OR VACUUM		POINT (TEST) CONNECTION		
Q QUANTITY	INTEGRATE, TOTALIZE			
R RADIATION		RECORD		
S SPEED, FREQUENCY	SAFETY		SWITCH	
T TEMPERATURE			TRANSMIT	
U MULTIVARIABLE		MULTIFUNCTION		
V VIBRATION			VALVE, DAMPER, LOUVER	
W WEIGHT OR FORCE		WELL		
X EMERGENCY	SHUTDOWN	SOURCE		
Y EVENT, STATE OR PRESENCE			RELAY, COMPUTE, CONVERT	
Z POSITION, DIMENSION			DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL	

ABBREVIATIONS				
AA - AMBIENT AIR	H/A - HAND/AUTO	REV - REVERSE ACTING		
AI - ANALOG INPUT	HOA - HAND OFF AUTO	RSP - REMOTE SET POINT		
A/M - AUTO/MANUAL	HV - HAND VALVE	RTD - RESISTANCE (TYPE) TEMP. DETECTOR		
AO - ANALOG OUTPUT	IA - INSTRUMENT AIR	S - SOLENOID ACTUATOR		
ASR - AUTOMATIC SETTING REGULATION	I/P - CURRENT/PNEUMATIC	SEL - SELECT		
BL - BATTERY LIMITS	ISO - ISOLATOR	SIS - BURNER MANAGEMENT SAFETY		
CCR - CENTRAL CONTROL ROOM	* IT - CURRENT TRANSFORMER	INSTRUMENTED SYSTEM		
CCS - CENTRAL CONTROL SYSTEM	JB - JUNCTION BOX	SP - SET POINT		
C/W - COMES WITH	L/R - LOCAL/REMOTE	S/S/S - START/STOP/STATUS		
DIR - DIRECT ACTING	LT - LEAK TEST	TC - THERMOCOUPLE		
ES - ELECTRICAL SUPPLY	MPU - MOTOR PROTECTION UNIT	TP - TEST PORT		
EC - ELECTRICAL CABINET	MV - MANIFOLD VALVE	V - VENT		
FC - FAIL CLOSED	NC - NORMALLY CLOSED	VA - VACUUM		
FO - FAIL OPEN	NO - NORMALLY OPEN	VSD - VARIABLE SPEED DRIVE		
FW - FRESH WATER	OP - OPERATING PANEL	* - SUPPLIER		
FL - FAIL LOCKED	PA - PLANT AIR	B - ELECTRIC BRAKE		
FI - FAIL INTERMEDIATE	QO - QUICK OPENING	◇ - MANUAL BRAKE		

LINETYPE SYMBOLS				
MAIN PROCESS MATERIAL	—○—	SOFTWARE SIGNAL		
MAIN PROCESS GAS	- - - - -	ELECTRICAL SIGNAL		
SECONDARY PROCESS MATERIAL	- - - - -	PNEUMATIC SIGNAL		
SECONDARY PROCESS GAS	×××××	CAPILLARY TUBING (FILLED SYSTEM)		
PROCESS SLURRY				
AMBIENT AIR / COMBUSTION AIR	—○—○—	BMS EQUIPMENT		
AUXILIARY AIR				
UTILITY PIPING (WATER, GAS, etc.)				
FLUID IDENTIFIED BY ASSOCIATED				

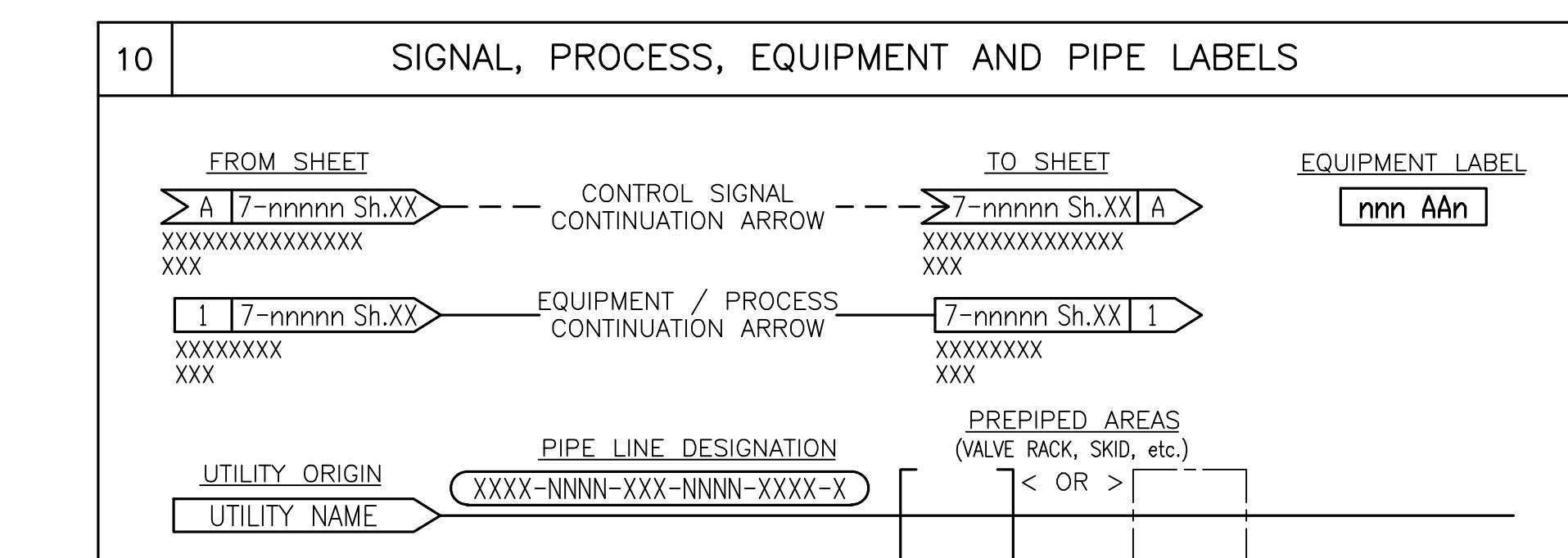
GENERAL INSTRUMENT SYMBOLS		
DISCRETE INSTRUMENT i.e. TRANSMITTER, VALVE, SINGLE LOOP CONTROLLER ETC.	PLANT CONTROL SYSTEM FUNCTION i.e. DCS, PLC, HMI, MULTI LOOP CONTROLLER, CHART RECORDER, ETC.	SUPERVISORY COMPUTER FUNCTION i.e. EXPERT SYSTEM, RESOURCE PLANNING, MANAGEMENT REPORTING, ETC.
FIELD MOUNTED		FIELD MOUNTED
MAIN PANEL FRONT MOUNTED	MAIN DISPLAY OPERATOR ACCESSIBLE	MAIN DISPLAY OPERATOR ACCESSIBLE
AUXILIARY OR LOCAL PANEL FRONT MOUNTED	AUXILIARY OR LOCAL DISPLAY OPERATOR ACCESSIBLE	AUXILIARY OR LOCAL DISPLAY OPERATOR ACCESSIBLE
MAIN PANEL BACK MOUNTED	MAIN DISPLAY NOT ACCESSIBLE	MAIN DISPLAY NOT ACCESSIBLE
AUXILIARY OR LOCAL PANEL BACK MOUNTED	AUXILIARY OR LOCAL PANEL NOT ACCESSIBLE	AUXILIARY OR LOCAL PANEL NOT ACCESSIBLE



FUNCTION MODIFIERS AND OTHER INSTRUMENT SYMBOLS				
<input type="checkbox"/> Low Select	<input type="checkbox"/> Sum	<input type="checkbox"/> Pulse		
<input type="checkbox"/> High Select	<input type="checkbox"/> Add	<input type="checkbox"/> Differential		
<input type="checkbox"/> Low Limit	<input type="checkbox"/> Subtract	<input type="checkbox"/> Convertor (SEE I/O CODE)		
<input type="checkbox"/> High Limit	<input type="checkbox"/> Multiply	<input type="checkbox"/> Ratio		
<input type="checkbox"/> Bias	<input type="checkbox"/> Divide	<input type="checkbox"/> Derivative		
<input type="checkbox"/> Average	<input type="checkbox"/> SqRoot	<input type="checkbox"/> Time Function		
<input type="checkbox"/> Reverse	<input type="checkbox"/> Integral	<input type="checkbox"/> Non-Linear Function		
			I/O CODE	
			E = VOLTAGE	
			I = CURRENT	
			R = RESISTANCE	
			A = ANALOG	
			H = HYDRAULIC	
			P = PNEUMATIC	
			D = DIGITAL	
BMS Burner Management System				
Interlock, Logic				
Interlock, Hardwired				
			Electric Heat Traced Inst	

MOTOR ABBREVIATIONS				
RDY - READY	RN - RUN	AUT - AUTO		
MC - START / STOP	RMC - REVERSE START / STOP	RRN - REVERSE RUN		

VALVE, FLOW ELEMENT AND OTHER PIPING SYMBOLS		
NORMALLY OPEN	NORMALLY CLOSED	RELIEF VALVE
►	►	GATE VALVE
IOI	!●	BALL VALVE
►	►	GLOBE VALVE
►	►	PLUG VALVE
►	►	NEEDLE VALVE
■■■	■■■	SLIDE GATE VALVE
►	►	DIAPHRAM VALVE
!○!	!●	BUTTERFLY VALVE
►	►	PINCH VALVE
►	◆	BALL CHECK VALVE
		ANGLE VALVE
		3 WAY VALVE
		3 WAY BALL VALVE
		4 WAY VALVE
		QUICK OPENING VALVE
		ROTARY VALVE
		CHECK VALVE, SWING GATE
		CHECK VALVE, SPRING OPERATED
		BACK FLOW PREVENTER
		PIPE PLUG
		SPOOL PIECE
		QUICK DISCONNECT
		REDUCER
		SPRAY HEAD
		FLANGE
		FILTER
		SILENCER
		SCREEN
		BAFFLE SILENCER (MUFFLER)
		LUBRICATOR
		STRAINER
		BASKET STRAINER
		Y STRAINER
		DUPLEX STRAINER
		PILOT TUBE
		ROTAMETER
		STRAIGHTENING VANES
		TURBINE
		VENTURI
		VORTEX
		SINGLE BLADE DAMPER
		MULTI-BLADE (LOUVER) DAMPER
		PRESSURE CONTROL VALVE
		TEMPERING DAMPER
		PNEUMATIC ACTUATOR
		PNEUMATIC ACTUATOR



wood. SUPPLIER REVIEW DECAL	
PO/Contract No.: _____	SDR Code: _____
PO/Contract Description: _____	
Equipment Tag Numbers: _____	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed.	
<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: _____ Date: _____	
Classification: RESTRICTED	
DRN: WEB	PROJECT No. C.005859
DATE: 2018-04-12	MATERIAL No.: _____
CKD: SJH	MATERIAL Spec.: _____
DATE: 2018-04-20	MATERIAL Wt.: _____ Wt. Unit: _____
BUYER LOCATION	SCALE: 1:1 For Construction
ALBEMARLE KEMERTON PLANT	APPD: SJH DATE: 2018-04-20
BUNBURY, WESTERN AUSTRALIA	ANSI DRAWING NO. D 10262912-DWK SHEET 1 OF 25 REV 13

13 NO CHANGES TO THIS SHEET  
12 REVISED PER PROJECT UPDATES  
11 REVISED PER PROJECT UPDATES  
10 CHANGED INSTRUMENT SUPPLIER NOTATION

JPH JPH 2020-07-06  
JPH WEB 2

EQUIPMENT LETTER CODES		
CODE	MAIN CATEGORY	SUB CATEGORY / APPLICATION / COMMENT
AC	AIR COMPRESSOR	
AD	AUXILIARY DRIVE	
AI	ACIDIFICATION	
AN	AIR CONDITIONER	
AP	AERATION PAD	
AR	AIR RECEIVER	
AY	AIR DRYER	
BD	BALLING DRUM	
BE	BUCKET ELEVATOR	Bucket Conveyor
BG	BEARING	Roller, Drive
BL	BLOWER	
BN	BIN	Stone, Walking Floor, Feed, Bunker (Solid material storage)
BO	BOILER	Steam, Waste Heat, Steam Generating Drum
BR	BURNER	Secondary, Primary, Kiln, Waste, Incinerator, Preheat
BX	BOX	Mixing, Collection
CD	CART DUMPER	
CH	CHUTE	Transfer, Stone, Feed, Feed Pipe, Expansion Joint
CL	CLASSIFIER	
CM	COMBS	Pellet
CN	CALCINER	Rotary, Fluid Bed
CO	COOLER	Annular, NEIMS, Rotary (Only for main process materials. Use HX for secondary process or WQ for cooling with water spray.)
CPL	CONTROL PANEL	
CR	CRUSHER	Stone, Primary, Secondary
CV	CONVEYOR	Belt, Screw, Vibrating, Drag, Chain, Wet Ash, Reversing Belt, Roller, Box, Discharge Auger, Auger, Tubular, Pan, Pneumatic, Air Float (For Bucket Conveyor use BE)
CY	CYCLONE	Multicyclone
DC	DUST COLLECTOR	Baghouse, Scrubber
DD	DAM	Pond, Tailings
DE	DENSIFIER	
DI	DISTRIBUTOR	Stone, Splitter, Diverter (solids)
DM	DAMPER	
DR	DRIVE	Kiln, Cooler, Travelling Grate, etc.
DS	DISPOSAL RECEPTACLE	(Waste material)
DU	DUCT	Air, Gas, Dust
DV	DUMP VALVE	Double, Single, Trap
DZ	DEMINERALIZER	
EL	ELEVATOR	Lift, Freight, Passenger (For Bucket Elevator use BE)
EP	ELECTROSTATIC	
EV	EXPLOSION VENT	
FE	FEEDER	Vibrating, Volumetric, Tube, Tubular, Rotary
FL	FILTER	Air, Fluid, Dust
FN	FAN	Vent, ID, Cooler, Combustion Air, Secondary, Tertiary
FR	FRAME	Supporting Structure for Multiple Racks - See RA
FS	FEED SPOUT	Retractable
FU	FURNACE	Combustion Chamber, Primary Chamber, Secondary Chamber, Roaster, Incinerator, Fluid Bed, Calciner
GT	GATE	Slide, Knife, Isolation
HD	HOOD	Firing, Feed, Discharge, Exhaust
HE	HEATER	
HP	HOPPER	Discharge, Dust
HT	HOIST	Winch, Chain, Crane, Derrick, Jib, Lift

EQUIPMENT TAG NUMBER STRUCTURES		
<b>INDIVIDUAL ITEM</b>  FN-105 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEMS</b>  BG-105-1 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEM GROUPS</b>  PU-105-2A EQUIPMENT CODE — PYRO UNIT NUMBER — ITEM WITHIN GROUP SEQUENTIAL IDENTIFIER
IDENTIFIES AN ITEM WITHIN A PYRO NUMBERED UNIT WHERE NO OTHER ITEM WITHIN THAT UNIT HAS THE SAME EQUIPMENT CODE. Example: A single Fan in Unit 105 as FN-105	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE THERE ARE TWO OR MORE ITEMS WITHIN THAT UNIT HAVING THE SAME EQUIPMENT CODE. Example: Four bearings in Unit 105 as BG-105-1 thru BG-105-4	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE IT MAY BE BENEFICIAL TO GROUP LIKE ITEMS. Example: Unit 105 contains 3 pumps. The service of the first is different than that of the other two, and the third serves as a backup for the second. The first pump is identified as PU-105-1. The second and third are PU-105-2A and PU-105-2B.

DO NOT SCALE	THIRD ANGLE PROJECTION	13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
		12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
		11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
		10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

## 12 METSO FLUID CODES

CODE	FLUID	CATEGORY	UNIT
AA	AMBIENT AIR	Air	
AC	COMBUSTION AIR	Air	
AI	INSTRUMENT AIR	Air	001
AP	PLANT AIR	Air	002
AX	AIR - NON-SPECIFIC	Air	003
DN	NUISANCE DUST	Dust	
CO	COAL	Fuel	010
CP	COAL - PULVERIZED	Fuel	011
FB	BLAST FURNACE GAS	Fuel	012
FF	BASIC OXYGEN FURNACE GAS	Fuel	013
FH	FUEL OIL HEAVY	Fuel	014
FK	COKE OVEN GAS	Fuel	015
FL	FUEL OIL LIGHT	Fuel	016
FN	NATURAL GAS	Fuel	017
FP	PROPANE	Fuel	018
FR	REFINERY GAS	Fuel	019
GC	CALIBRATION GAS	Gas	020
GH	HYDROGEN	Gas	021
GM	CARBON MONOXIDE	Gas	022
GR	REFRIGERANT	Gas	023
GS	HYDROGEN SULFIDE	Gas	024
GX	GAS - NON-SPECIFIC COMBUSTABLE	Gas	025
GY	OXYGEN	Gas	026
IA	ARGON	Gas, Inert	030
IC	CARBON DIOXIDE	Gas, Inert	031
IH	HELIUM	Gas, Inert	032
IL	HALON	Gas, Inert	033
IN	NITROGEN	Gas, Inert	034
IX	INERT GAS - NON-SPECIFIC	Gas, Inert	035
KA	AMMONIA SOLUTION	Chemical	040
KF	CHEMICAL FLOW	Chemical	041
KL	LIME	Chemical	042
KU	CAUSTIC	Chemical	043
KV	SOLVENT	Chemical	044
LG	LUBRICATING GREASE	Lubrication	045
LO	LUBE OIL	Lubrication	046
OD	DEDUSTING OIL	Oil	048
OH	HYDRAULIC OIL	Oil	049
OS	SEAL OIL	Oil	050
OX	OIL - NON-SPECIFIC	Oil	051
PM1	PROCESS MATERIAL - PRIMARY	Process	
PM2	PROCESS MATERIAL - SECONDARY	Process	
PG1	PROCESS GAS - PRIMARY	Process	
PG2	PROCESS GAS - SECONDARY	Process	
PP	PETROLEUM COKE	Process	
PS	SLURRY	Process	
PC	CALCINED COKE	Product	
BB	BOILER BLOWDOWN	Steam	
CD	CONDENSATE	Steam	
ST	STEAM	Steam	
VA	VACUUM	Vacuum	
EF	EFFLUENT	Waste	
SS	SANITARY SEWER	Waste	
YD	WASTE SLUDGE	Waste	
YG	WASTE GAS	Waste	
YL	WASTE LIQUID	Waste	
YO	WASTE OIL	Waste	
YS	WASTE SOLID	Waste	
YY	WASTE SOLVENT	Waste	
YW	WASTE WATER	Waste	
YX	WASTE - NON-SPECIFIC	Waste	
WA	POTABLE WATER	Water	070
WB	BOILER FEED WATER	Water	071
WC	COOLING WATER	Water	072
WD	DEMINERALIZED WATER	Water	073
WF	FIRE WATER	Water	074
WG	WATER GLYCOL	Water	075
WL	GLAND SEAL WATER	Water	076
WP	PROCESS WATER	Water	077
WR	RAW WATER	Water	078
WS	SEA WATER	Water	079
WX	WATER - NON-SPECIFIC	Water	080

## PIPE LINE NUMBER DESIGNATION

XXXX-NNNN-XXX-NNNN-XXXX-X

PLANT AREA	
SIZE	
SERVICE CODE	
LINE-TRAIN NO.	
LINE-SEQUENTIAL NO.	
MATERIAL SPECIFICATION CODE	
INSULATION CODE	

PIPE LINE NUMBER DESIGNATION ACCORDING TO SECTION 4. OF THE WOOD TECHNICAL SPECIFICATION DOCUMENT 606541-0000-DE20-SPC-0001.

## FIELD CONNECTION NUMBER STRUCTURE

TYPICAL FIELD CONNECTION # ID TAG **XX-XX-XX**  
 FLUID CODE **TT**  
 SEQUENCE No. **TT**  
 VENDOR'S IDENTIFIER (OPTIONAL) **TT**

REFERENCE DOCUMENT 900107213-NCD FOR FIELD CONNECTION DETAILS.

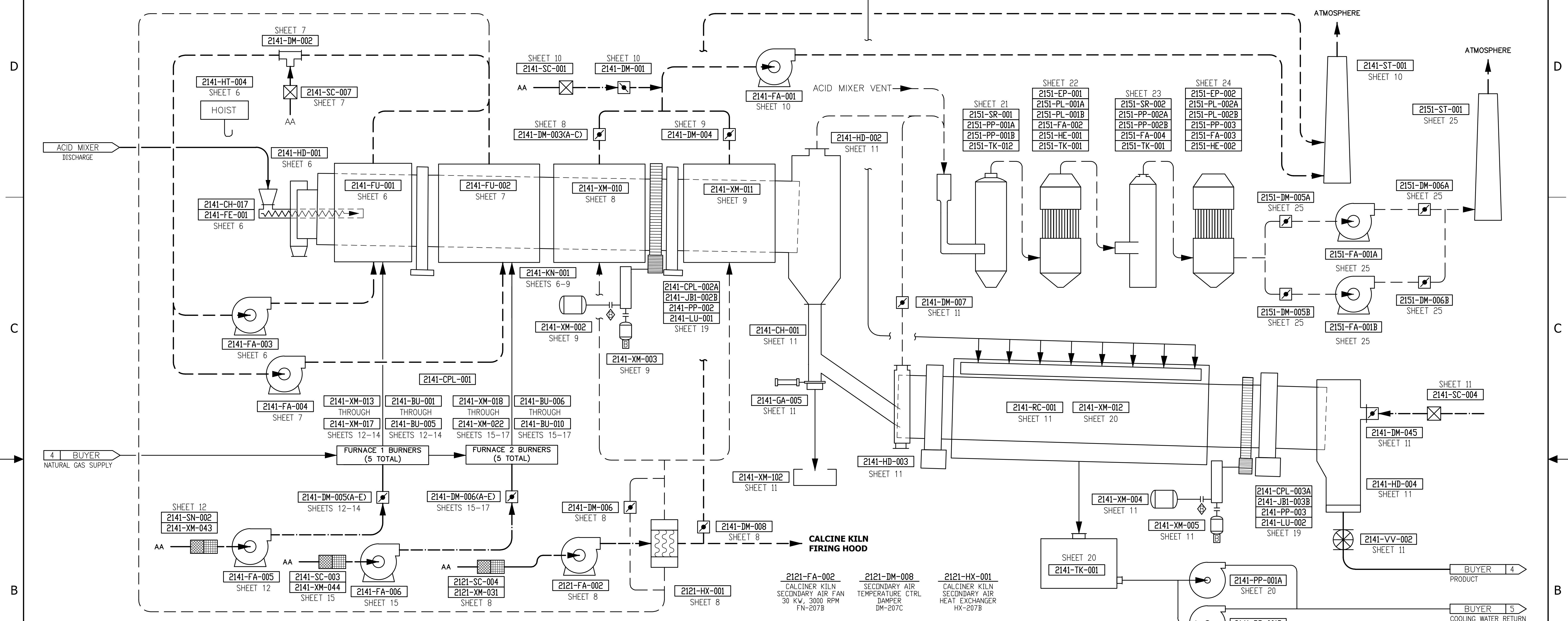
P&I DRAWING SHEET LIST		
SHEET	REV	TITLE
1	12	LEGEND
2	12	LEGEND
3	12	OVERVIEW
4	12	MOTOR DETAILS
5	12	UTILITIES
6	12	ACID ROASTER KILN FURNACE 1
7	12	ACID ROASTER KILN FURNACE 2
8	12	ACID ROASTER KILN HEATED JACKET 1
9	12	ACID ROASTER KILN HEATED JACKET 2
10	12	ACID ROASTER EXHAUST FAN AND STACK
11	12	ACID ROASTER KILN DISCHARGE HOOD AND COOLER
12	12	ACID ROASTER FURNACE 1 ZONE 1 BURNERS
13	12	ACID ROASTER FURNACE 1 ZONE 2 BURNERS
14	12	ACID ROASTER FURNACE 1 ZONE 3 BURNERS
15	12	ACID ROASTER FURNACE 2 ZONE 1 BURNERS
16	12	ACID ROASTER FURNACE 2 ZONE 2 BURNERS
17	12	ACID ROASTER FURNACE 2 ZONE 3 BURNERS
18	12	ACID ROASTER EXHAUST GAS ANALYZER
19	12	ACID ROASTER GEAR SPRAY SYSTEMS
20	12	ACID ROASTER COOLING WATER SYSTEM
21	12	ACID ROASTER SCRUBBER SEPARATOR
22	12	ACID ROASTER SCRUBBER WESP STAGE 1
23	12	ACID ROASTER SCRUBBER PACKED TOWER
24	12	ACID ROASTER SCRUBBER WESP STAGE 2
25	12	ACID ROASTER SCRUBBER EXHAUST FAN AND STACK

NOTE:  
1. ALL PIPING INCLUDING VALVES, GAUGES, TUBING, FITTINGS, PIPE SUPPORTS AND HOSES ARE BY BUYER UNLESS NOTED BY METSO.

wood. SUPPLIER REVIEW DECAL	
PO/Contract No.: <input type="text"/>	SDDR Code: <input type="text"/>
PO/Contract Description: <input type="text"/>	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise	

1 BUYER  
COOLING WATER SUPPLY

NOTE: CHUTES, EXPANSION JOINTS, SILENCERS AND SCREENS ARE EXCLUDED FROM THE EQUIPMENT TAG DESCRIPTION LIST ON THIS SHEET. REFER TO THEIR CORRESPONDING DETAIL SHEET FOR DESCRIPTION.



Metso Minerals Industries, Inc. Pyro Processing 2715 Pleasant Valley Rd. York, PA 17402 USA														LITHIUM SPODUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM ACID ROASTER OVERVIEW																																																																																																																																																																																																																																																																																																					
2141-BU-001-005		2141-BU-006-010		2141-CH-001		2141-CPL-001		2141-CPL-002A		2141-CPL-003A		2141-DM-001		2141-DM-002		2141-DM-003(A-C)		2141-DM-004		2141-DM-005(A-C)		2141-DM-006(A-C)		2141-DM-007		2141-PP-001B SHEET 20																																																																																																																																																																																																																																																																																									
FURNACE #1 BURNER (X5)	BR-507A	FURNACE #2 BURNER (X5)	BR-507B	KILN DISCHARGE TRANSFER CHUTE	CH-512	ACID ROAST BMS	CPL-507	KILN GEAR SPRAY CONTROL PANEL	CPL-504A	COOLER GEAR SPRAY CONTROL PANEL	CPL-513A	EXHAUST FAN TEMPERING DAMPER	DM-510	FURNACE RECIRCULATION AIR TEMPERING DAMPER	DM-508B	JACKET #1 EXHAUST DAMPERS #1-3	EXHAUST DAMPER	JACKET #2 EXHAUST DAMPER	FURNACE #1 COMBUSTION AIR DAMPERS #1-3	FURNACE #2 COMBUSTION AIR DAMPERS #1-3	JACKET #1 EXHAUST DAMPERS #1-3	FURNACE #2 COMBUSTION AIR DAMPERS #1-3	COOLER EXHAUST DAMPER	DM-513B																																																																																																																																																																																																																																																																																											
SECONDARY AIR TEMPERING DAMPER	DM-207B	ACID ROAST COOLER SWEEP AIR DAMPER	DM-516	ENSHROUDING JACKET EXHAUST FAN 55 kW, 3000 RPM	FN-510	2141-FA-001	2141-FA-003	FURNACE #1 RECIRCULATING FAN 7.5 kW, 3000 RPM	FN-508B-1	2141-FA-004	FURNACE #2 RECIRCULATING FAN 7.5 kW, 3000 RPM	FN-508B-2	2141-FA-005	FURNACE #1 COMBUSTION FAN 11 kW, 3000 RPM	FN-508A-1	2141-FA-006	FURNACE #2 COMBUSTION AIR FAN 11 kW, 3000 RPM	FN-508A-2	2141-FE-001	ACID ROAST SCREW FEEDER 5.5 kW, 1500 RPM	ENSHPROUDING FURNACE #1	2141-FU-001	KILN EMERGENCY DISCHARGE FURNACE #2	2141-FU-002	KILN FEED HOOD	2141-GA-005	KILN DISCHARGE HOOD	2141-HD-001	COOLER FEED HOOD	2141-HD-002	COOLER DISCHARGE HOOD	2141-HD-003	COOLER DISCHARGE HOOD	2141-HD-004	ACID ROAST KILN FEED SCREW HOIST	2141-HT-004																																																																																																																																																																																																																																																																															
KILN GEAR SPRAY HTR JUNC BOX	JB-504B	COOLER GEAR SPRAY HTR JUNC BOX	JB1-513B	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-002	KILN GEAR SPRAY PNEUMATIC PUMP	2141-PP-003	KOOLER GEAR SPRAY PNEUMATIC PUMP	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST COOLER	2141-ST-001	ACID ROAST EXHAUST STACK	2141-TK-001	COOLER WATER COLLECTION TANK	2141-VV-002	COOLER DISCHARGE ROTARY VALVE 1.1 kW 1500RPM	2141-XM-002	ACID ROAST KILN MAIN DRIVE 110 kW, 1000 RPM	2141-XM-003	ACID ROAST KILN INCHING DRIVE 7.5 kW, 1000 RPM	2141-XM-004	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	2141-JB1-002B	COOLING GEAR SPRAY HTR JUNC BOX	2141-JB1-003B	COOLING GEAR SPRAY HTR JUNC BOX	2141-KN-001	ACID ROAST KILN	2141-LU-001	KILN GEAR SPRAY SKID	2141-LU-002	KOOLER GEAR SPRAY SKID	2141-PP-001A	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-PP-001B	KOOLER WATER PUMP 30 kW, 1500 RPM	2141-RC-001	ACID ROAST 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Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

**LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
OVERVIEW**

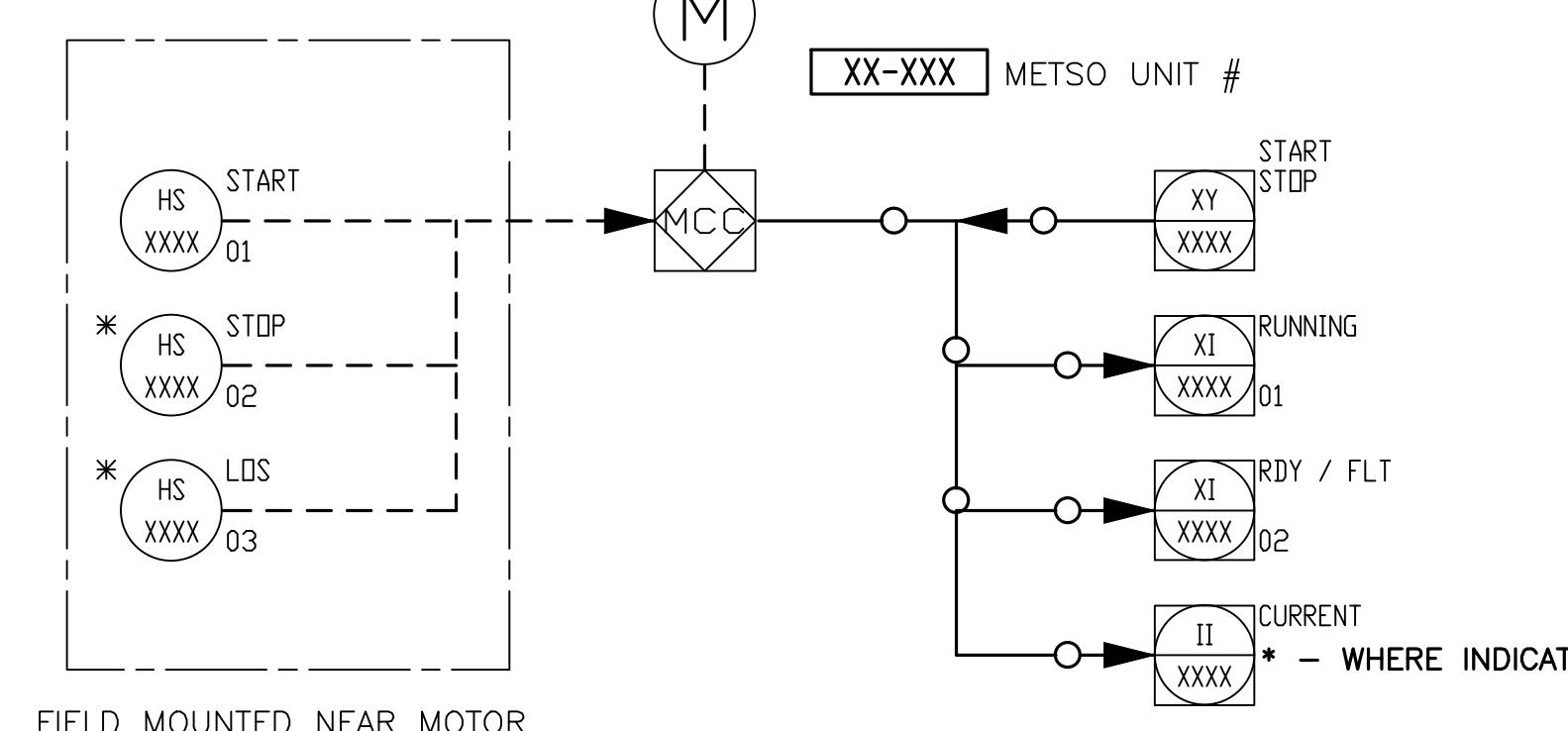
# wood

<b>WOOD.</b>		<b>SUPPLIER REVIEW DECAL</b>
PO/Contract No.:		SDDR Code:
PO/Contract Description.:		
Equipment Tag Numbers:		
<p>REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER. NOR DOES IR RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)</li> <li><input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.</li> <li><input type="checkbox"/> 3. Revise and resubmit. <u>Work may NOT proceed.</u></li> <li><input type="checkbox"/> 4. Review not required - for information only.</li> <li><input type="checkbox"/> 5. Certified Final</li> </ul>		
EPCM Project Document Number		Revision
EPCM Signature:		Date:

CLASSIFICATION: RESTRICTED

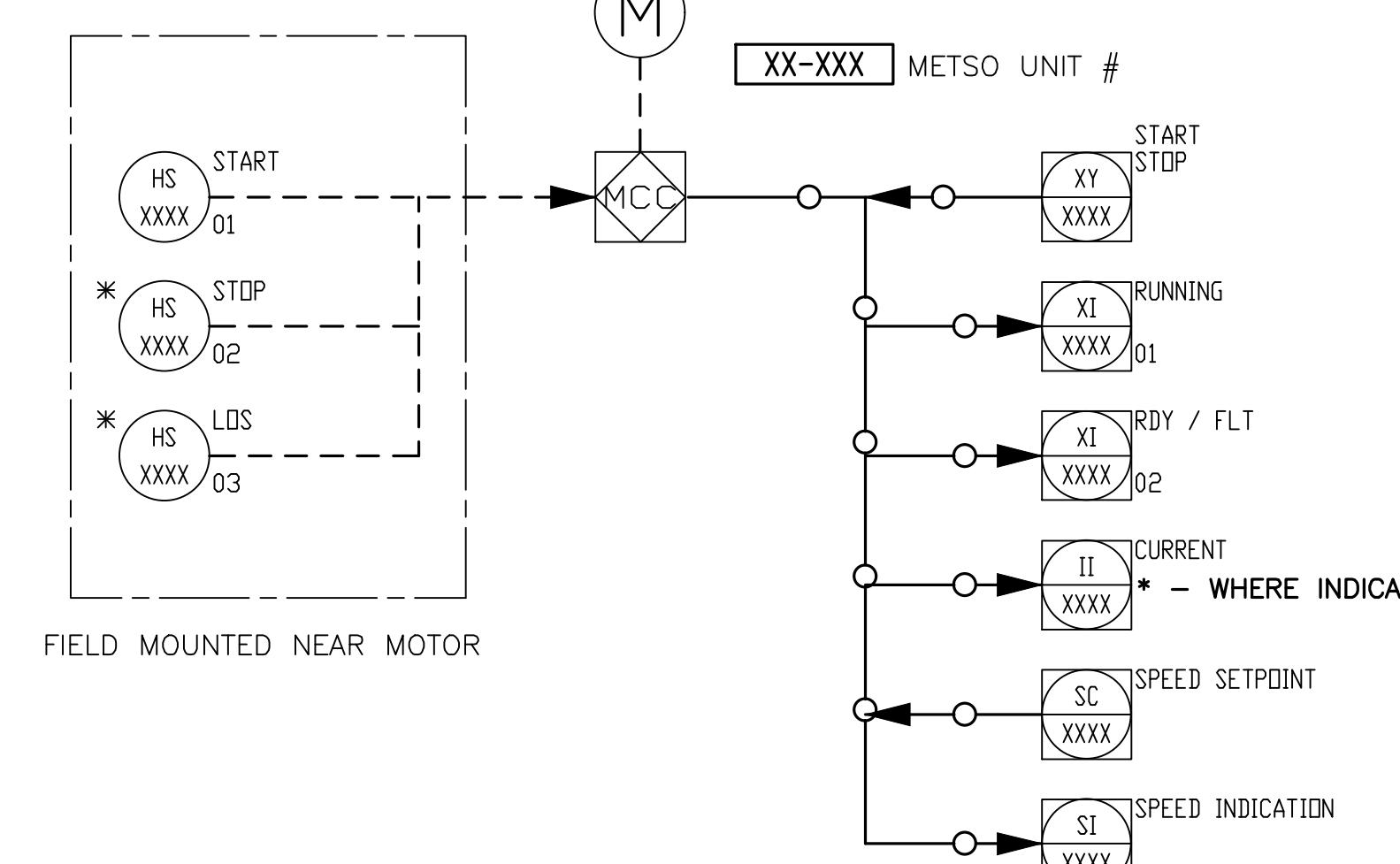
## MOTOR DETAIL #1

NON-REVERSING STARTER

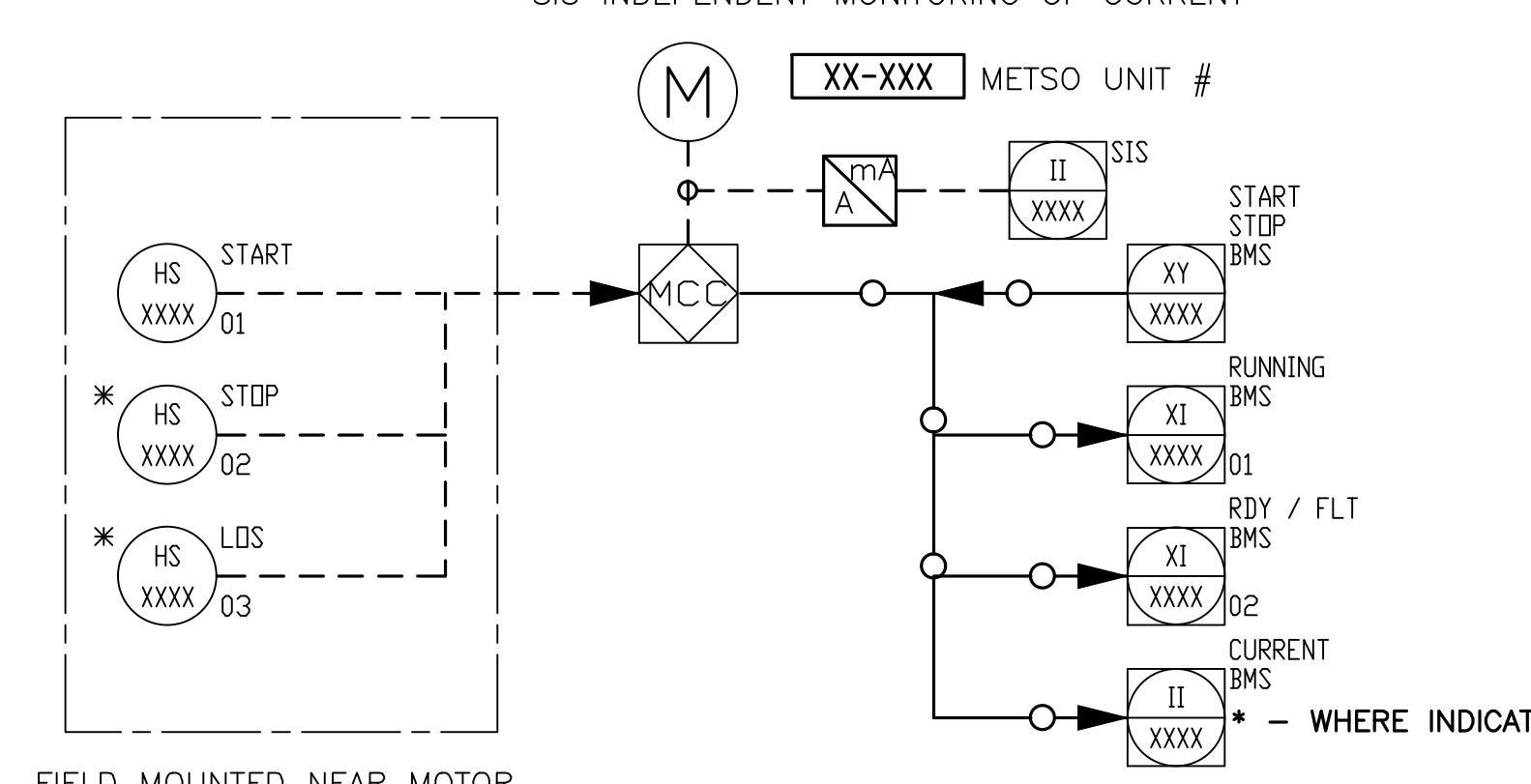


## MOTOR DETAIL #4

VARIABLE SPEED DRIVE

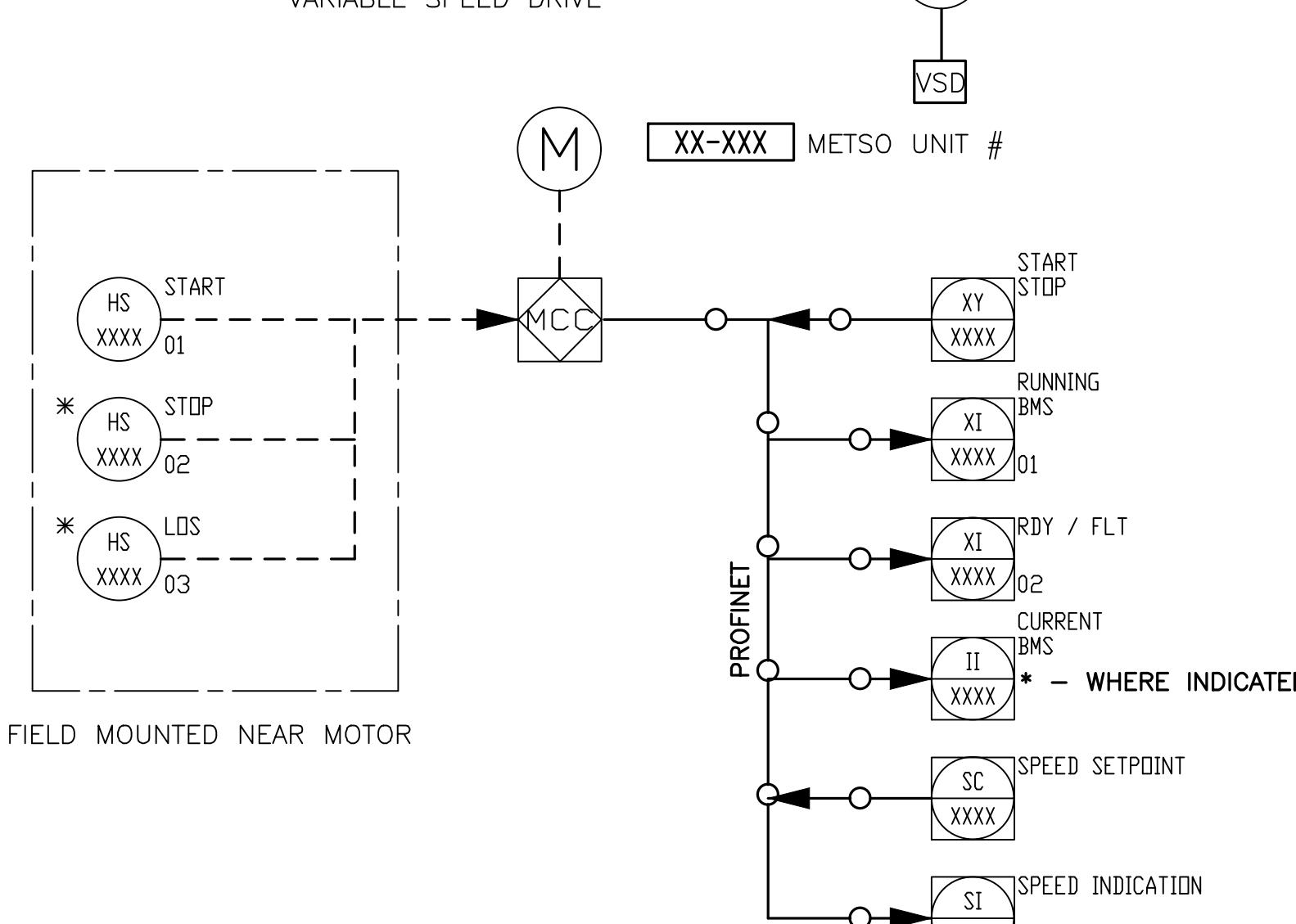


## MOTOR DETAIL #2

NON-REVERSING STARTER  
CONTROLLED BY BMS  
SIS INDEPENDENT MONITORING OF CURRENT

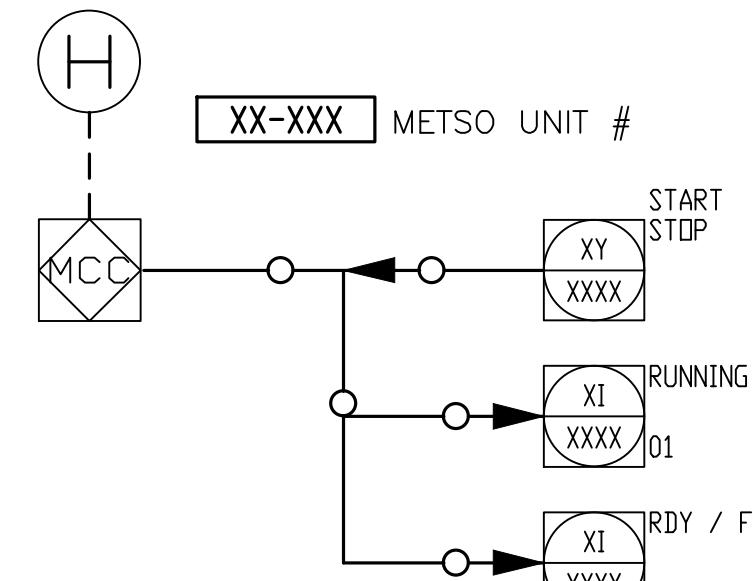
## MOTOR DETAIL #5

VARIABLE SPEED DRIVE



## HEATER DETAIL #3

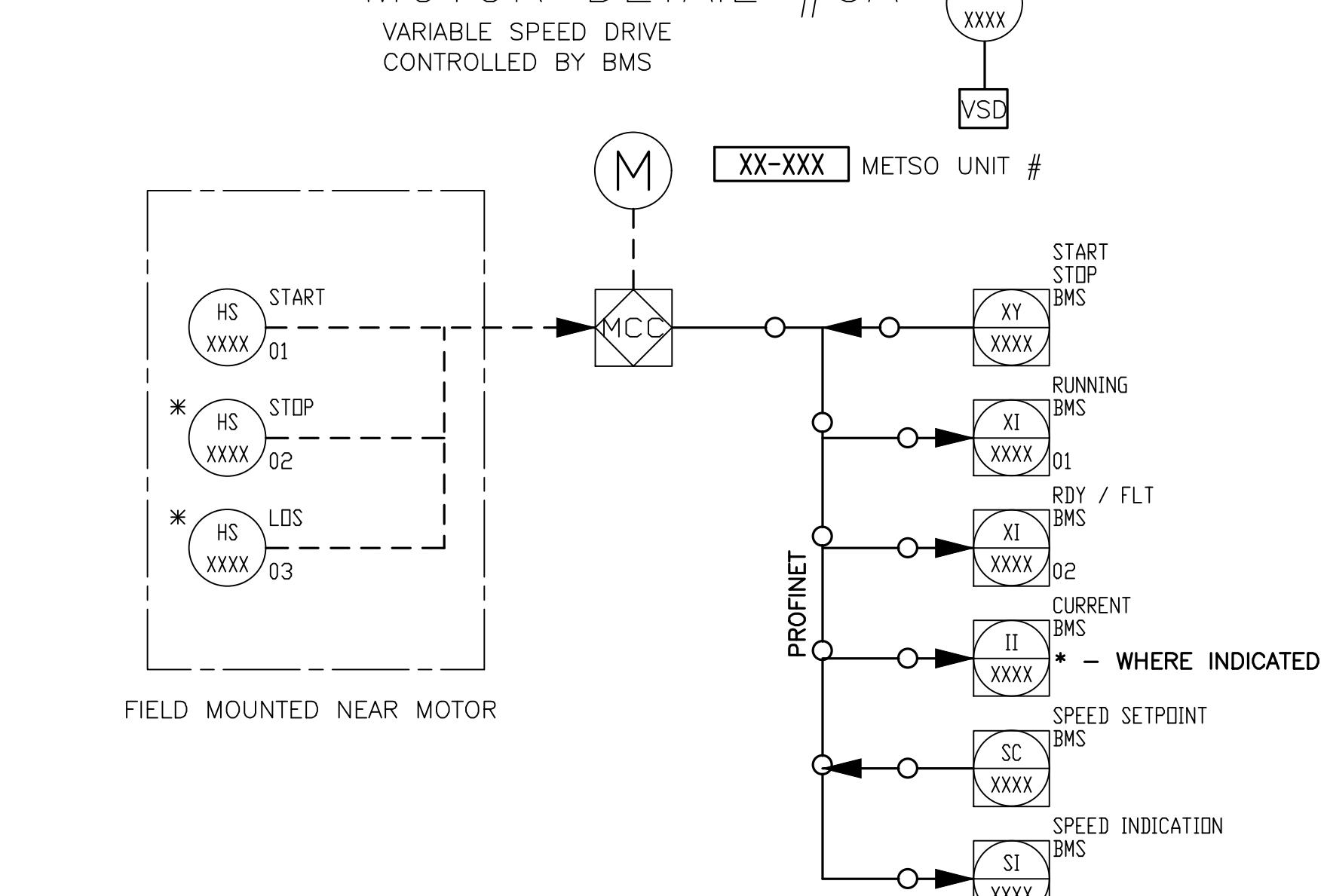
CONTACTOR / HEATER



## MOTOR/HEATER LIST

METSO UNIT #	DESCRIPTION	DETAIL #	CURRENT INDICATION	EMERGENCY POWER FEED	P&ID REFERENCE
2141-FA-001	FURNACE EXHAUST FAN	4	YES	YES	10262912-010
2121-FA-002	CALCINE KILN BURNER SECONDARY AIR FAN	5A	YES	NO	10262912-008
2141-FA-003	FURNACE 1 RECIRCULATING AIR FAN	4	YES	YES	10262912-006
2141-FA-004	FURNACE 2 RECIRCULATING AIR FAN	4	YES	YES	10262912-007
2141-FA-005	FURNACE 1 COMBUSTION AIR FAN	2	YES	NO	10262912-012
2141-FA-006	FURNACE 2 COMBUSTION AIR FAN	2	YES	NO	10262912-015
2141-FE-001	KILN SCREW FEEDER	4	NO	NO	10262912-006
2141-HT-004	KILN SCREW FEEDER HOIST	N/A	NO	NO	10262912-006
2141-PP-001A	COOLER WATER PUMP	4	NO	NO	10262912-020
2141-PP-001B	COOLER WATER PUMP	4	NO	NO	10262912-020
2141-VV-002	COOLER DISCHARGE ROTARY VALVE	1	NO	NO	10262912-011
2141-XM-002	KILN DRIVE	4	YES	NO	10262912-009
2141-XM-003	KILN INCHING DRIVE	1	NO	YES	10262912-009
2141-XM-004	COOLER DRIVE	4	YES	NO	10262912-011
2141-XM-005	COOLER AUXILIARY DRIVE	1	NO	YES	10262912-011
2151-FA-001A	ACID SCRUBBER EXHAUST FAN	4	YES	YES	10262912-025
2151-FA-001B	ACID SCRUBBER EXHAUST FAN	4	YES	YES	10262912-025
2151-FA-002	WESP PREHEAT FAN	N/A	NO	YES	10262912-022
2151-FA-003	WESP PREHEAT FAN	N/A	NO	YES	10262912-024
2151-FA-004	PACKED TOWER SPARGING AIR FAN	1	NO	NO	10262912-023
2151-HE-001	WESP PREHEATER	N/A	NO	YES	10262912-022
2151-HE-002	WESP PREHEATER	N/A	NO	YES	10262912-024
2151-PP-001A	SEPARATOR RECIRCULATION PUMP	1	YES	YES	10262912-021
2151-PP-001B	SEPARATOR RECIRCULATION PUMP	1	YES	YES	10262912-021
2151-PP-002A	PACKED TOWER RECIRCULATION PUMP	1	YES	YES	10262912-023
2151-PP-002B	PACKED TOWER RECIRCULATION PUMP	1	YES	YES	10262912-023
2151-PP-003	WESP SUMP PUMP	4	YES	YES	10262912-024

## MOTOR DETAIL #5A



wood. SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0) <input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments. <input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed. <input type="checkbox"/> 4. Review not required - for information only. <input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: Date:	
PROJECT No. C.005859 EQUIPMENT No.	
DATE: 2018-04-12 MATERIAL No.:	
CKD: SJH MATERIAL Spec.:	
DATE: 2018-04-20 MATERIAL Wt.: Wt. Unit:	
SCALE: 1:1 For Construction	
APPD: SJH DATE: 2018-04-20 ANSI DRAWING NO. SHEET 4 OF 25 REV 13	

CLASSIFICATION: RESTRICTED

13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

DO NOT SCALE

THIRD ANGLE PROJECTION

REV

DESCRIPTION OF REVISION



Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

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TITLE LITHIUM SPUDOMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
MOTOR DETAILS

BUYER ALBEMARLE KEMERTON PLANT  
LOCATION BUNBURY, WESTERN AUSTRALIA

DRN: WEB PROJECT No. C.005859 EQUIPMENT No.

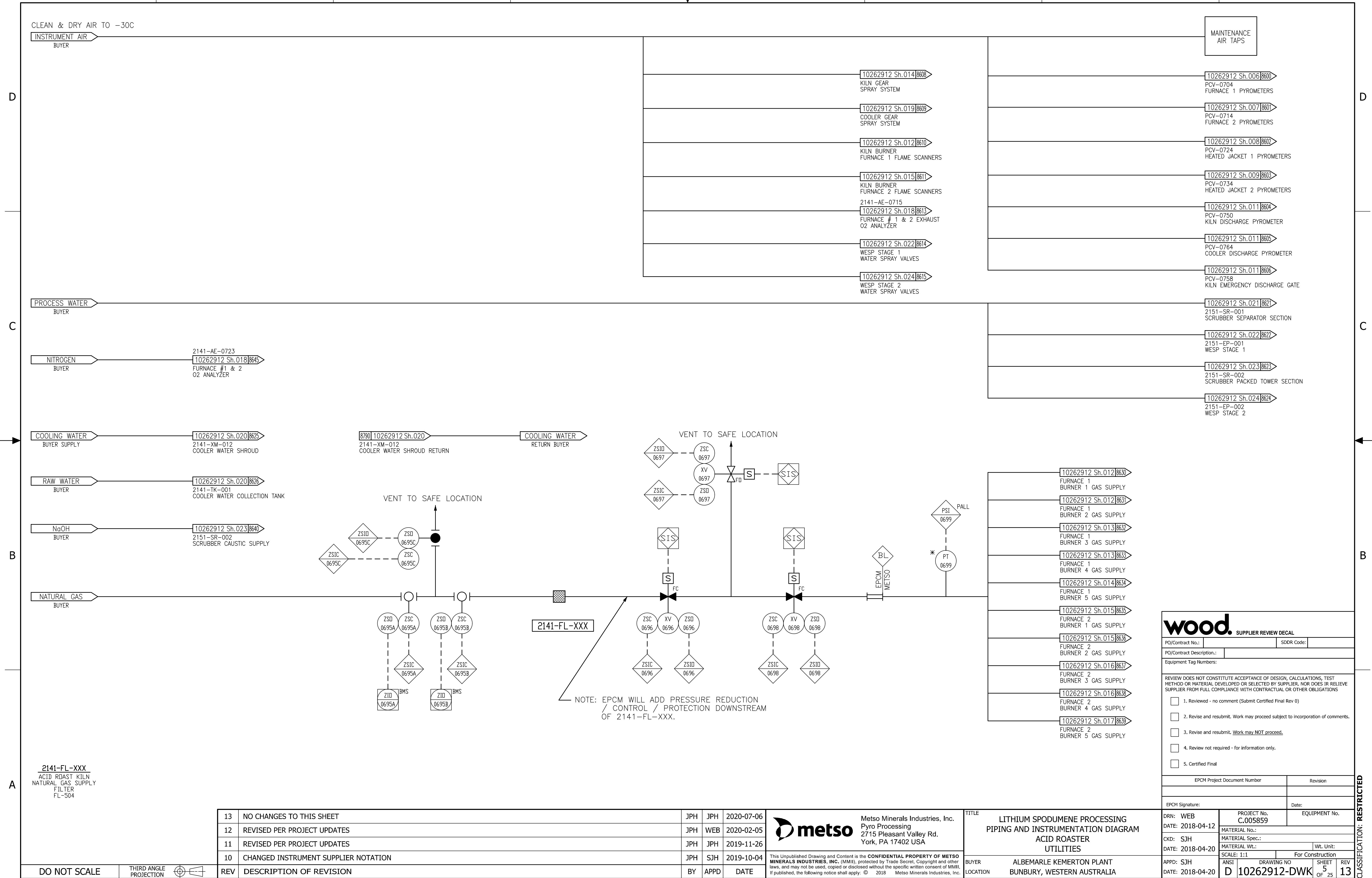
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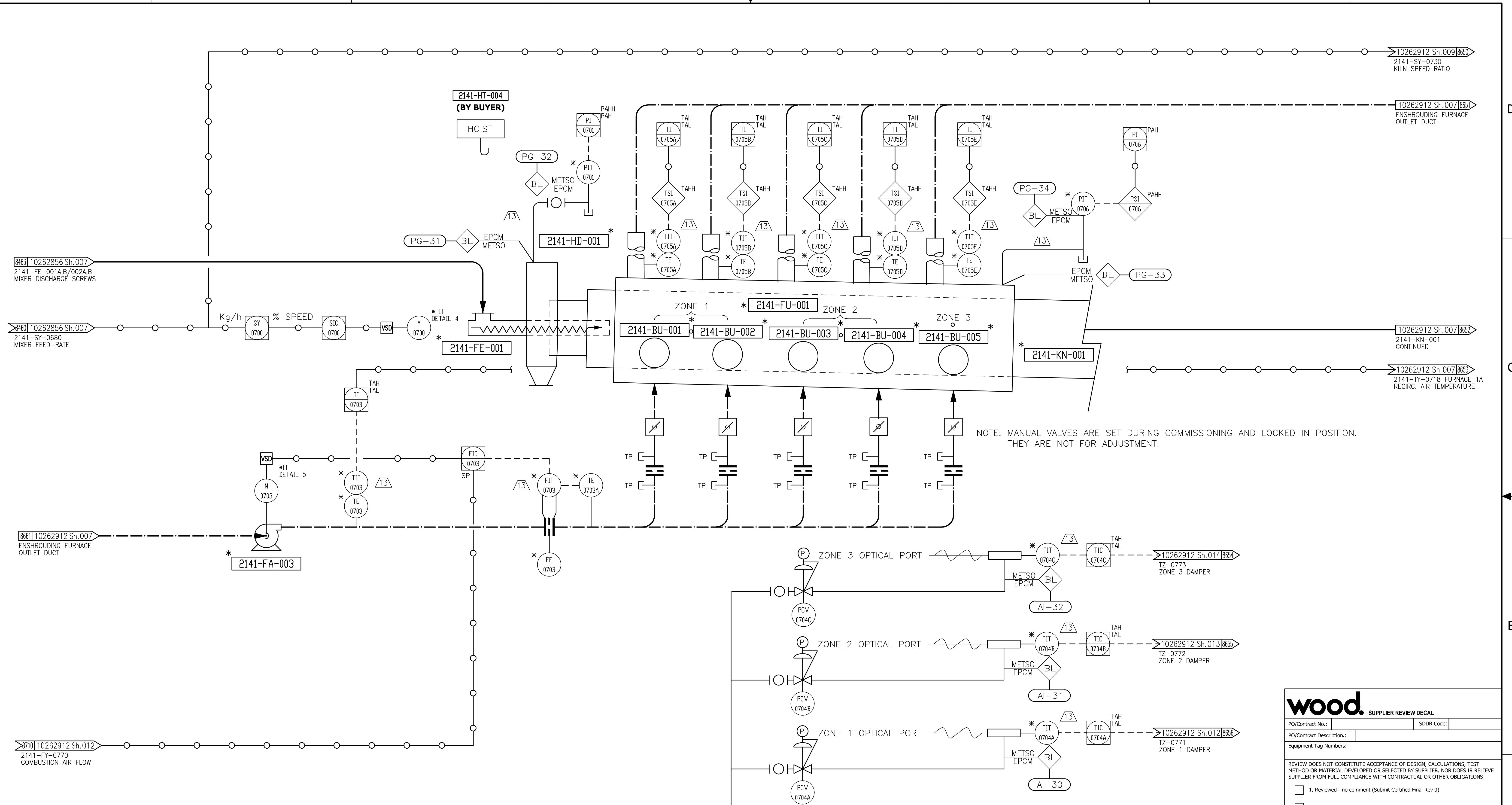
CKD: SJH MATERIAL Spec.:

DATE: 2018-04-20 MATERIAL Wt.: Wt. Unit:

SCALE: 1:1 For Construction

APPD: SJH DATE: 2018-04-20 ANSI DRAWING NO. SHEET 4 OF 25 REV 13





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# LITHIUM SPODUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM ACID ROASTER

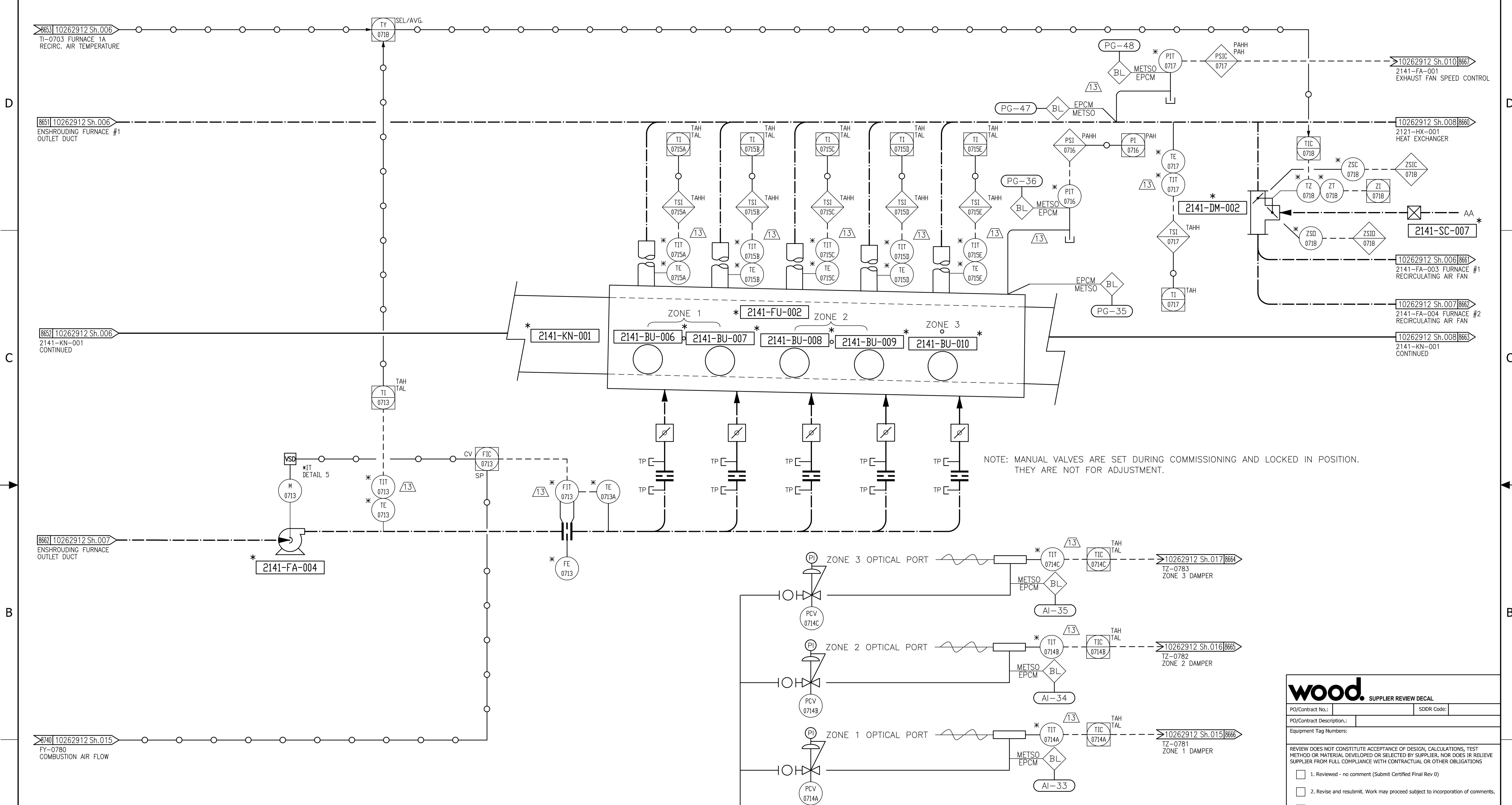
# KILN FURNACE 1

13	REVISED PER ARK HAZOP	JPH	JPH
12	REVISED PER PROJECT UPDATES	JPH	WEB
11	REVISED PER PROJECT UPDATES	JPH	JPH
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH
REV	DESCRIPTION OF REVISION	BY	APPD
			DATE

<b>wood.</b>		<b>SUPPLIER REVIEW DECAL</b>
PO/Contract No.:		SDDR Code:
PO/Contract Description.:		
Equipment Tag Numbers:		
<p>REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER. NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)</li> <li><input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.</li> <li><input type="checkbox"/> 3. Revise and resubmit. <u>Work may NOT proceed.</u></li> <li><input type="checkbox"/> 4. Review not required - for information only.</li> <li><input type="checkbox"/> 5. Certified Final</li> </ul>		
EPCM Project Document Number		Revision
EPCM Signature:		Date:

**CLASSIFICATION: RESTRICTED**

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1



wood. SUPPLIER REVIEW DECAL	
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<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: _____ Date: _____	
PROJECT No. C.005859 EQUIPMENT No. _____	
DRN: WEB DATE: 2018-04-12	
MATERIAL No.: _____	
CKD: SJH MATERIAL Spec.: _____	
MATERIAL Wt.: _____ Wt. Unit: _____	
DATE: 2018-04-20 SCALE: 1:1 For Construction	
BUYER ALBEMARLE KEMERTON PLANT LOCATION BUNBURY, WESTERN AUSTRALIA APPD: SJH	
ANSI D 10262912-DWK DRAWING NO. SHEET 7 OF 25 REV 13 DATE: 2018-04-20	



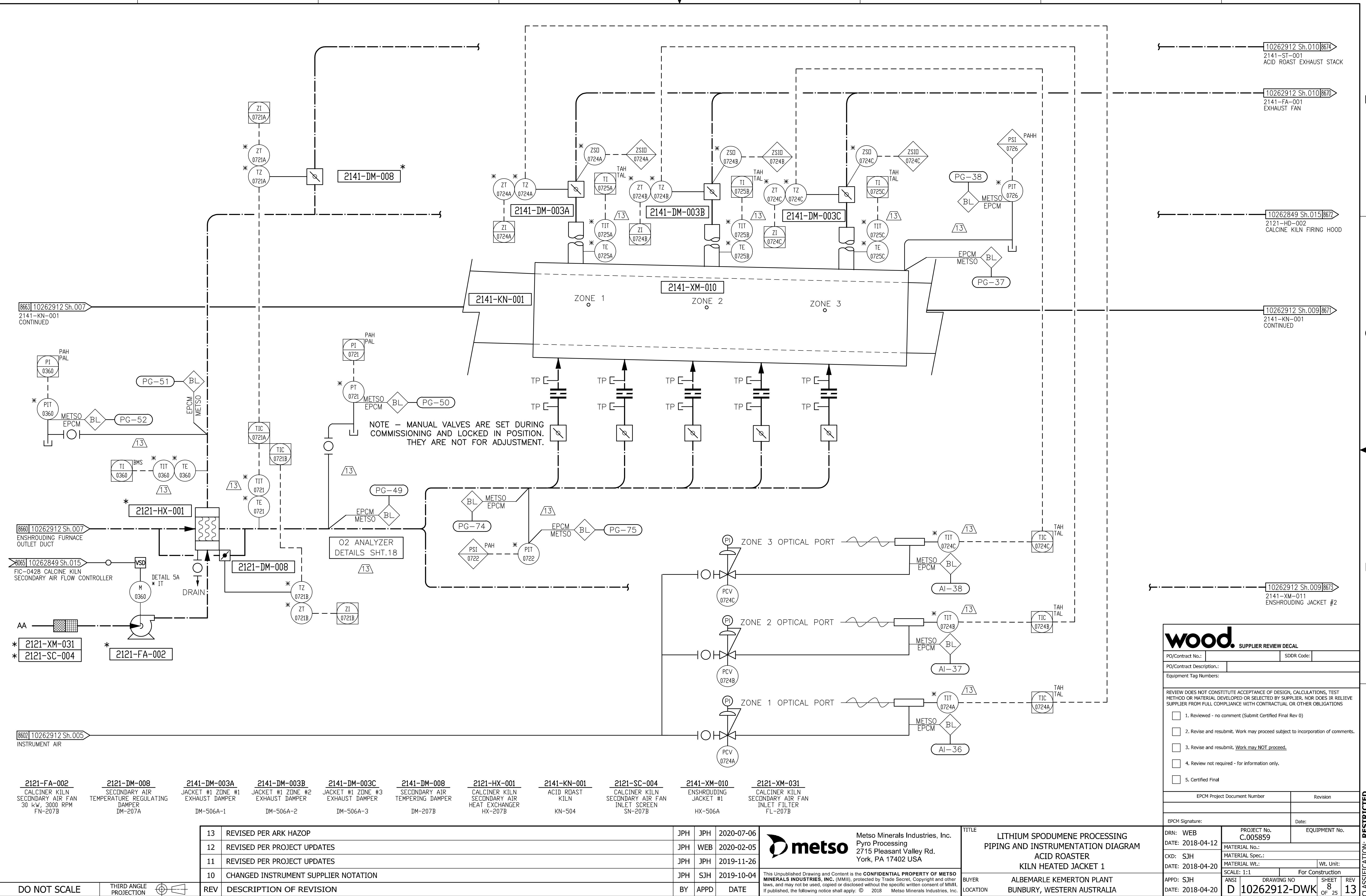
Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

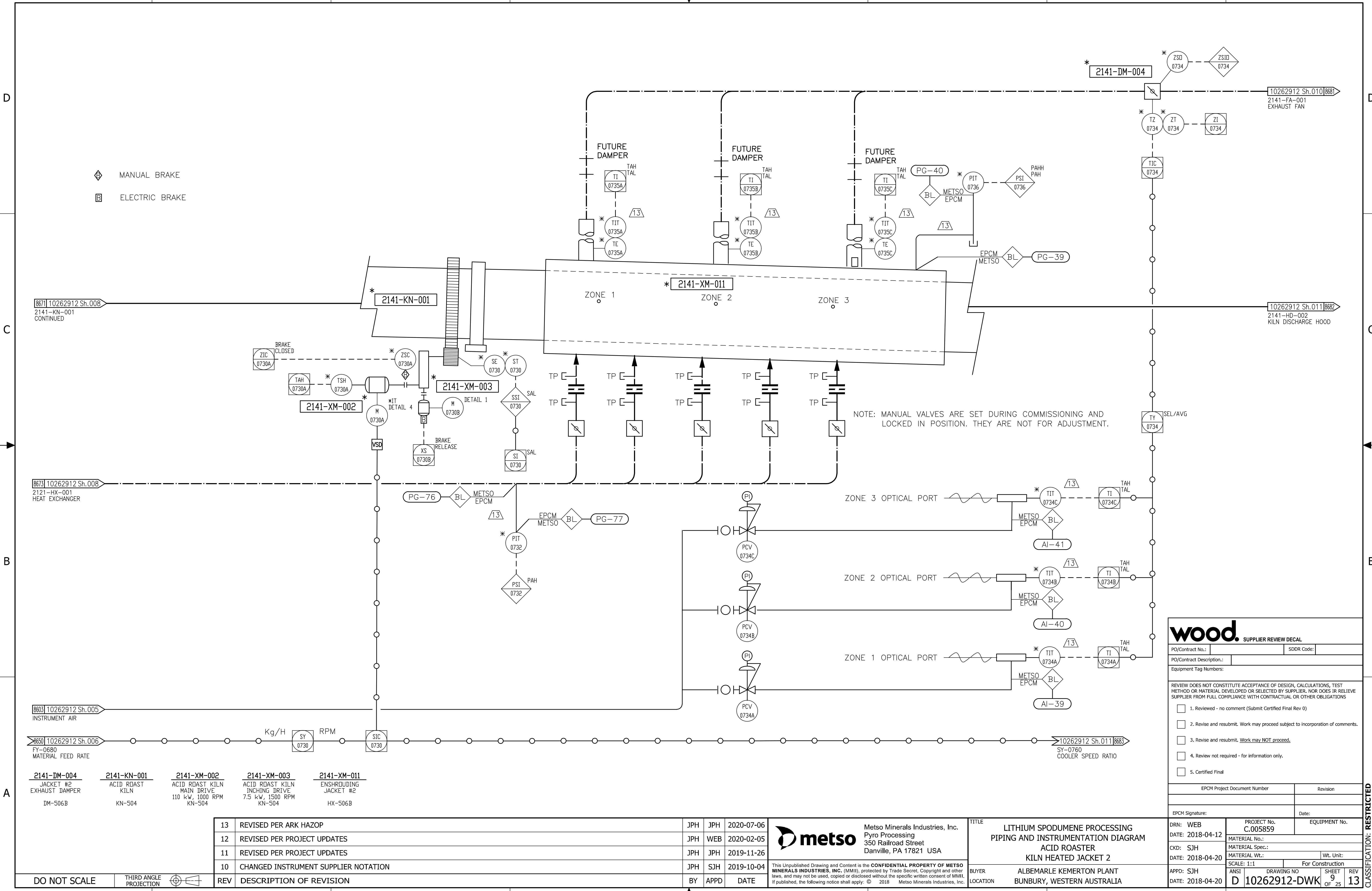
LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
KILN FURNACE 2

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DO NOT SCALE	THIRD ANGLE PROJECTION	REV	DESCRIPTION OF REVISION	BY	APPD	DATE
13	REVISED PER ARK HAZOP			JPH	JPH	2020-07-06
12	REVISED PER CUSTOMER COMMENTS			JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES			JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION			JPH	SJH	2019-10-04
DO NOT SCALE	THIRD ANGLE PROJECTION	REV	DESCRIPTION OF REVISION	BY	APPD	DATE

CLASSIFICATION: RESTRICTED





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Pyro Processing  
350 Railroad Street  
Danville, PA 17821 USA

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TITLE  
LITHIUM SPUDOMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
KILN HEATED JACKET 2

DRN: WEB  
DATE: 2018-04-12  
PROJECT No. C.005859  
MATERIAL No.:  
CKD: SJH  
MATERIAL Spec.:  
MATERIAL Wt.: Wt. Unit:  
SCALE: 1:1 For Construction  
BUYER ALBEMARLE KEMERTON PLANT  
LOCATION BUNBURY, WESTERN AUSTRALIA  
APPD: SJH  
DATE: 2018-04-20

ANSI DRAWING NO. D 10262912-DWK SHEET 9 OF 25 REV 13  
CLASSIFICATION: RESTRICTED

D

D

C

C

B

B

A

A

86710262912 Sh.008  
2141-DM-008  
SECONDARY AIR TEMPERING DAMPER

86710262912 Sh.008  
2141-XM-010  
HEATED JACKET #1

86710262912 Sh.009  
2141-XM-011  
HEATED JACKET #2

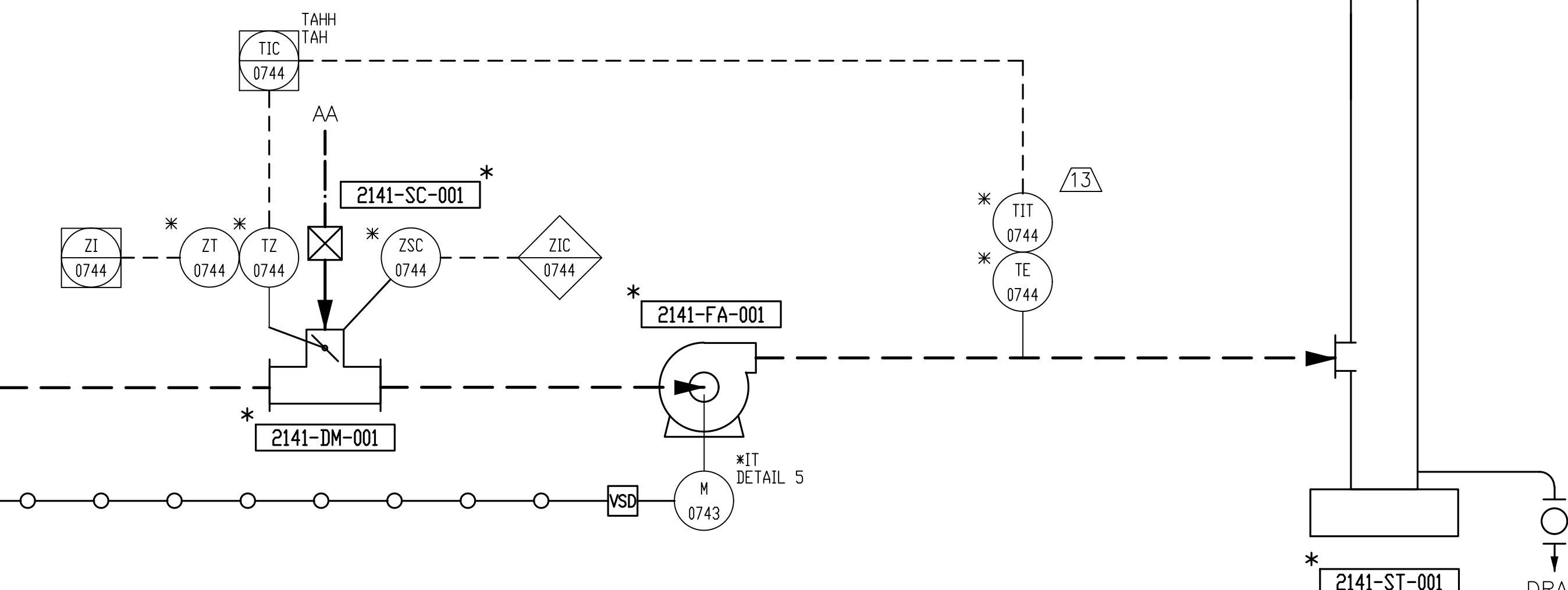
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2141-PIC-0717 FURNACE EXHAUST  
PRESSURE CONTROLLER

2141-DM-001  
EXHAUST FAN  
TEMPERING DAMPER  
DM-510

2141-FA-001  
ENSHROUDING JACKET  
EXHAUST FAN  
55 kW, 3000 RPM  
FN-510

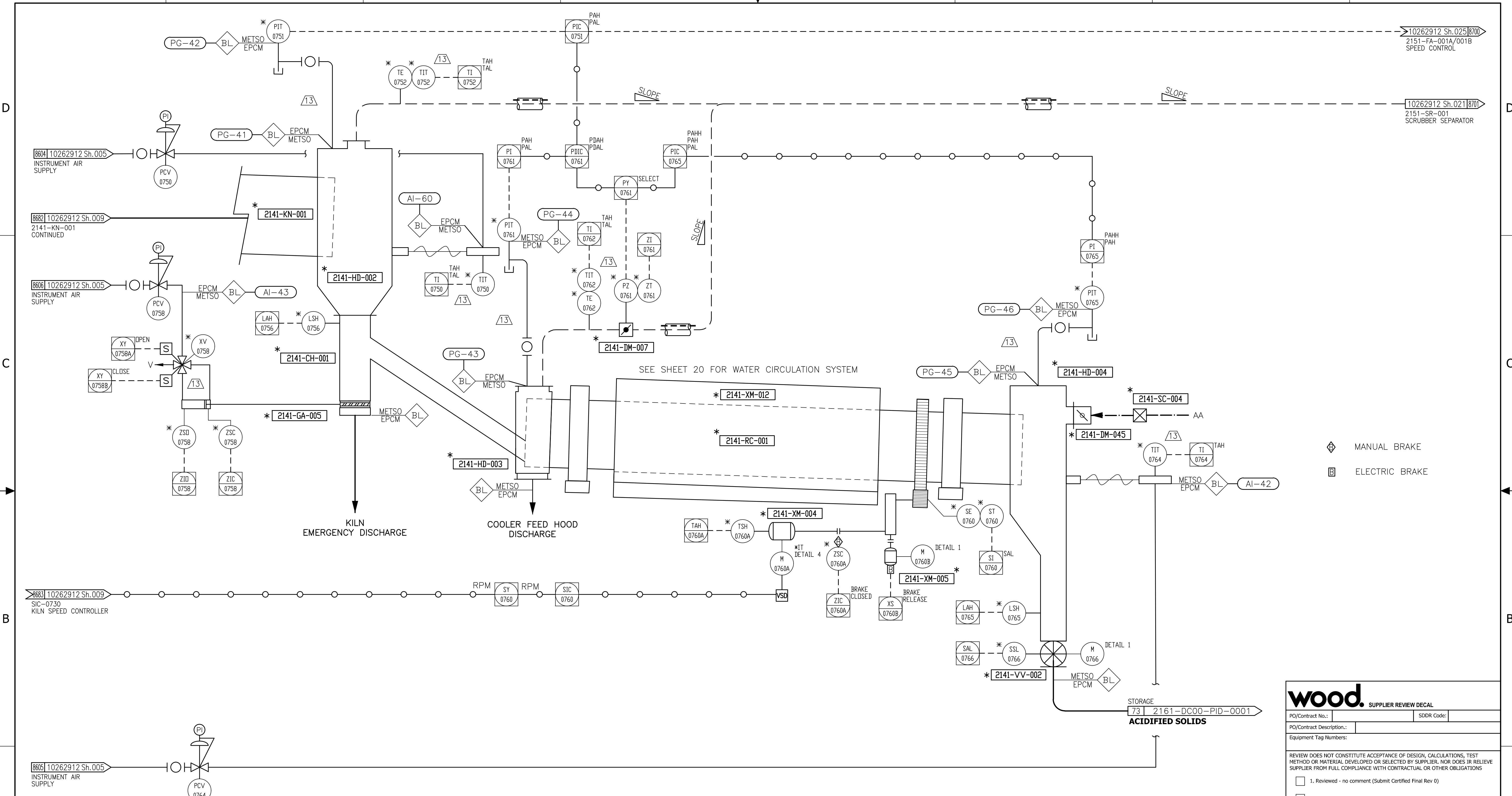
2141-SC-001  
EXHAUST FAN  
TEMPERING DAMPER  
INLET SCREEN  
SN-510

2141-ST-001  
ACID ROAST  
EXHAUST STACK  
SK-511



13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06	metso	Metso Minerals Industries, Inc. Pyro Processing 350 Railroad Street Danville, PA 17821 USA	TITLE LITHIUM SPODUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM ACID ROASTER EXHAUST FAN AND STACK	DRN: WEB DATE: 2018-04-12	PROJECT No. C.005859	EQUIPMENT No.
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05				MATERIAL No.:		
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26				CKD: SJH	MATERIAL Spec.:	
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04		This Unpublished Drawing and Content is the CONFIDENTIAL PROPERTY OF METSO MINERALS INDUSTRIES, INC. (MMI), protected by Trade Secret, Copyright and other laws, and may not be used, copied or disclosed without the specific written consent of MMI. If published, the following notice shall apply. © 2018 Metso Minerals Industries, Inc.	DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:	
DO NOT SCALE	THIRD ANGLE PROJECTION	REV	DESCRIPTION OF REVISION	BY APPD DATE		BUYER ALBEMARLE KEMERTON PLANT LOCATION BUNBURY, WESTERN AUSTRALIA	APPD: SJH DATE: 2018-04-20	SCALE: 1:1 For Construction	ANSI D 10262912-DWK	DRAWING NO. SHEET 10 OF 25 REV 13

CLASSIFICATION: RESTRICTED



2141-CH-001	2141-DM-007	2141-DM-045	2141-GA-005	2141-HD-002	2141-HD-003	2141-HD-004	2141-KN-001	2141-RC-001	2141-SC-004	2141-VV-002	2141-XM-004	2141-XM-005	2141-XM-012
KILN DISCHARGE TRANSFER CHUTE	COOLER EXHAUST DAMPER	ACID ROAST COOLER SWEEP AIR DAMPER	KILN EMERGENCY DISCHARGE GATE	KILN DISCHARGE HOOD	KILOMETER-512	KILOMETER-512	KILOMETER-504	KILOMETER-513	ACID ROAST COOLER SWEEP AIR DAMPER SCREEN	ROTARY VALVE 1.1 kW, 1500 RPM	ACID ROAST COOLER MAIN DRIVE 55 kW, 1000 RPM	ACID ROAST COOLER AUXILIARY DRIVE 3.7 kW, 1500 RPM	KILOMETER-513
CH-512	DM-512	DM-516	GT-512	HD-509	HD-512	HD-516	KN-504	CD-513	SN-516	VV-516	CD-513	CD-513	HX-514

13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

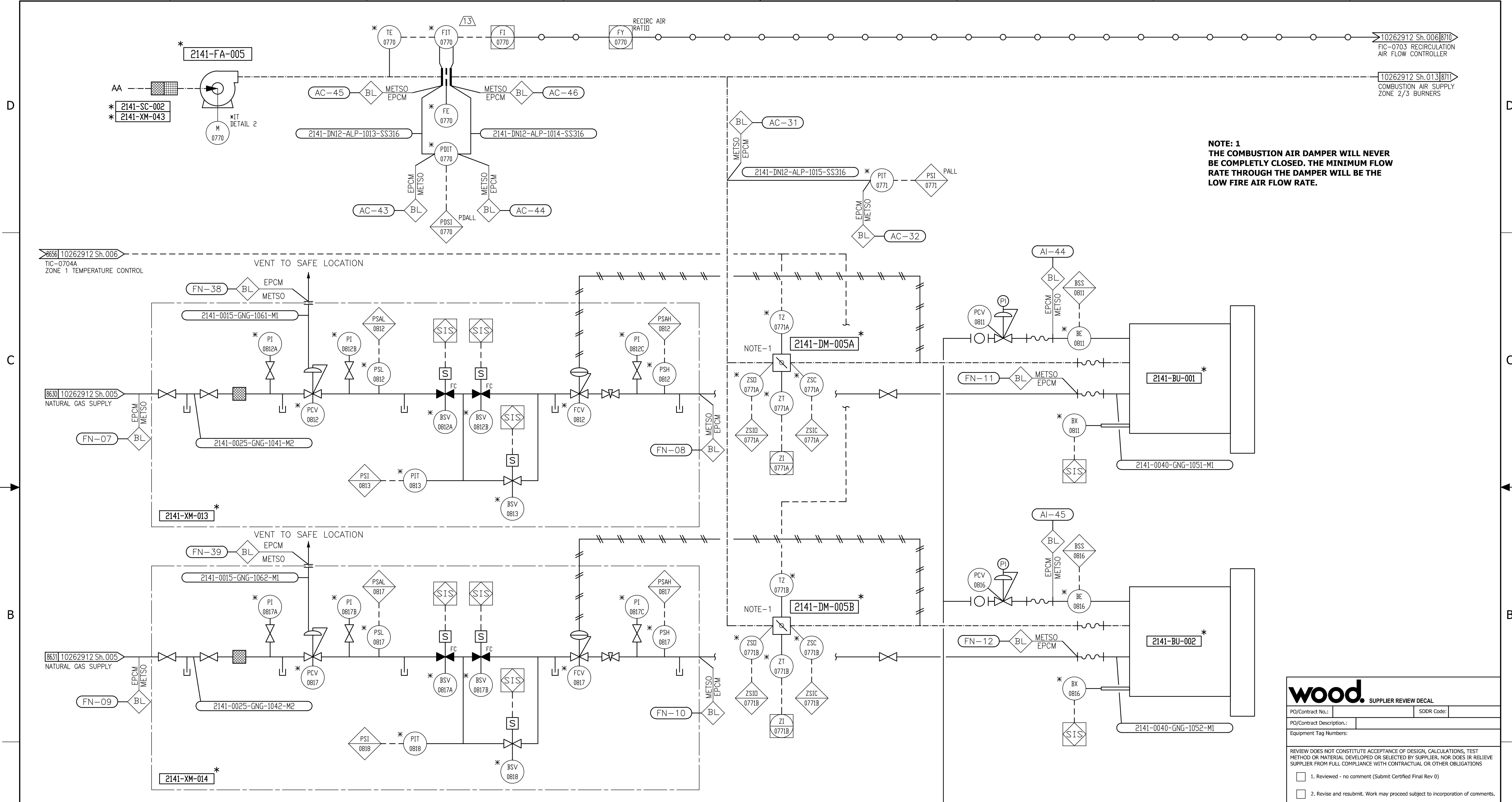
DO NOT SCALE THIRD ANGLE PROJECTION REV DESCRIPTION OF REVISION



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DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-12	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
APPD: SJH	SCALE: 1:1	For Construction
DATE: 2018-04-20	ANSI	DRAWING NO. D 10262912-DWK
	SHEET	11 OF 25
	REV	13



<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
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<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: Date:	

**2141-BU-001** FURNACE #1  
**2141-BU-002** FURNACE #1  
**2141-DM-005A** BURNER #1  
**2141-DM-005B** BURNER #2  
**2141-FA-005** COMBUSTION AIR FAN  
**2141-SC-002** COMBUSTION AIR FAN INLET SILENCER  
**2141-XM-013** BURNER #1 GAS RACK  
**2141-XM-014** BURNER #2 GAS RACK  
**2141-XM-043** COMBUSTION AIR FAN INLET FILTER

REV		DESCRIPTION OF REVISION	
13	REVISED PER ARK HAZOP	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB 2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH 2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH 2019-10-04
DO NOT SCALE	THIRD ANGLE PROJECTION	BY APPD	DATE



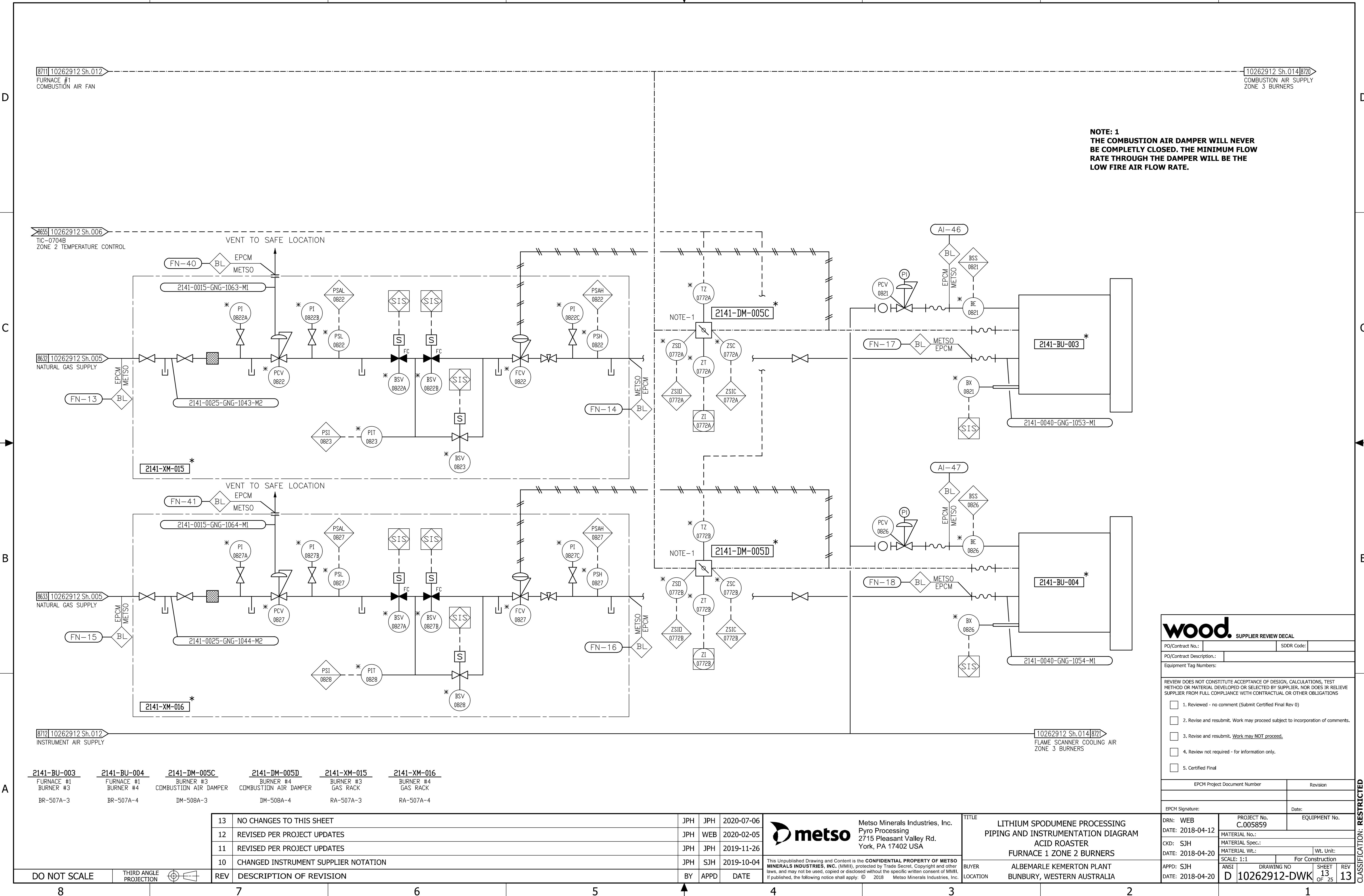
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 2715 Pleasant Valley Rd.  
 York, PA 17402 USA

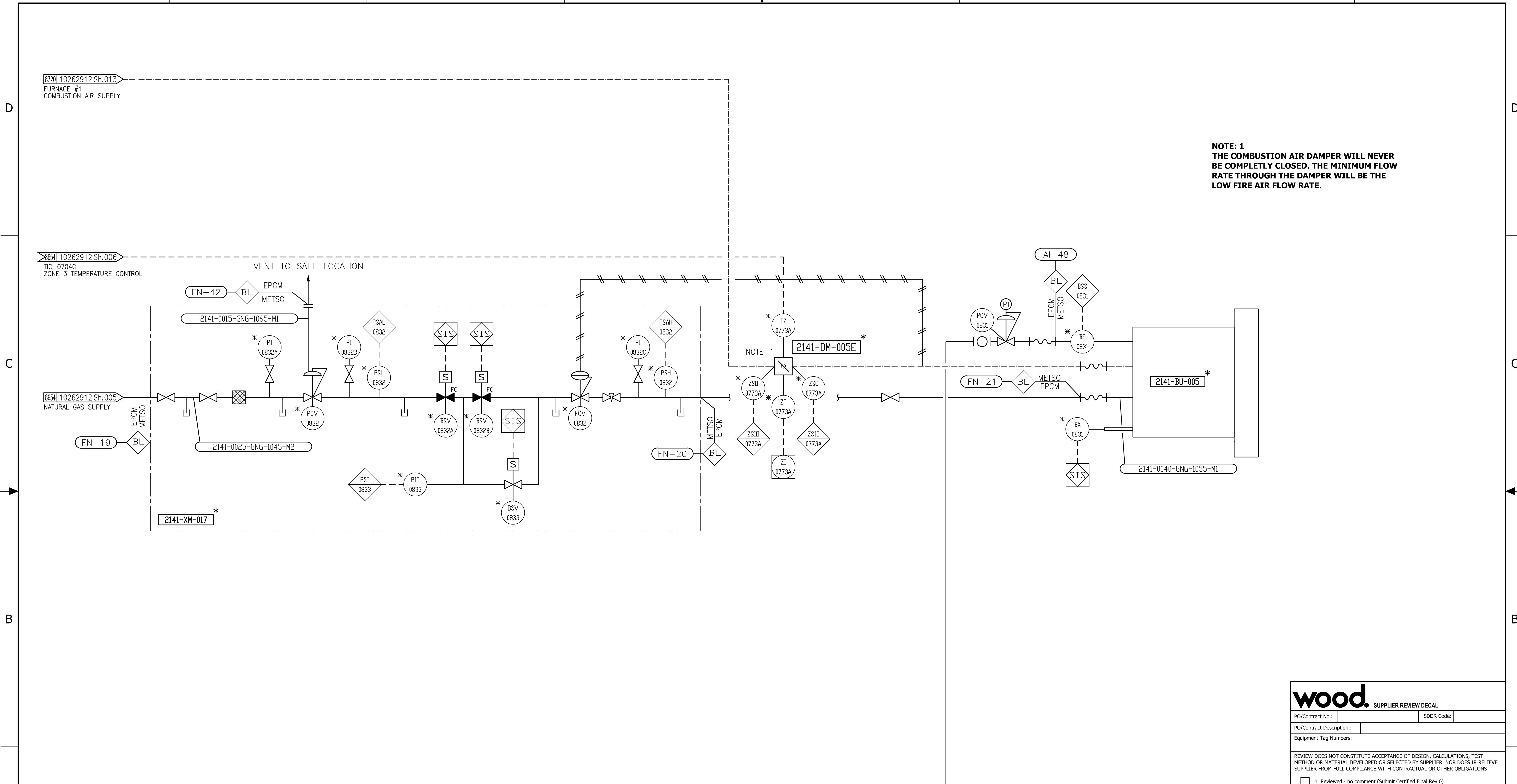
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TITLE  
 LITHIUM SPUDOMENE PROCESSING  
 PIPING AND INSTRUMENTATION DIAGRAM  
 ACID ROASTER  
 FURNACE 1 ZONE 1 BURNERS

DRN: WEB  
 DATE: 2018-04-12  
 MATERIAL No.:  
 CKD: SJH  
 MATERIAL Spec.:  
 DATE: 2018-04-20  
 MATERIAL Wt.:  
 SCALE: 1:1  
 For Construction  
 BUYER LOCATION: ALBEMARLE KEMERTON PLANT  
 BUNBURY, WESTERN AUSTRALIA

EQUIPMENT No.: C.005859  
 DRN: WEB  
 DATE: 2018-04-12  
 MATERIAL No.:  
 CKD: SJH  
 MATERIAL Spec.:  
 DATE: 2018-04-20  
 MATERIAL Wt.:  
 SCALE: 1:1  
 For Construction  
 ANSI D 10262912-DWK  
 DRAWING NO. 12 OF 25  
 REV 13





<b>wood.</b> SUPPLIER REVIEW DECAL		
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PO/Contract Description:		
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EPCM Project Document Number		Revision
EPCM Signature: Date:		
PROJECT No. C.005859		
DATE: 2018-04-12		
MATERIAL No.:		
CKD: SJH		
MATERIAL Spec.:		
DATE: 2018-04-20		
MATERIAL Wt. Wt. Unit:		
SCALE: 1:1 For Construction		
BUYER ALBEMARLE KEMERTON PLANT		
LOCATION BUNBURY, WESTERN AUSTRALIA		
APPD: SJH DATE: 2018-04-20		
ANSI DRAWING NO D 10262912-DWK SHEET 14 OF 25 REV 13		

2141-BU-005    2141-DM-005E    2141-XM-017  
 FURNACE #1    BURNER #5    BURNER #5  
 BURNER #5    COMBUSTION AIR DAMPER    GAS RACK  
 BR-507A-5    DM-509A-5    RA-507A-5

13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

DO NOT SCALE    THIRD ANGLE PROJECTION    REV

DESCRIPTION OF REVISION

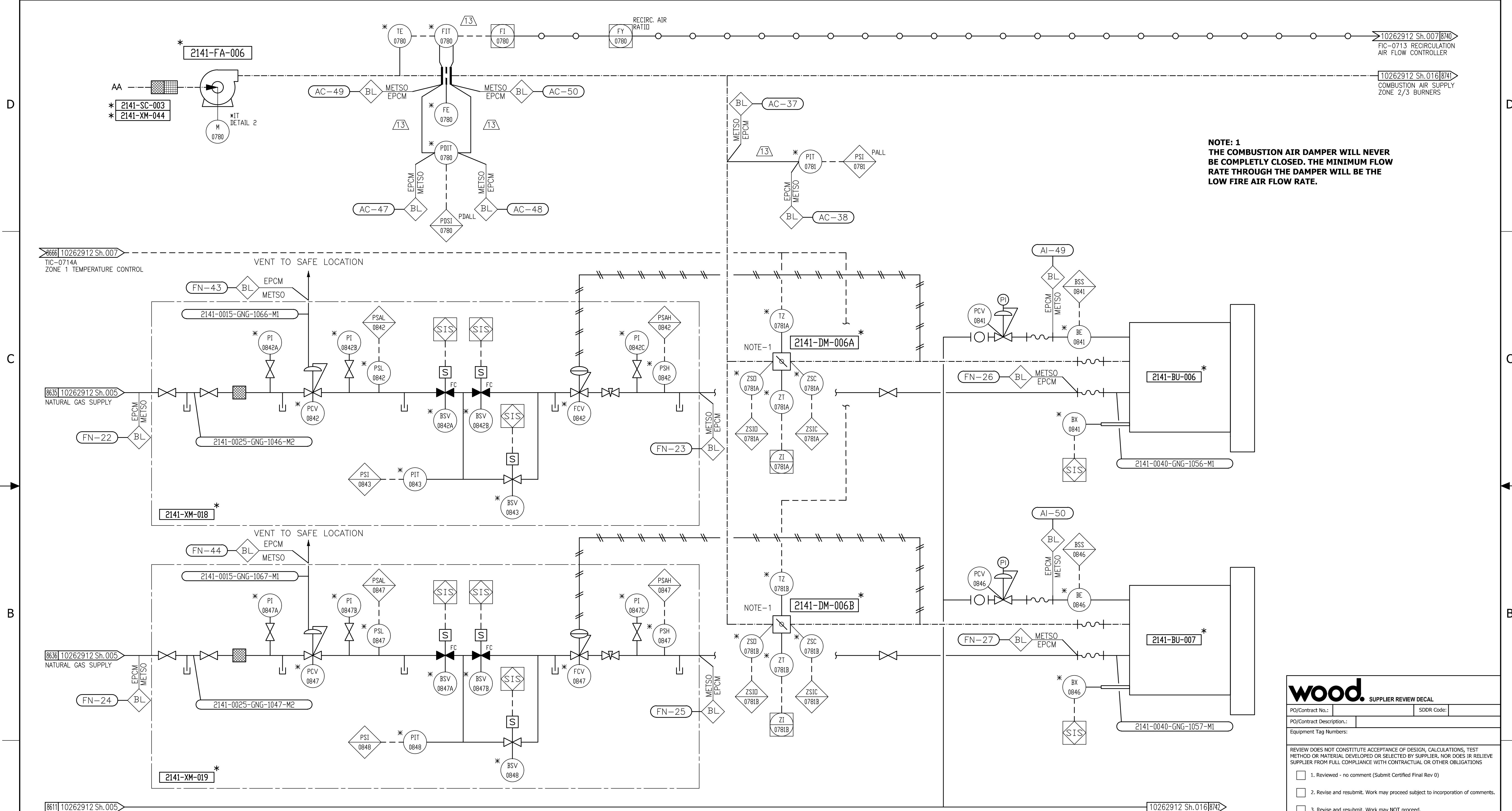
BY APPD DATE



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TITLE LITHIUM SPUDUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
FURNACE 1 ZONE 3 BURNERS

DRN: WEB PROJECT No. C.005859 EQUIPMENT No.  
 DATE: 2018-04-12 MATERIAL No.:  
 CKD: SJH MATERIAL Spec.:  
 DATE: 2018-04-20 MATERIAL Wt. Wt. Unit:  
 BUYER ALBEMARLE KEMERTON PLANT SCALE: 1:1 For Construction  
 LOCATION BUNBURY, WESTERN AUSTRALIA APPD: SJH DATE: 2018-04-20  
 ANSI DRAWING NO D 10262912-DWK SHEET 14 OF 25 REV 13



<b>wood.</b> SUPPLIER REVIEW DECAL	
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EPCM Project Document Number	Revision
EPCM Signature: Date:	

2141-BU-006	2141-BU-007	2141-DM-006A	2141-DM-006B	2141-FA-006	2141-SC-003	2141-XM-018	2141-XM-019	2141-XM-044
FURNACE #2 BR-507B-1	FURNACE #2 BR-507B-2	BURNER #6 DM-508A-1	BURNER #7 DM-508A-2	FURNACE #2 COMBUSTION AIR FAN 11 kW, 3000 RPM FN-508A-2	COMBUSTION AIR FAN SILENCER SC-508A-2	BURNER #6 GAS RACK RA-507B-1	BURNER #7 GAS RACK RA-507B-2	COMBUSTION AIR FAN INLET FILTER FL-508A-2

13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
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DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			



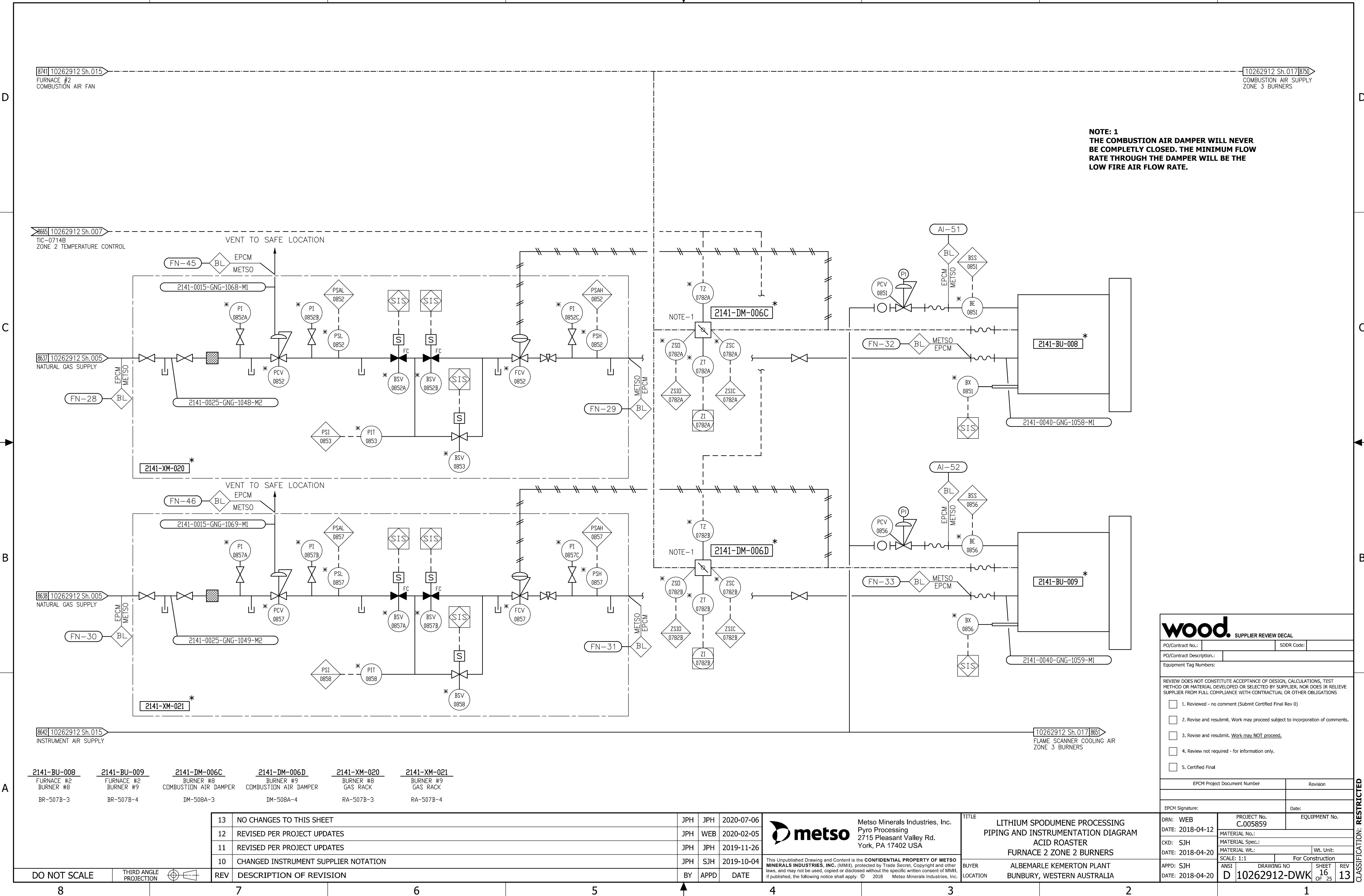
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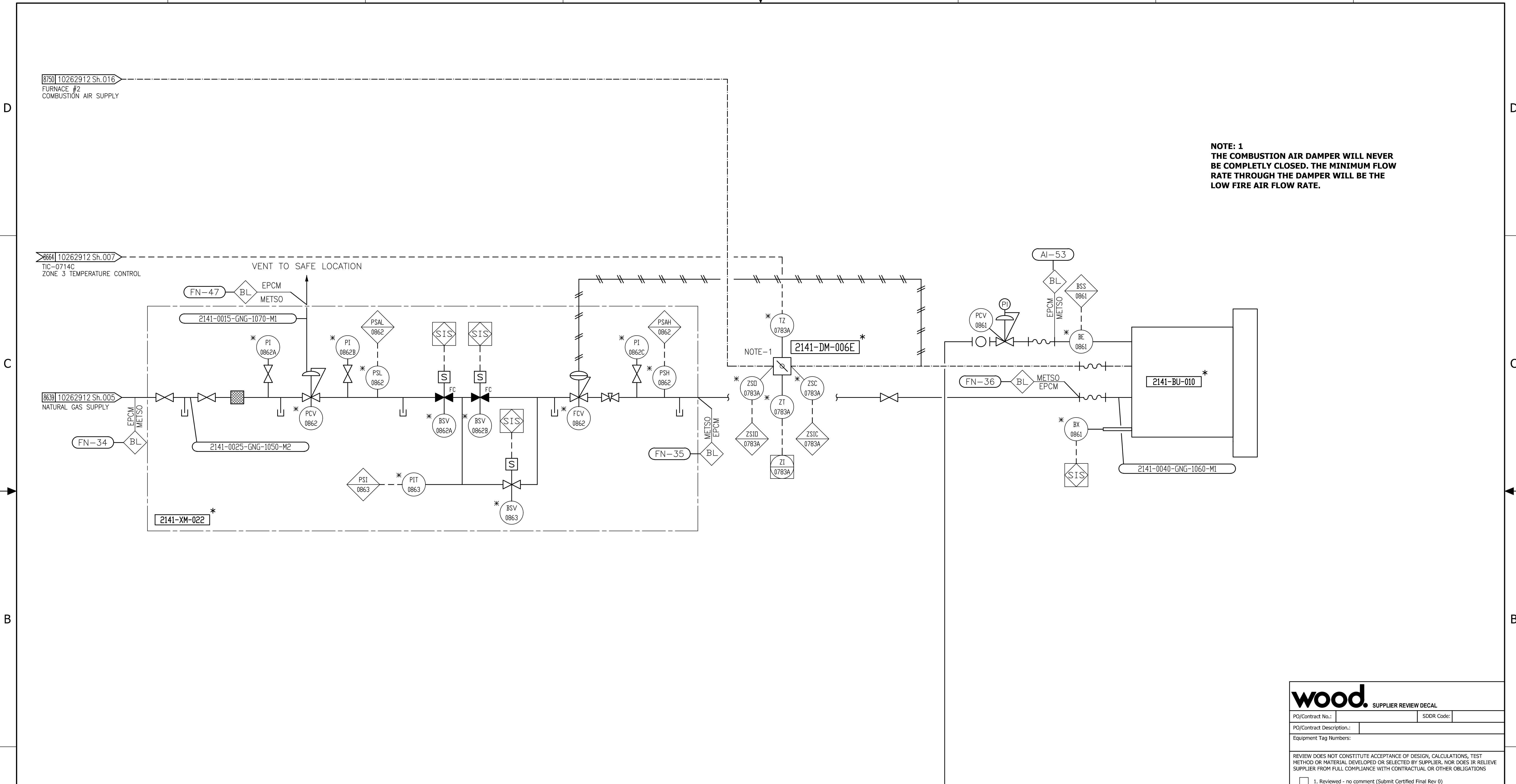
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TITLE  
LITHIUM SPUDOMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
FURNACE 2 ZONE 1 BURNERS

BUYER  
ALBEMARLE KEMERTON PLANT  
LOCATION  
BUNBURY, WESTERN AUSTRALIA

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-12	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
APPD: SJH	SCALE: 1:1	For Construction
DATE: 2018-04-20	ANSI	DRAWING NO. D 10262912-DWK
	SHEET 15 OF 25	REV 13





2141-BU-010    2141-DM-006E    2141-XM-022

FURNACE #2  
BURNER #5  
COMBUSTION AIR DAMPER

BURNER #10  
GAS RACK

RA-507B-5

BR-507B-5

DM-508B-5

RA-507B-5

13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
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11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
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DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
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Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE  
LITHIUM SPUDUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
FURNACE 2 ZONE 3 BURNERS

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-12	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
BUYER ALBEMARLE KEMERTON PLANT	SCALE: 1:1	For Construction
LOCATION BUNBURY, WESTERN AUSTRALIA	APPD: SJH	
DATE: 2018-04-20	ANSI D 10262912-DWK	SHEET 17 OF 25 REV 13

CLASSIFICATION: RESTRICTED

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C

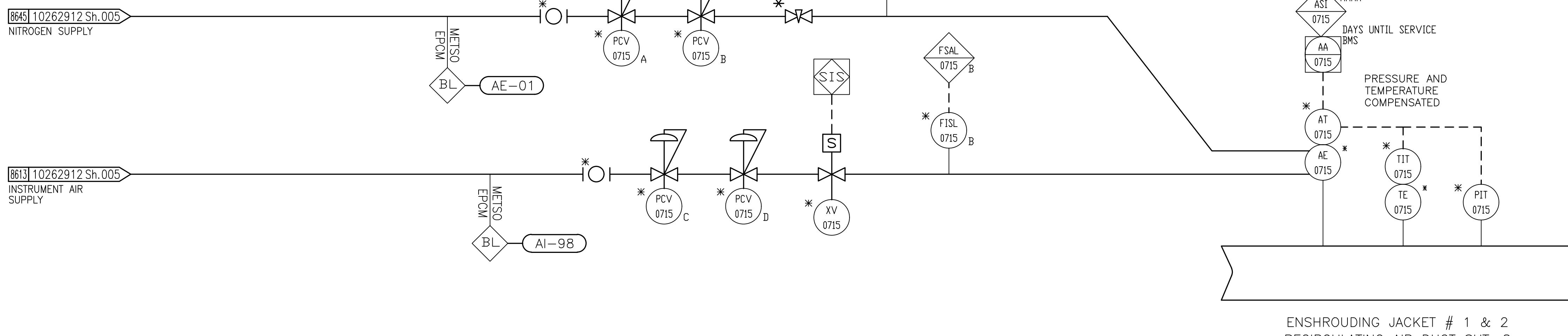
C

B

B

A

A



wood. SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
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EPCM Project Document Number	Revision
EPCM Signature: Date:	
PROJECT No. C.005859 EQUIPMENT No.	
DRN: WEB	DATE: 2018-04-12
MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:
MATERIAL Wt. Wt. Unit:	
BUYER ALBEMARLE KEMERTON PLANT	SCALE: 1:1 For Construction
LOCATION BUNBURY, WESTERN AUSTRALIA	APPD: SJH DATE: 2018-04-20
ANSI DRAWING NO. SHEET 18 REV 13 OF 25	

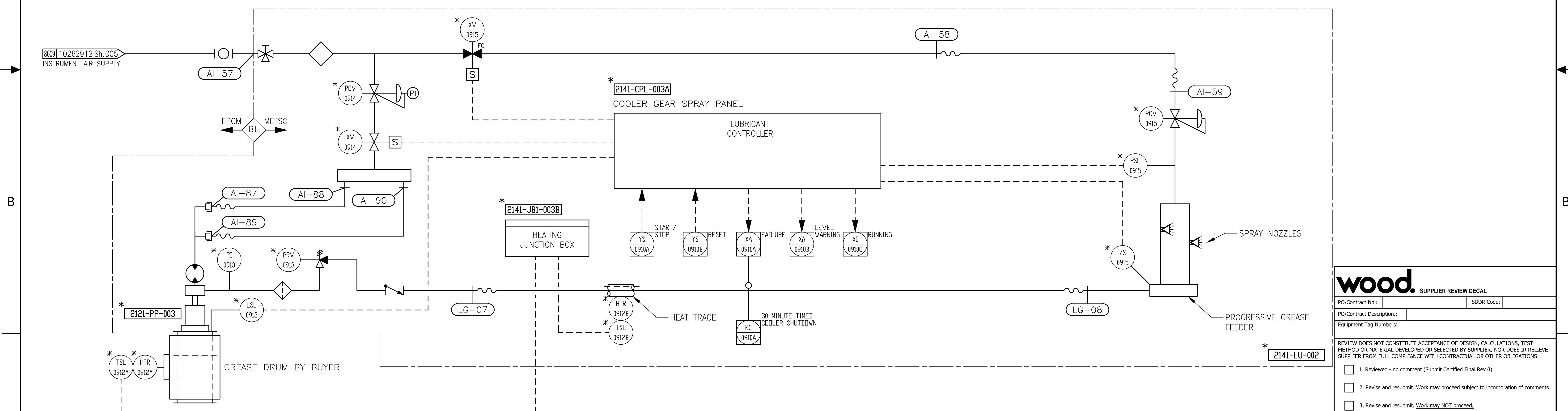
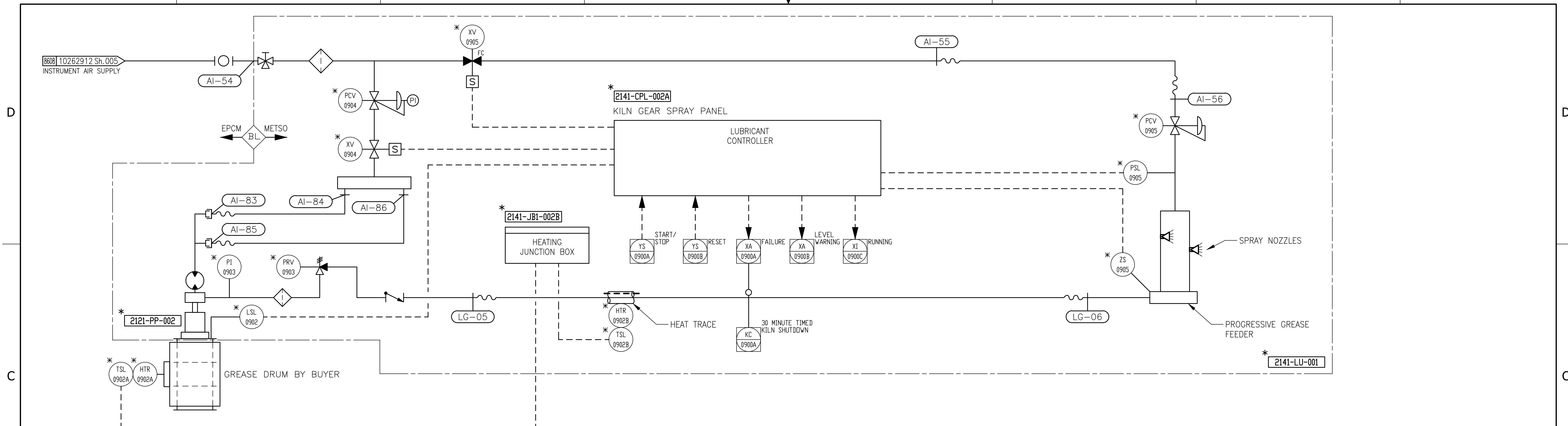


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DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			

CLASSIFICATION: RESTRICTED



2141-CPL-002A  
KILN GEAR SPRAY CONTROL PANEL  
CPL-504A

2141-JB1-002B  
KILN GEAR SPRAY HTR JUNC BDX  
JB1-504B

2141-CPL-003A  
COOLER GEAR SPRAY CONTROL PANEL  
CPL-513A

2141-JB1-003B  
COOLER GEAR SPRAY HTR JUNC BDX  
JB1-513B

2141-PP-002  
KILN GEAR SPRAY GREASE PUMP  
PU-504

2141-PP-003  
COOLER GEAR SPRAY GREASE PUMP  
PU-513

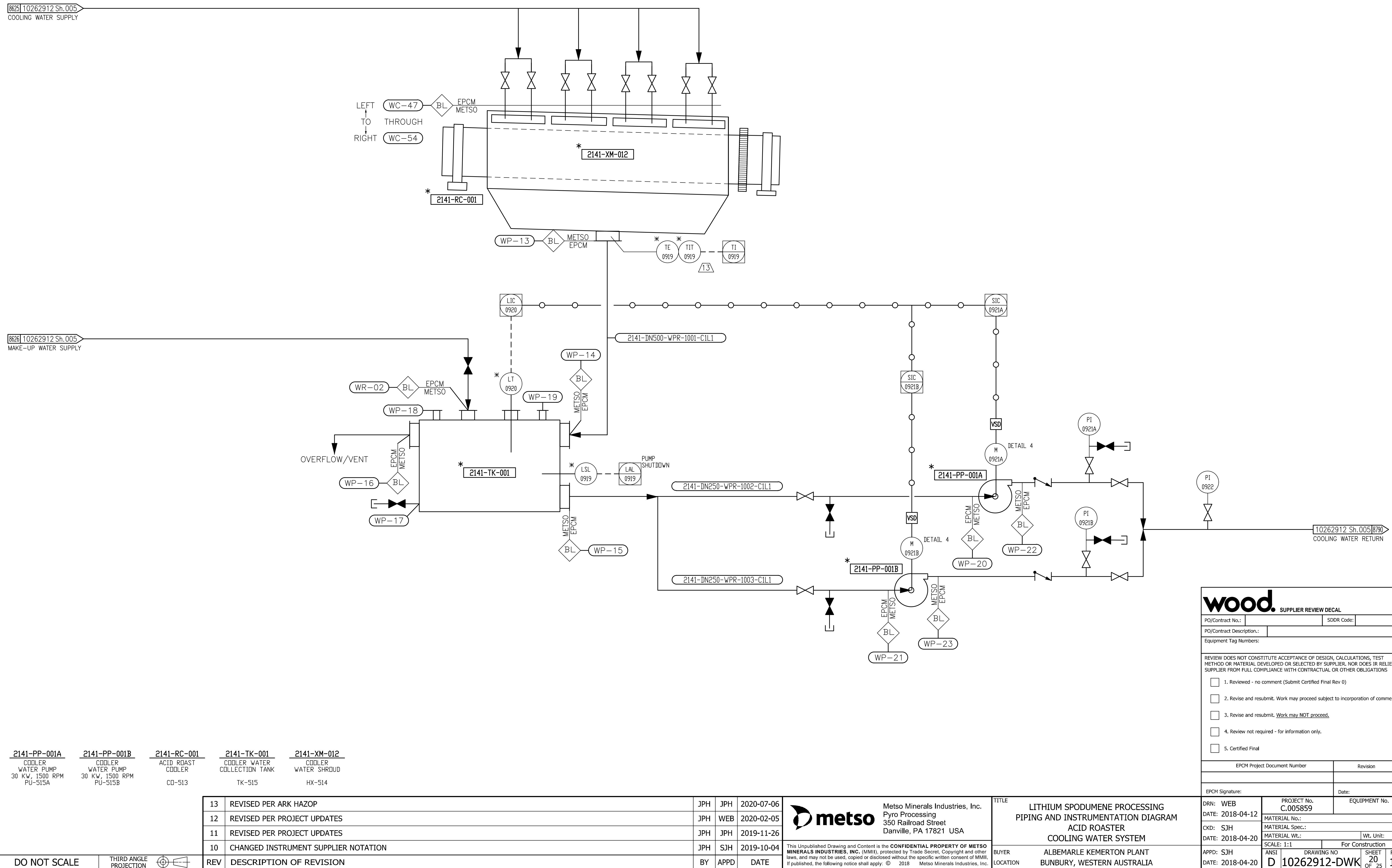
2141-LU-001  
KILN GEAR SPRAY SKID  
SD-504

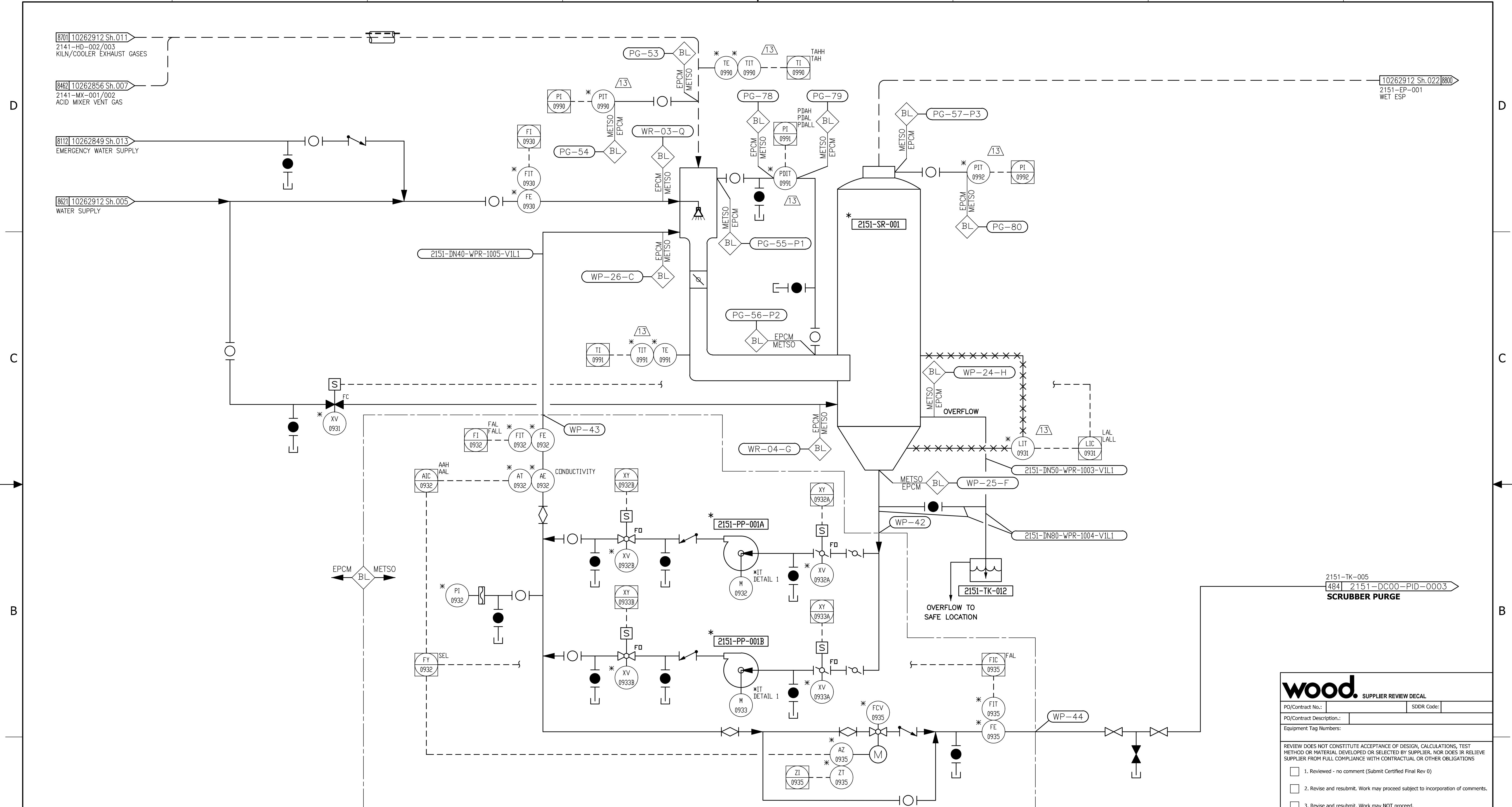
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SD-513

13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

DO NOT SCALE    THIRD ANGLE PROJECTION    REV    DESCRIPTION OF REVISION    BY APPD DATE

	Metso Minerals Industries, Inc. Pyro Processing 2715 Pleasant Valley Rd. York, PA 17402 USA	TITLE	PROJECT No. C.005859	EQUIPMENT No.
		DATE: 2018-04-12	MATERIAL No.:	
CKD: SJH	BUYER LOCATION	MATERIAL Spec.:		
		MATERIAL Wt.:	Wt. Unit:	
APPD: SJH	BUYER LOCATION	SCALE: 1:1	For Construction	
		DATE: 2018-04-20	ANSI	DRAWING NO. D 10262912-DWK
REV 13	CLASSIFICATION: RESTRICTED	REV 13	19 OF 25	





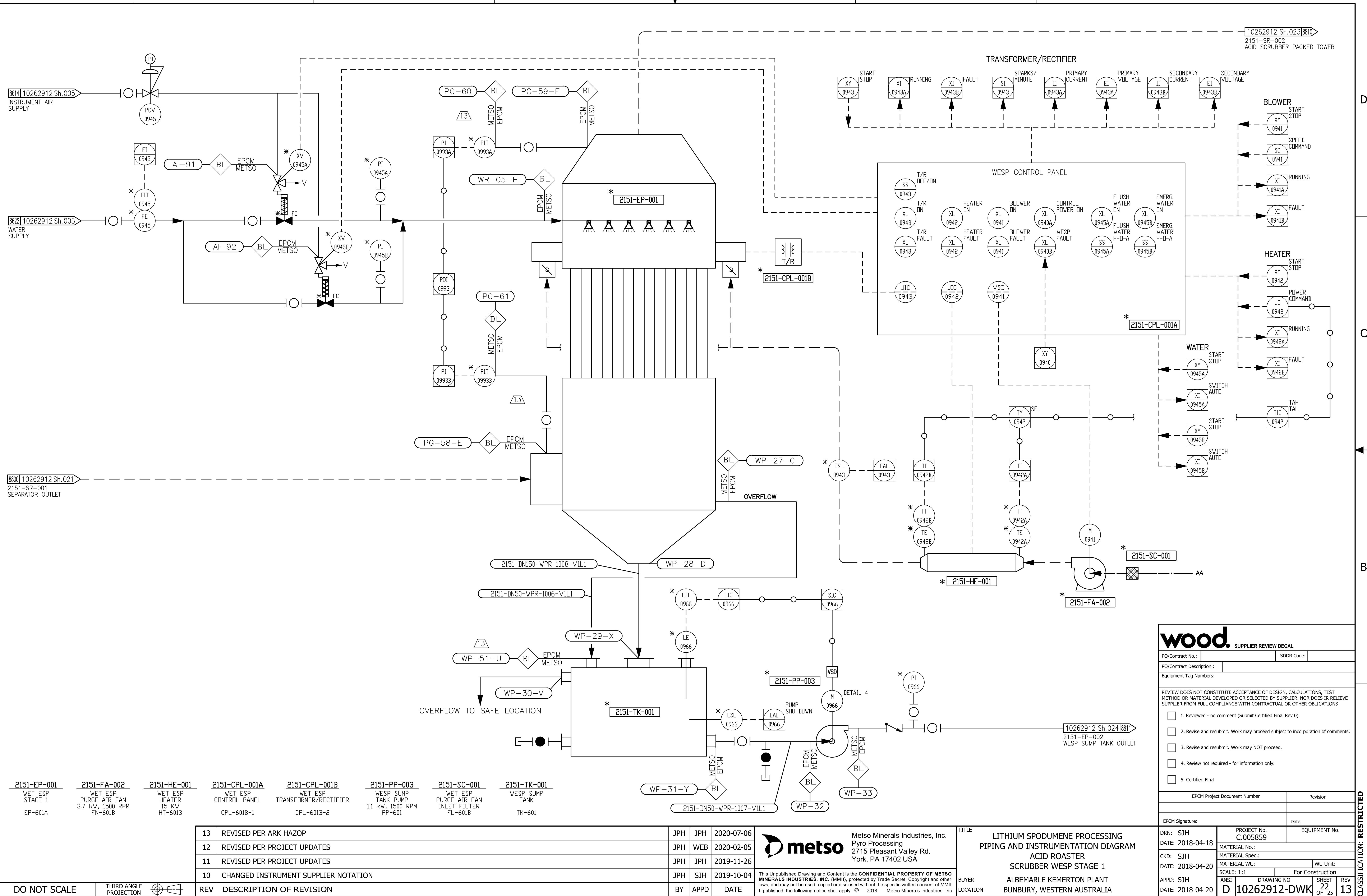
2151-PP-001A  
SEPARATOR  
RECIRCULATION PUMP  
3.7 KV, 1500 RPM  
PU-601A-1

2151-PP-001B  
SEPARATOR  
RECIRCULATION PUMP  
3.7 KV, 1500 RPM  
PU-601A-2

2151-SR-001  
VENTURI SCRUBBER  
SB-601A

2151-TK-012  
SEPARATOR  
SEAL POT  
TK-601A

13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06		Metso Minerals Industries, Inc. Pyro Processing 2715 Pleasant Valley Rd. York, PA 17402 USA	TITLE LITHIUM SPODUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM ACID ROASTER SCRUBBER SEPARATOR	DRN: SJH	PROJECT No. C.005859	EQUIPMENT No.
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05				DATE: 2018-04-18	MATERIAL No.:	
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26				CKD: SJH	MATERIAL Spec.:	
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04		This Unpublished Drawing and Content is the CONFIDENTIAL PROPERTY OF METSO MINERALS INDUSTRIES, INC. (MMI), protected by Trade Secret, Copyright and other laws, and may not be used, copied or disclosed without the specific written consent of MMI. If published, the following notice shall apply. © 2018 Metso Minerals Industries, Inc.	BUYER LOCATION ALBEMARLE KEMERTON PLANT BUNBURY, WESTERN AUSTRALIA	DATE: 2018-04-20	MATERIAL Wt. / Unit:	
DO NOT SCALE	THIRD ANGLE PROJECTION	REV	DESCRIPTION OF REVISION	BY APPD DATE				SCALE: 1:1 For Construction	APPD: SJH	DRAWING NO. D 10262912-DWK
								REV 13	DATE: 2018-04-20	CLASSIFICATION: RESTRICTED



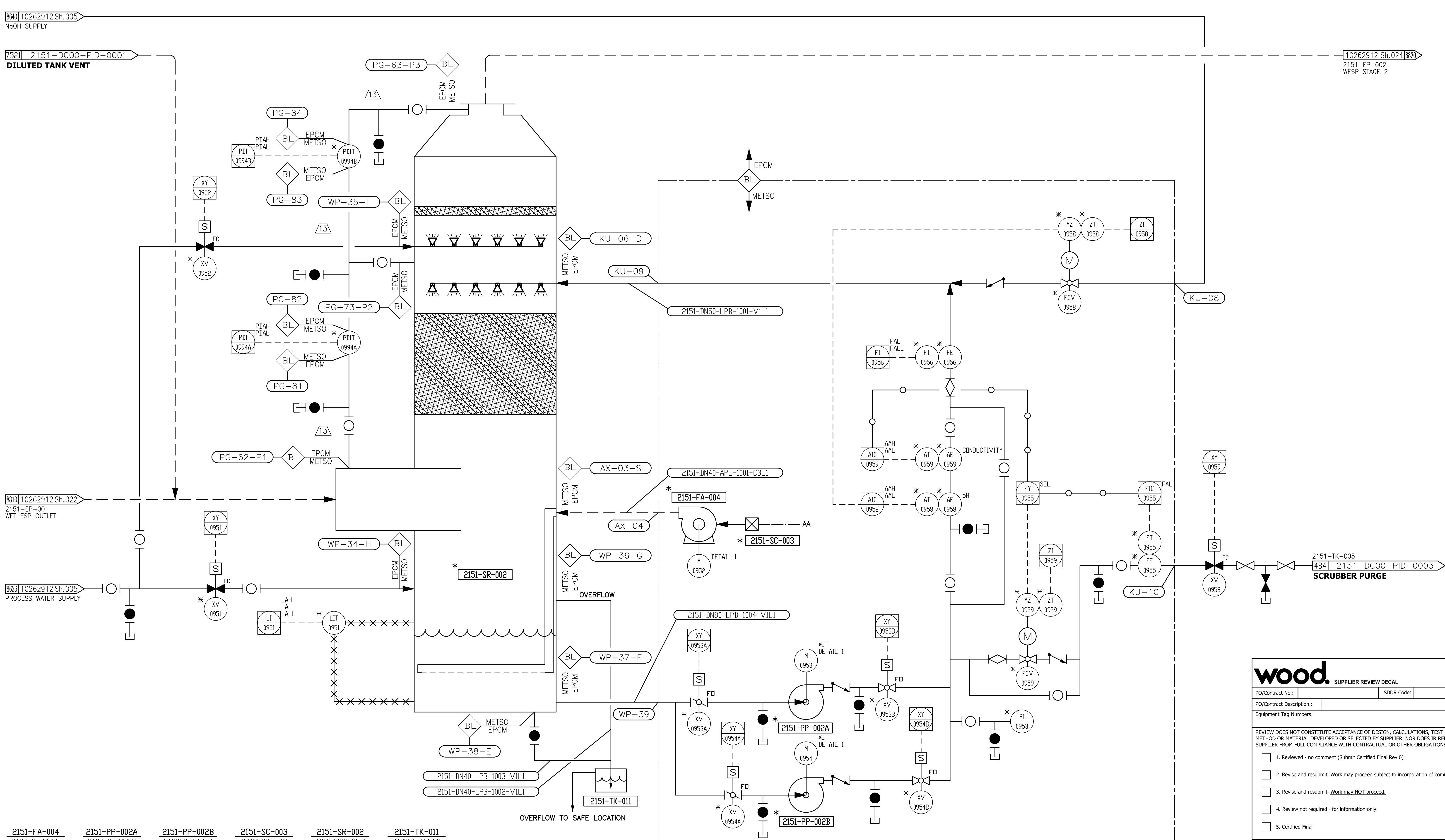
13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

DO NOT SCALE    THIRD ANGLE PROJECTION    REV

DESCRIPTION OF REVISION

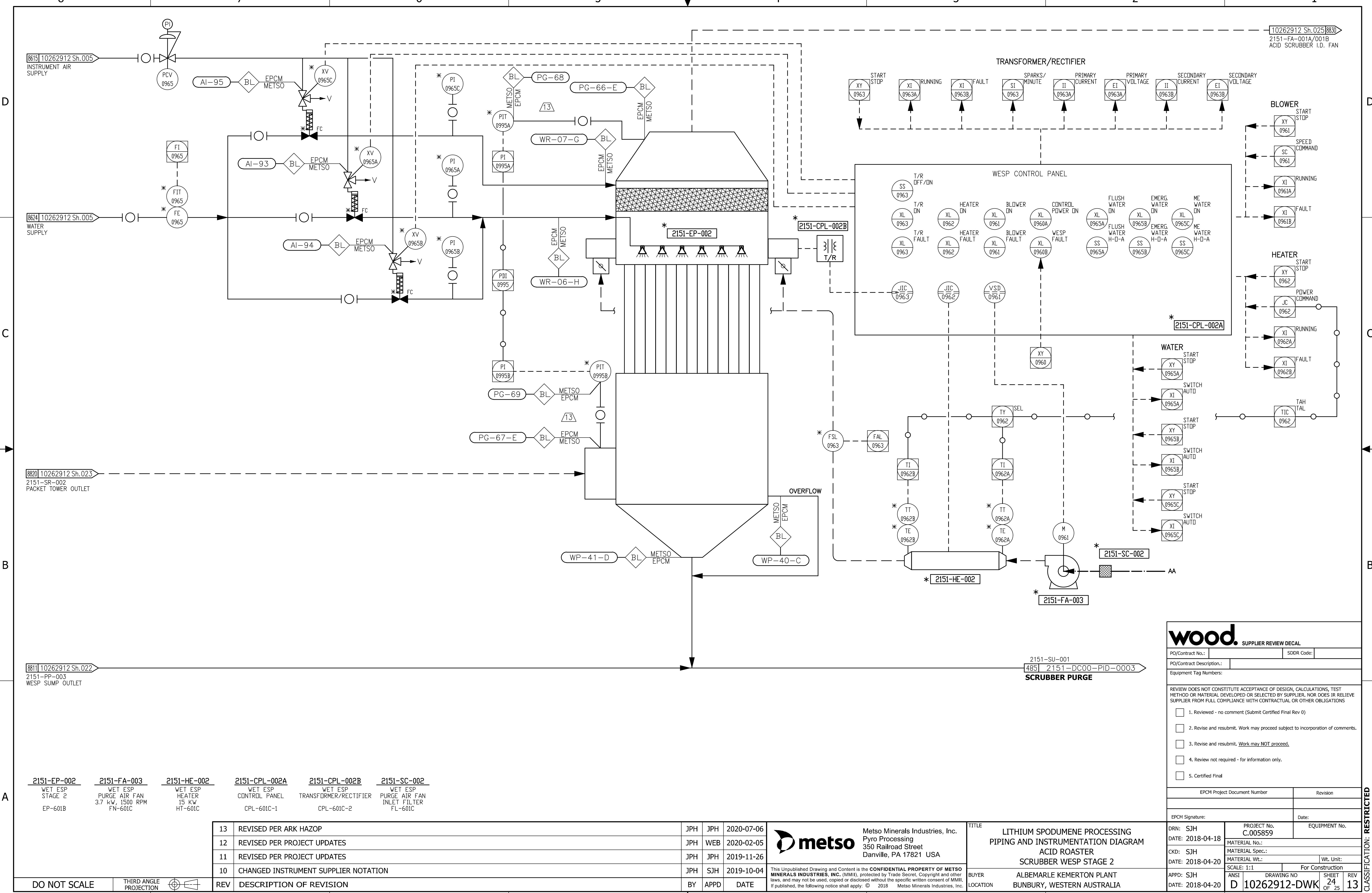
BY APPD DATE

DRN: SJH	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-18	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
SCALE: 1:1	For Construction	
APPD: SJH	ANSI	DRAWING NO. D 10262912-DWK
DATE: 2018-04-20	REV 13	22 OF 25



wood. SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed.	
<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: Date:	

CLASSIFICATION: RESTRICTED



Compendium Rev AAR 25-09-2020. Only to be read in conjunction with other compendium Rev AAR documents.

D

D

C

C

B

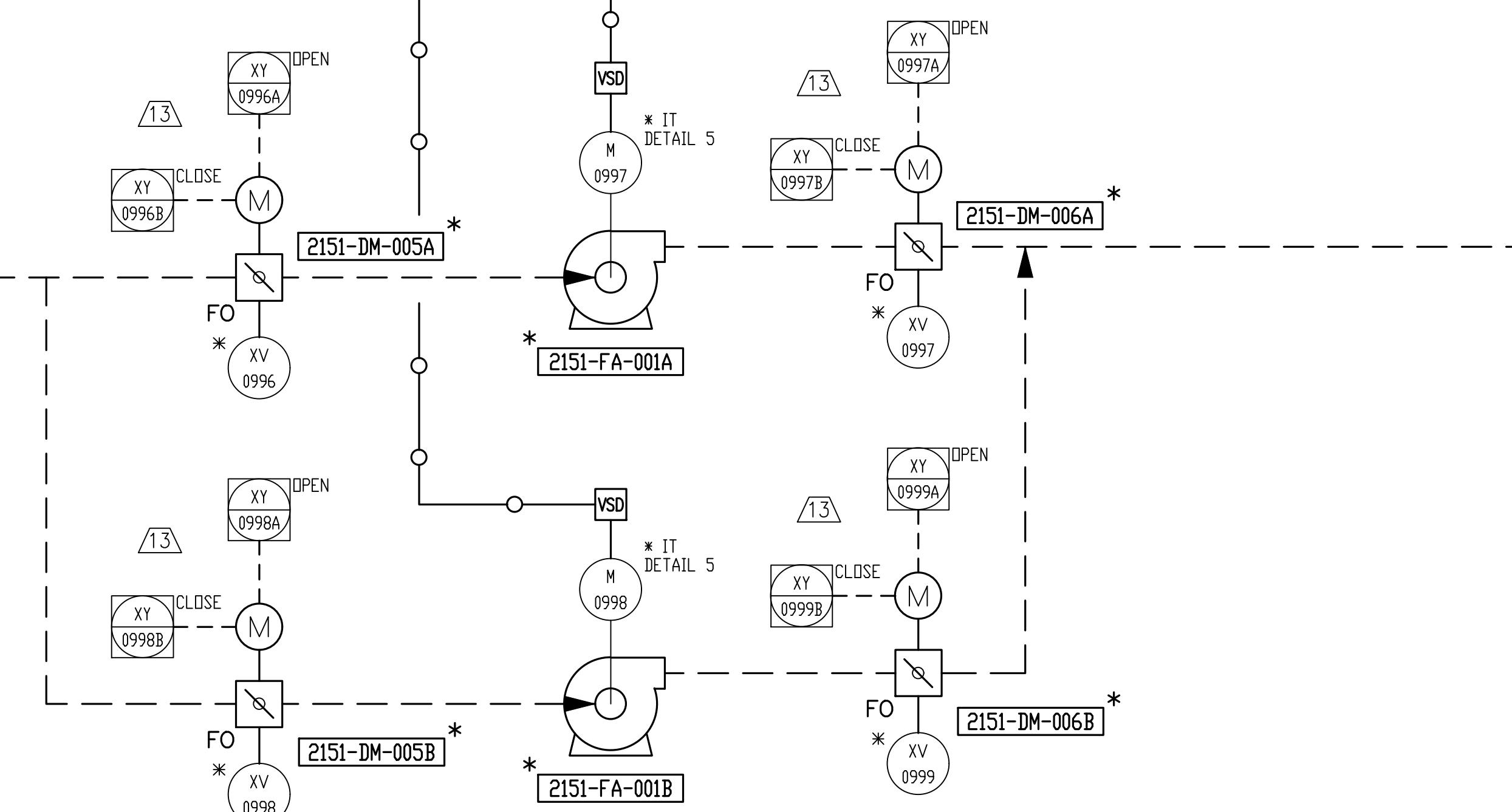
B

A

A

8700 10262912 Sh.011  
PIC-0751 DISCHARGE HOOD  
PRESSURE CONTROLLER

8830 10262912 Sh.024  
2151-EP-002  
WESP STAGE 2



2151-DM-005A	2151-DM-005B	2151-DM-006A	2151-DM-006B	2151-FA-001A	2151-FA-001B	2151-ST-001
EXHAUST FAN INLET DAMPER DM-601-1	EXHAUST FAN OUTLET DAMPER DM-601-2	EXHAUST FAN INLET DAMPER DM-601-3	EXHAUST FAN OUTLET DAMPER DM-601-4	ACID SCRUBBER EXHAUST FAN 30 KW, 1500 RPM FN-601-1	ACID SCRUBBER EXHAUST FAN 30 KW, 1500 RPM FN-601-2	ACID SCRUBBER EXHAUST STACK SK-601

13	REVISED PER ARK HAZOP	JPH	JPH	2020-07-06
12	REVISED PER PROJECT UPDATES	JPH	WEB	2020-02-05
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-11-26
10	CHANGED INSTRUMENT SUPPLIER NOTATION	JPH	SJH	2019-10-04

DO NOT SCALE    THIRD ANGLE PROJECTION    REV    DESCRIPTION OF REVISION    BY APPD DATE



Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE LITHIUM SPUDUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ACID ROASTER  
SCRUBBER EXHAUST FAN AND STACK

DRN: SJH	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-18	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
SCALE: 1:1	For Construction	
APPD: SJH	ANSI	DRAWING NO. D 10262912-DWK
DATE: 2018-04-20	REV 25 OF 25	REV 13

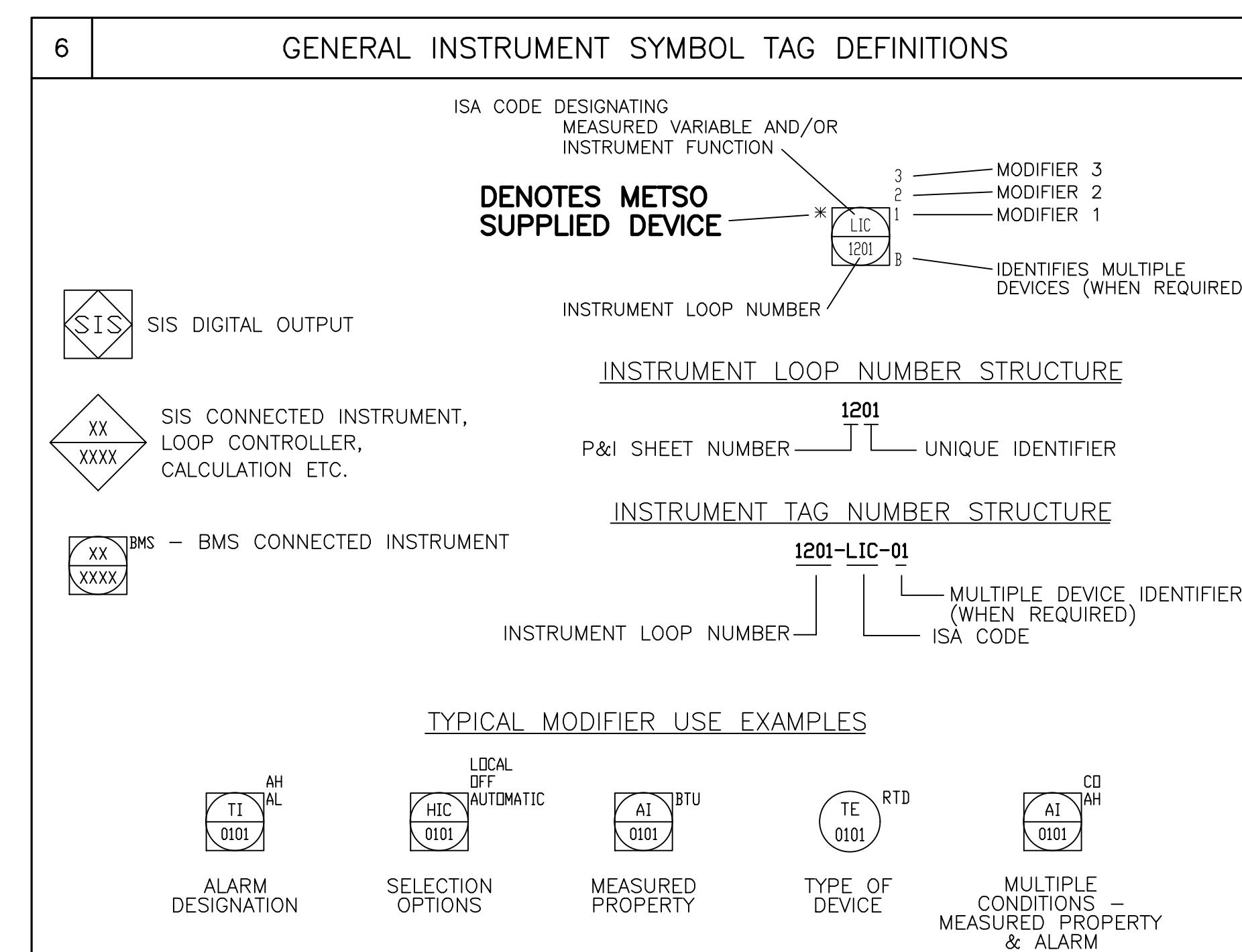
CLASSIFICATION: RESTRICTED

INSTRUMENT IDENTIFICATION				
FIRST LETTER		SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A ANALYSIS		ALARM		
B BURNER FLAME				CLOSED
C CONDUCTIVITY		CONTROL		
D DENSITY OR SPECIFIC GRAVITY	DIFFERENTIAL			
E VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F FLOW	RATIO			
G GAGING		GLASS, VIEWING DEVICE		
H HAND OPERATED				HIGH
I CURRENT		INDICATE		
J POWER	SCAN			
K TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L LEVEL		LIGHT		LOW
M MOISTURE OR HUMIDITY	MOMENTARY			MIDDLE OR INTERMEDIATE
N USER'S CHOICE				
O USER'S CHOICE	OPERATED	ORIFICE, RESTRICTION		OPEN
P PRESSURE OR VACUUM		POINT (TEST) CONNECTION		
Q QUANTITY	INTEGRATE, TOTALIZE			
R RADIATION		RECORD		
S SPEED, FREQUENCY	SAFETY		SWITCH	
T TEMPERATURE			TRANSMIT	
U MULTIVARIABLE		MULTIFUNCTION		
V VIBRATION			VALVE, DAMPER, LOUVER	
W WEIGHT OR FORCE		WELL		
X EMERGENCY	SHUTDOWN	SOURCE		
Y EVENT, STATE OR PRESENCE			RELAY, COMPUTE, CONVERT	
Z POSITION, DIMENSION			DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL	

ABBREVIATIONS				
AA - AMBIENT AIR	H/A - HAND/AUTO	REV - REVERSE ACTING		
AI - ANALOG INPUT	HOA - HAND OFF AUTO	RSP - REMOTE SET POINT		
A/M - AUTO/MANUAL	HV - HAND VALVE	RTD - RESISTANCE (TYPE) TEMP. DETECTOR		
AO - ANALOG OUTPUT	IA - INSTRUMENT AIR	S - SOLENOID ACTUATOR		
ASR - AUTOMATIC SETTING REGULATION	I/P - CURRENT/PNEUMATIC	SEL - SELECT		
BL - BATTERY LIMITS	ISO - ISOLATOR	SIS - BURNER MANAGEMENT SAFETY		
CCR - CENTRAL CONTROL ROOM	* IT - CURRENT TRANSFORMER	INSTRUMENTED SYSTEM		
CCS - CENTRAL CONTROL SYSTEM	JB - JUNCTION BOX	SP - SET POINT		
C/W - COMES WITH	L/R - LOCAL/REMOTE	S/S/S - START/STOP/STATUS		
DIR - DIRECT ACTING	LT - LEAK TEST	TC - THERMOCOUPLE		
ES - ELECTRICAL SUPPLY	MPU - MOTOR PROTECTION UNIT	TP - TEST PORT		
EC - ELECTRICAL CABINET	MV - MANIFOLD VALVE	V - VENT		
FC - FAIL CLOSED	NC - NORMALLY CLOSED	VA - VACUUM		
FO - FAIL OPEN	NO - NORMALLY OPEN	VSD - VARIABLE SPEED DRIVE		
FW - FRESH WATER	OP - OPERATING PANEL	* - SUPPLIER		
FL - FAIL LOCKED	PA - PLANT AIR	B - ELECTRIC BRAKE		
FI - FAIL INTERMEDIATE	QO - QUICK OPENING	◇ - MANUAL BRAKE		

LINETYPE SYMBOLS				
MAIN PROCESS MATERIAL	MAIN PROCESS GAS	SOFTWARE SIGNAL	ELECTRICAL SIGNAL	
SECONDARY PROCESS MATERIAL	SECONDARY PROCESS GAS	PNEUMATIC SIGNAL	CAPILLARY TUBING (FILLED SYSTEM)	
PROCESS SLURRY				
AMBIENT AIR / COMBUSTION AIR	AUXILIARY AIR	EQUIPMENT		
UTILITY PIPING (WATER, GAS, etc.)	FLUID IDENTIFIED BY ASSOCIATED			

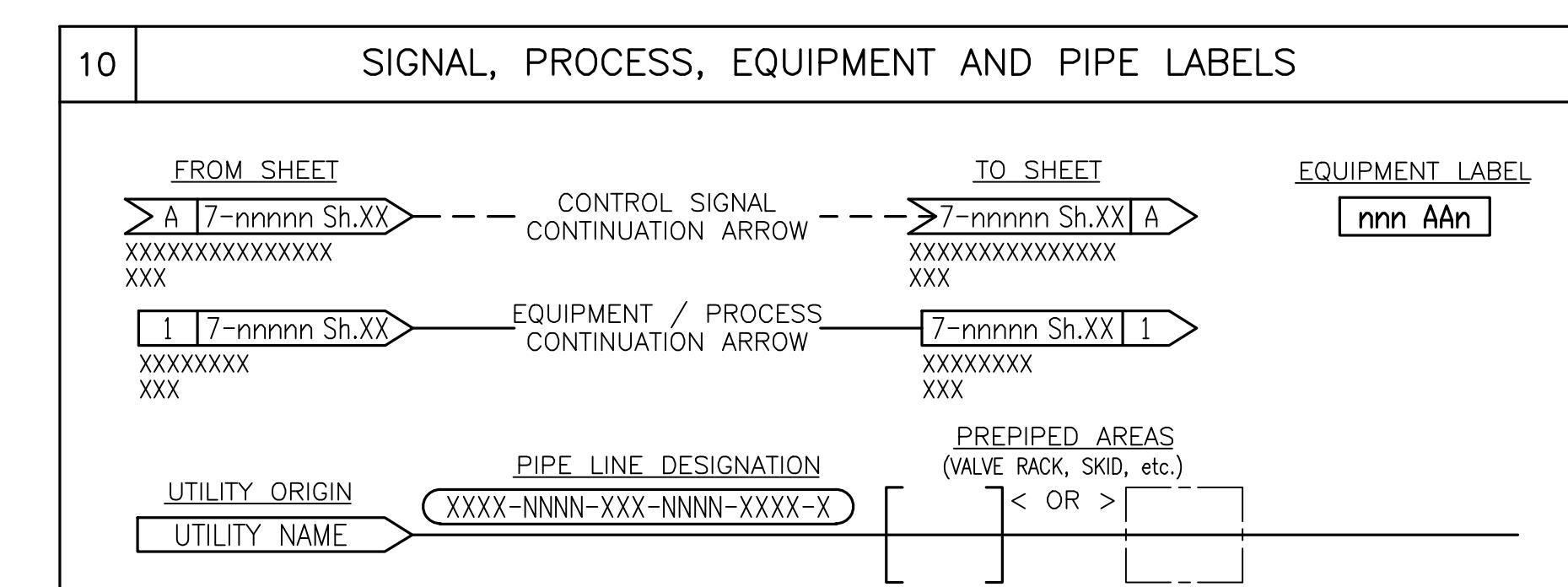
GENERAL INSTRUMENT SYMBOLS		
DISCRETE INSTRUMENT i.e. TRANSMITTER, VALVE, SINGLE LOOP CONTROLLER ETC.	PLANT CONTROL SYSTEM FUNCTION i.e. DCS, PLC, HMI, MULTI LOOP CONTROLLER, CHART RECORDER, ETC.	SUPERVISORY COMPUTER FUNCTION i.e. EXPERT SYSTEM, RESOURCE PLANNING, MANAGEMENT REPORTING, ETC.
FIELD MOUNTED		FIELD MOUNTED
MAIN PANEL FRONT MOUNTED	MAIN DISPLAY OPERATOR ACCESSIBLE	MAIN DISPLAY OPERATOR ACCESSIBLE
AUXILIARY OR LOCAL PANEL FRONT MOUNTED	AUXILIARY OR LOCAL DISPLAY OPERATOR ACCESSIBLE	AUXILIARY OR LOCAL DISPLAY OPERATOR ACCESSIBLE
MAIN PANEL BACK MOUNTED	MAIN DISPLAY NOT ACCESSIBLE	MAIN DISPLAY NOT ACCESSIBLE
AUXILIARY OR LOCAL PANEL BACK MOUNTED	AUXILIARY OR LOCAL PANEL NOT ACCESSIBLE	AUXILIARY OR LOCAL PANEL NOT ACCESSIBLE



FUNCTION MODIFIERS AND OTHER INSTRUMENT SYMBOLS				
Low Select	Sum	Pulse		
High Select	Add	Differential		
Low Limit	Subtract	Convertor (SEE I/O CODE)		
High Limit	Multiply	Ratio		
Bias	Divide	Derivative		
Average	SqRoot	Time Function		
Reverse	Integral	Non-Linear Function		
			I/O CODE	
			E = VOLTAGE	
			I = CURRENT	
			R = RESISTANCE	
			A = ANALOG	
			H = HYDRAULIC	
			P = PNEUMATIC	
			D = DIGITAL	
BMS Burner Management System				
Interlock, Logic				
Interlock, Hardwired				
			Electric Heat Traced Inst	

MOTOR ABBREVIATIONS				
RDY - READY	RN - RUN	AUT - AUTO		
MC - START / STOP	RMC - REVERSE START / STOP	RRN - REVERSE RUN		

VALVE, FLOW ELEMENT AND OTHER PIPING SYMBOLS		
NORMALLY OPEN	NORMALLY CLOSED	RELIEF VALVE
►	►	GATE VALVE
IOI	!●	BALL VALVE
►	►	GLOBE VALVE
►	►	PLUG VALVE
►	►	NEEDLE VALVE
■■■	■■■	SLIDE GATE VALVE
►	►	DIAPHRAM VALVE
!○!	!●	BUTTERFLY VALVE
►	►	PINCH VALVE
◆	◆	BALL CHECK VALVE
		ANGLE VALVE
		3 WAY VALVE
		3 WAY BALL VALVE
		4 WAY VALVE
		QUICK OPENING VALVE
		ROTARY VALVE
		CHECK VALVE, SWING GATE
		CHECK VALVE, SPRING OPERATED
		BACK FLOW PREVENTER
		PIPE PLUG
		SPOOL PIECE
		QUICK DISCONNECT
		REDUCER
		SPRAY HEAD
		FLANGE
		FILTER
		SILENCER
		SCREEN
		BAFFLE SILENCER (MUFFLER)
		LUBRICATOR
		STRAINER
		BASKET STRAINER
		Y STRAINER
		DUPLEX STRAINER
		PILOT TUBE
		ROTAMETER
		STRAIGHTENING VANES
		TURBINE
		VENTURI
		VORTEX
		WEIR
		SINGLE BLADE DAMPER
		MULTI-BLADE (LOUVER) DAMPER
		PRESSURE CONTROL VALVE
		TEMPERING DAMPER
		PNEUMATIC ACTUATOR
		SPRING RETURN PNEUMATIC ACTUATOR



wood. SUPPLIER REVIEW DECAL	
PO/Contract No.: _____	SDR Code: _____
PO/Contract Description: _____	
Equipment Tag Numbers: _____	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed.	
<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: _____ Date: _____	
Title: _____	
DRN: WEB	PROJECT No. C.005859
DATE: 2018-04-10	MATERIAL No.: _____
CKD: SJH	MATERIAL Spec.: _____
DATE: 2018-04-20	MATERIAL Wt.: _____ Wt. Unit: _____
BUYER LOCATION	SCALE: 1:1 For Construction
ALBEMARLE KEMERTON PLANT	APPD: SJH
BUNBURY, WESTERN AUSTRALIA	DRAWING NO. D 10262849-DWK
DATE: 2018-04-20	Sheet 1 of 19 REV 14

14	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
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EQUIPMENT LETTER CODES		
CODE	MAIN CATEGORY	SUB CATEGORY / APPLICATION / COMMENT
AC	AIR COMPRESSOR	
AD	AUXILIARY DRIVE	
AI	ACIDIFICATION	
AN	AIR CONDITIONER	
AP	AERATION PAD	
AR	AIR RECEIVER	
AY	AIR DRYER	
BD	BALLING DRUM	
BE	BUCKET ELEVATOR	Bucket Conveyor
BG	BEARING	Roller, Drive
BL	BLOWER	
BN	BIN	Stone, Walking Floor, Feed, Bunker (Solid material storage)
BO	BOILER	Steam, Waste Heat, Steam Generating Drum
BR	BURNER	Secondary, Primary, Kiln, Waste, Incinerator, Preheat
BX	BOX	Mixing, Collection
CD	CART DUMPER	
CH	CHUTE	Transfer, Stone, Feed, Feed Pipe, Expansion Joint
CL	CLASSIFIER	
CM	COMBS	Pellet
CN	CALCINER	Rotary, Fluid Bed
CO	COOLER	Annular, NEIMS, Rotary (Only for main process materials. Use HX for secondary process or WQ for cooling with water spray.)
CPL	CONTROL PANEL	
CR	CRUSHER	Stone, Primary, Secondary
CV	CONVEYOR	Belt, Screw, Vibrating, Drag, Chain, Wet Ash, Reversing Belt, Roller, Box, Discharge Auger, Auger, Tubular, Pan, Pneumatic, Air Float (For Bucket Conveyor use BE)
CY	CYCLONE	Multicyclone
DC	DUST COLLECTOR	Baghouse, Scrubber
DD	DAM	Pond, Tailings
DE	DENSIFIER	
DI	DISTRIBUTOR	Stone, Splitter, Diverter (solids)
DM	DAMPER	
DR	DRIVE	Kiln, Cooler, Travelling Grate, etc.
DS	DISPOSAL RECEPTACLE	(Waste material)
DU	DUCT	Air, Gas, Dust
DV	DUMP VALVE	Double, Single, Trap
DZ	DEMINERALIZER	
EL	ELEVATOR	Lift, Freight, Passenger (For Bucket Elevator use BE)
EP	ELECTROSTATIC	
EV	EXPLOSION VENT	
FE	FEEDER	Vibrating, Volumetric, Tube, Tubular, Rotary
FL	FILTER	Air, Fluid, Dust
FN	FAN	Vent, ID, Cooler, Combustion Air, Secondary, Tertiary
FR	FRAME	Supporting Structure for Multiple Racks - See RA
FS	FEED SPOUT	Retractable
FU	FURNACE	Combustion Chamber, Primary Chamber, Secondary Chamber, Roaster, Incinerator, Fluid Bed, Calciner
GT	GATE	Slide, Knife, Isolation
HD	HOOD	Firing, Feed, Discharge, Exhaust
HE	HEATER	
HP	HOPPER	Discharge, Dust
HT	HOIST	Winch, Chain, Crane, Derrick, Jib, Lift

EQUIPMENT TAG NUMBER STRUCTURES		
<b>INDIVIDUAL ITEM</b>  FN-105 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEMS</b>  BG-105-1 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEM GROUPS</b>  PU-105-2A EQUIPMENT CODE — PYRO UNIT NUMBER — ITEM WITHIN GROUP SEQUENTIAL IDENTIFIER
IDENTIFIES AN ITEM WITHIN A PYRO NUMBERED UNIT WHERE NO OTHER ITEM WITHIN THAT UNIT HAS THE SAME EQUIPMENT CODE. Example: A single Fan in Unit 105 as FN-105	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE THERE ARE TWO OR MORE ITEMS WITHIN THAT UNIT HAVING THE SAME EQUIPMENT CODE. Example: Four bearings in Unit 105 as BG-105-1 thru BG-105-4	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE IT MAY BE BENEFICIAL TO GROUP LIKE ITEMS. Example: Unit 105 contains 3 pumps. The service of the first is different than that of the other two, and the third serves as a backup for the second. The first pump is identified as PU-105-1. The second and third are PU-105-2A and PU-105-2B.

DO NOT SCALE	THIRD ANGLE PROJECTION	14	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
		13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
		12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
		11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
REV	DESCRIPTION OF REVISION	BY	APPD	DATE		

## 12 METSO FLUID CODES

CODE	FLUID	CATEGORY	UNIT
AA	AMBIENT AIR	Air	
AC	COMBUSTION AIR	Air	
AI	INSTRUMENT AIR	Air	001
AP	PLANT AIR	Air	002
AX	AIR - NON-SPECIFIC	Air	003
DN	NUISANCE DUST	Dust	
CO	COAL	Fuel	010
CP	COAL - PULVERIZED	Fuel	011
FB	BLAST FURNACE GAS	Fuel	012
FF	BASIC OXYGEN FURNACE GAS	Fuel	013
FH	FUEL OIL HEAVY	Fuel	014
FK	COKE OVEN GAS	Fuel	015
FL	FUEL OIL LIGHT	Fuel	016
FN	NATURAL GAS	Fuel	017
FP	PROPANE	Fuel	018
FR	REFINERY GAS	Fuel	019
GC	CALIBRATION GAS	Gas	020
GH	HYDROGEN	Gas	021
GM	CARBON MONOXIDE	Gas	022
GR	REFRIGERANT	Gas	023
GS	HYDROGEN SULFIDE	Gas	024
GX	GAS - NON-SPECIFIC COMBUSTABLE	Gas	025
GY	OXYGEN	Gas	026
IA	ARGON	Gas, Inert	030
IC	CARBON DIOXIDE	Gas, Inert	031
IH	HELIUM	Gas, Inert	032
IL	HALON	Gas, Inert	033
IN	NITROGEN	Gas, Inert	034
IX	INERT GAS - NON-SPECIFIC	Gas, Inert	035
KA	AMMONIA SOLUTION	Chemical	040
KF	CHEMICAL FLOW	Chemical	041
KL	LIME	Chemical	042
KU	CAUSTIC	Chemical	043
KV	SOLVENT	Chemical	044
LG	LUBRICATING GREASE	Lubrication	045
LO	LUBE OIL	Lubrication	046
OD	DEDUSTING OIL	Oil	048
OH	HYDRAULIC OIL	Oil	049
OS	SEAL OIL	Oil	050
OX	OIL - NON-SPECIFIC	Oil	051
PM1	PROCESS MATERIAL - PRIMARY	Process	
PM2	PROCESS MATERIAL - SECONDARY	Process	
PG1	PROCESS GAS - PRIMARY	Process	
PG2	PROCESS GAS - SECONDARY	Process	
PP	PETROLEUM COKE	Process	
PS	SLURRY	Process	
PC	CALCINED COKE	Product	
BB	BOILER BLOWDOWN	Steam	
CD	CONDENSATE	Steam	
ST	STEAM	Steam	
VA	VACUUM	Vacuum	
EF	EFFLUENT	Waste	
SS	SANITARY SEWER	Waste	
YD	WASTE SLUDGE	Waste	
YG	WASTE GAS	Waste	
YL	WASTE LIQUID	Waste	
YO	WASTE OIL	Waste	
YS	WASTE SOLID	Waste	
YY	WASTE SOLVENT	Waste	
YW	WASTE WATER	Waste	
YX	WASTE - NON-SPECIFIC	Waste	
WA	POTABLE WATER	Water	070
WB	BOILER FEED WATER	Water	071
WC	COOLING WATER	Water	072
WD	DEMINERALIZED WATER	Water	073
WF	FIRE WATER	Water	074
WG	WATER GLYCOL	Water	075
WL	GLAND SEAL WATER	Water	076
WP	PROCESS WATER	Water	077
WR	RAW WATER	Water	078
WS	SEA WATER	Water	079
WX	WATER - NON-SPECIFIC	Water	080

## PIPE LINE NUMBER DESIGNATION

XXXX-NNNN-XXX-NNNN-XXXX-X  
 PLANT AREA \_\_\_\_\_  
 SIZE \_\_\_\_\_  
 SERVICE CODE \_\_\_\_\_  
 LINE-TRAIN NO. \_\_\_\_\_  
 LINE-SEQUENTIAL NO. \_\_\_\_\_  
 MATERIAL SPECIFICATION CODE \_\_\_\_\_  
 INSULATION CODE \_\_\_\_\_

PIPE LINE NUMBER DESIGNATION ACCORDING TO SECTION 4. OF THE WOOD TECHNICAL SPECIFICATION DOCUMENT 606541-0000-DE20-SPC-0001.

## FIELD CONNECTION NUMBER STRUCTURE

TYPICAL FIELD CONNECTION # ID TAG **XX-XX-XX**  
 FLUID CODE \_\_\_\_\_  
 SEQUENCE No. \_\_\_\_\_  
 VENDOR'S IDENTIFIER (OPTIONAL) \_\_\_\_\_

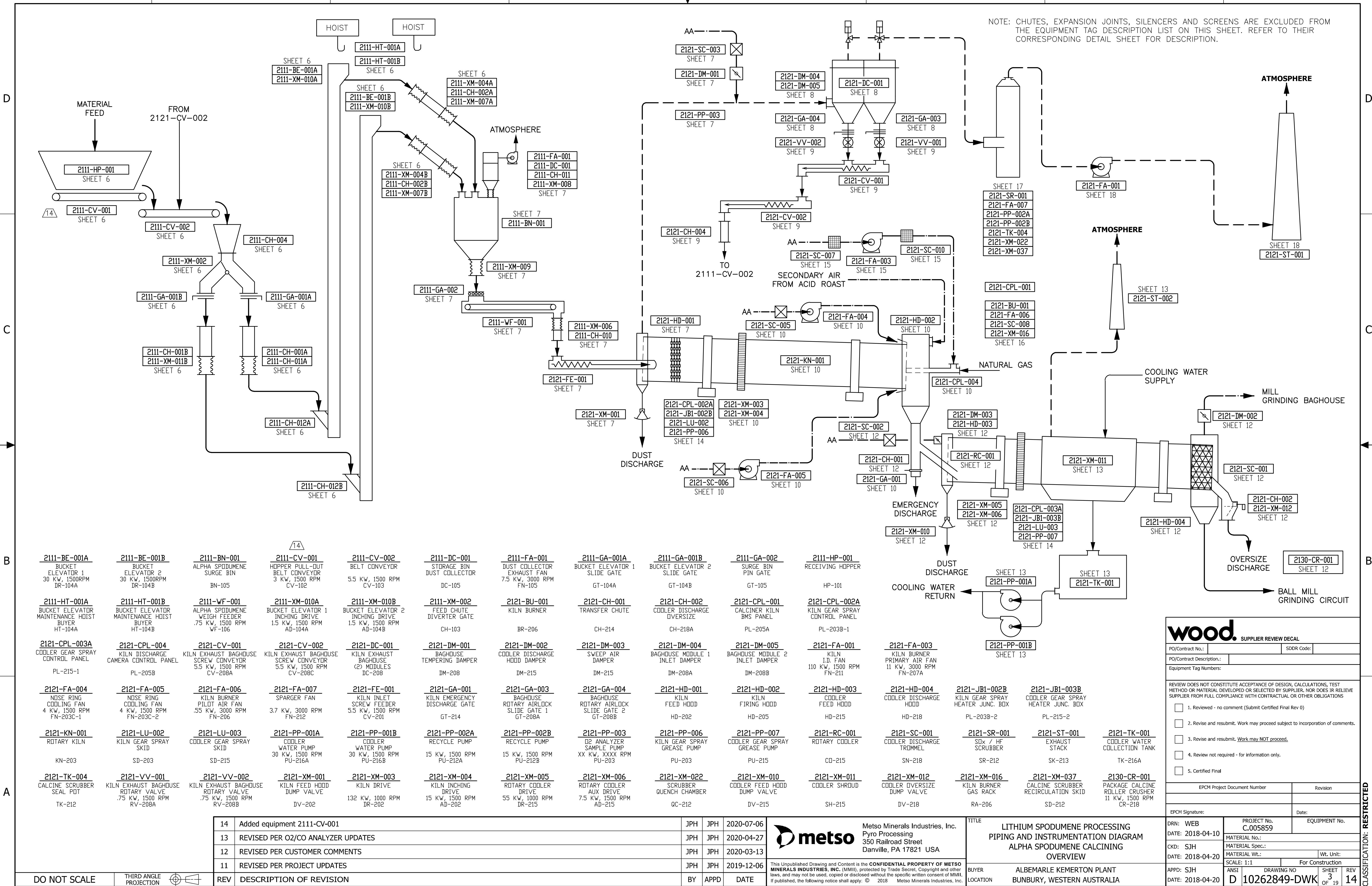
REFERENCE DOCUMENT 900107213-NCD FOR FIELD CONNECTION DETAILS.

P&I DRAWING SHEET LIST		
SHEET	REV	TITLE
1	12	LEGEND
2	12	LEGEND
3	12	OVERVIEW
4	12	MOTOR DETAILS
5	12	UTILITIES
6	12	ALPHA SPUDUMENE RECEIVING
7	12	KILN FEED SYSTEM
8	12	KILN BAGHOUSE
9	12	BAGHOUSE TAKE-AWAY
10	12	ROTARY KILN
11	12	KILN BEARING COOLING WATER
12	12	ROTARY COOLER
13	12	ROTARY COOLER PROCESS COOLING WATER SYSTEM
14	12	KILN/COOLER GEAR SPRAY SYSTEMS
15	12	CALCINE KILN BURNER
16	12	CALCINE KILN BURNER FUEL TRAIN
17	12	SCRUBBER
18	12	KILN I.D. FAN / STACK

NOTE:  
1. ALL PIPING INCLUDING VALVES, GAUGES, TUBING, FITTINGS, PIPE SUPPORTS AND HOSES ARE BY BUYER UNLESS NOTED BY METSO.

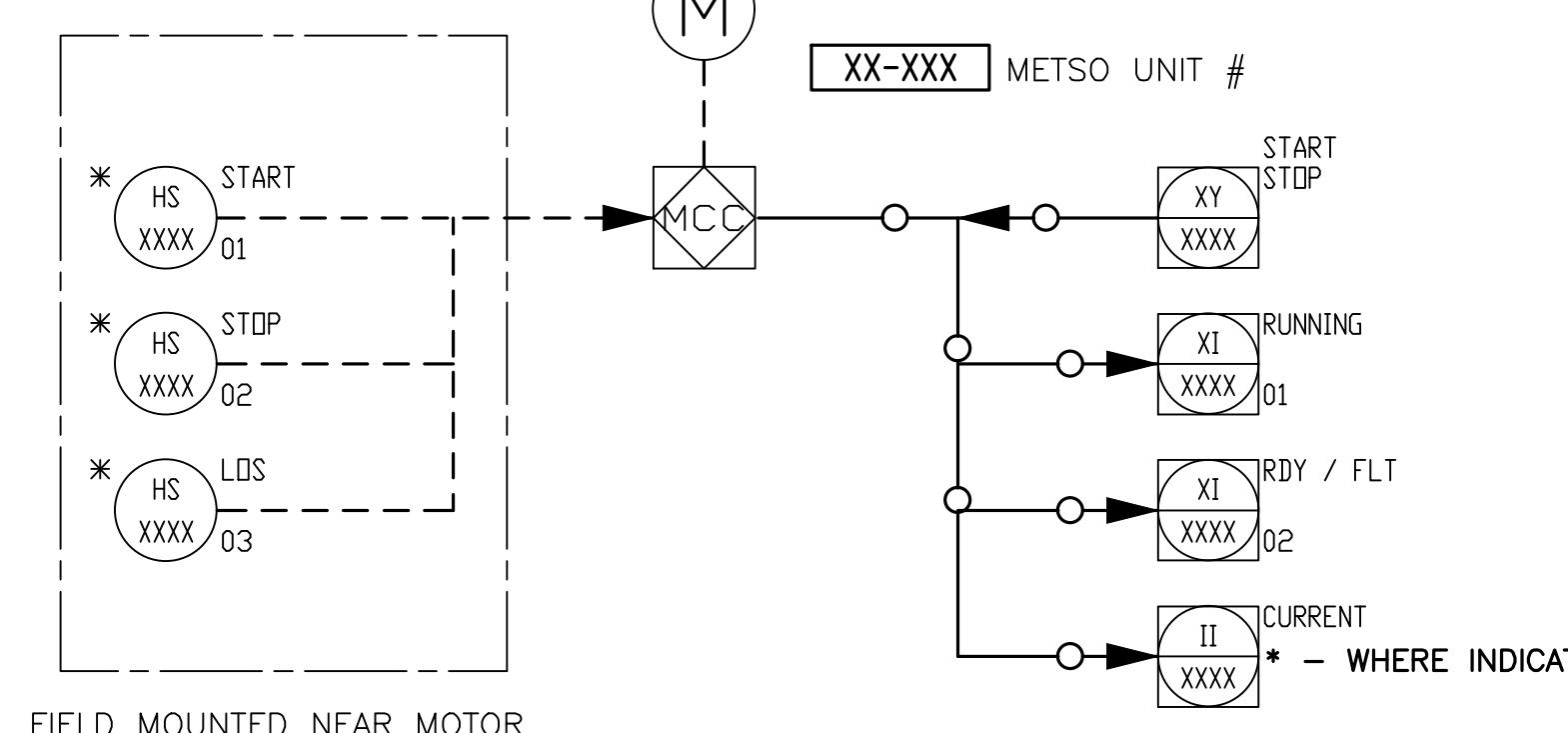
wood. SUPPLIER REVIEW DECAL	
PO/Contract No. _____ SDR Code. _____	
PO/Contract Description. _____	
Equipment Tag Numbers. _____	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed.	
<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: _____ Date: _____	

metso	Metso Minerals Industries, Inc. Pyro Processing 2715 Pleasant Valley Rd. York, PA 17402 USA	TITLE LITHIUM SPUDUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM ALPHA SPUDUMENE CALCINING LEGEND	DRN: WEB DATE: 2018-04-10	PROJECT No. C.005859	EQUIPMENT No.
CKD: SJH	BUYER ALBEMARLE KEMERTON PLANT LOCATION BUNBURY, WESTERN AUSTRALIA	MATERIAL No.: SPEC.: WT. UNIT:	DATE: 2018-04-20</		



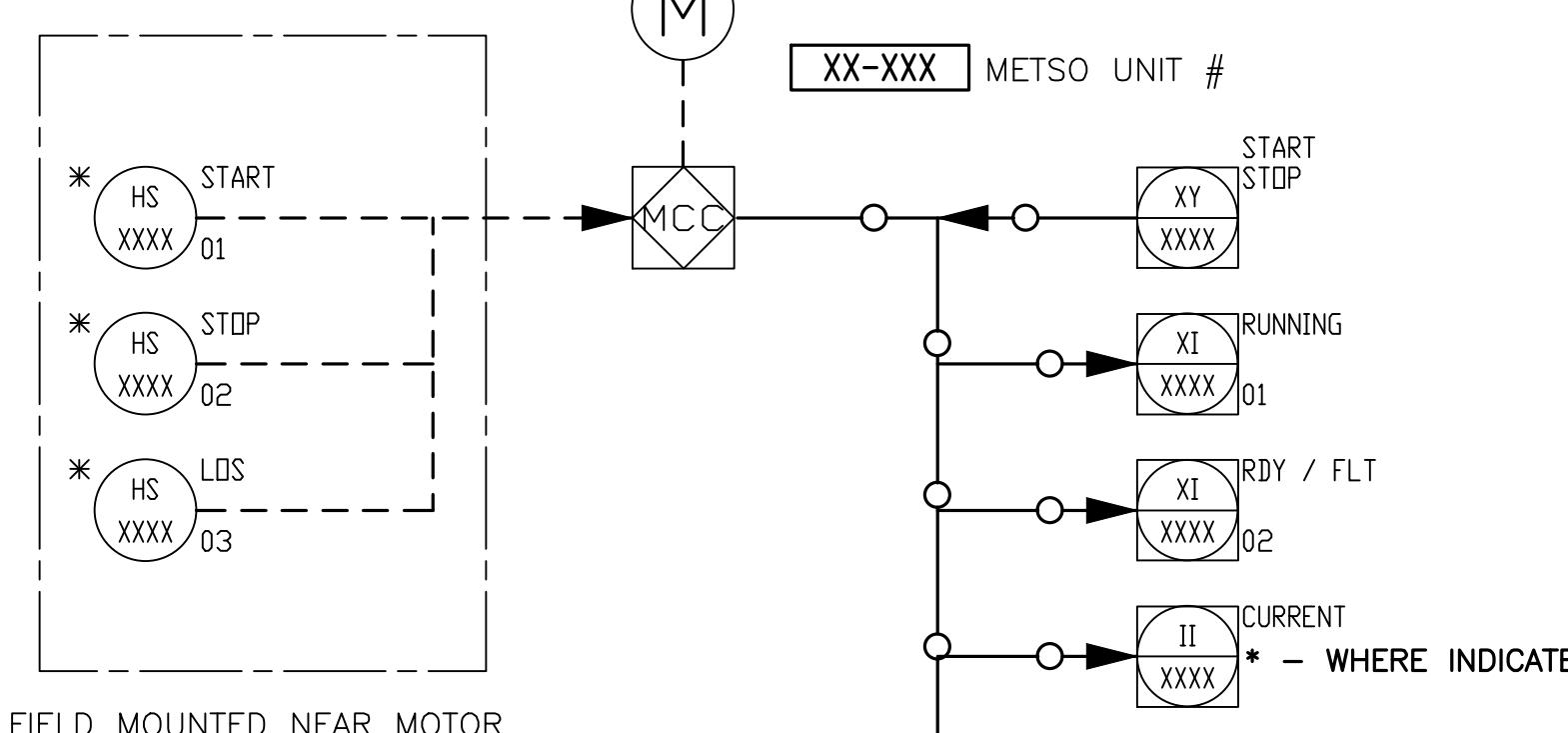
## MOTOR DETAIL #1

NON-REVERSING STARTER

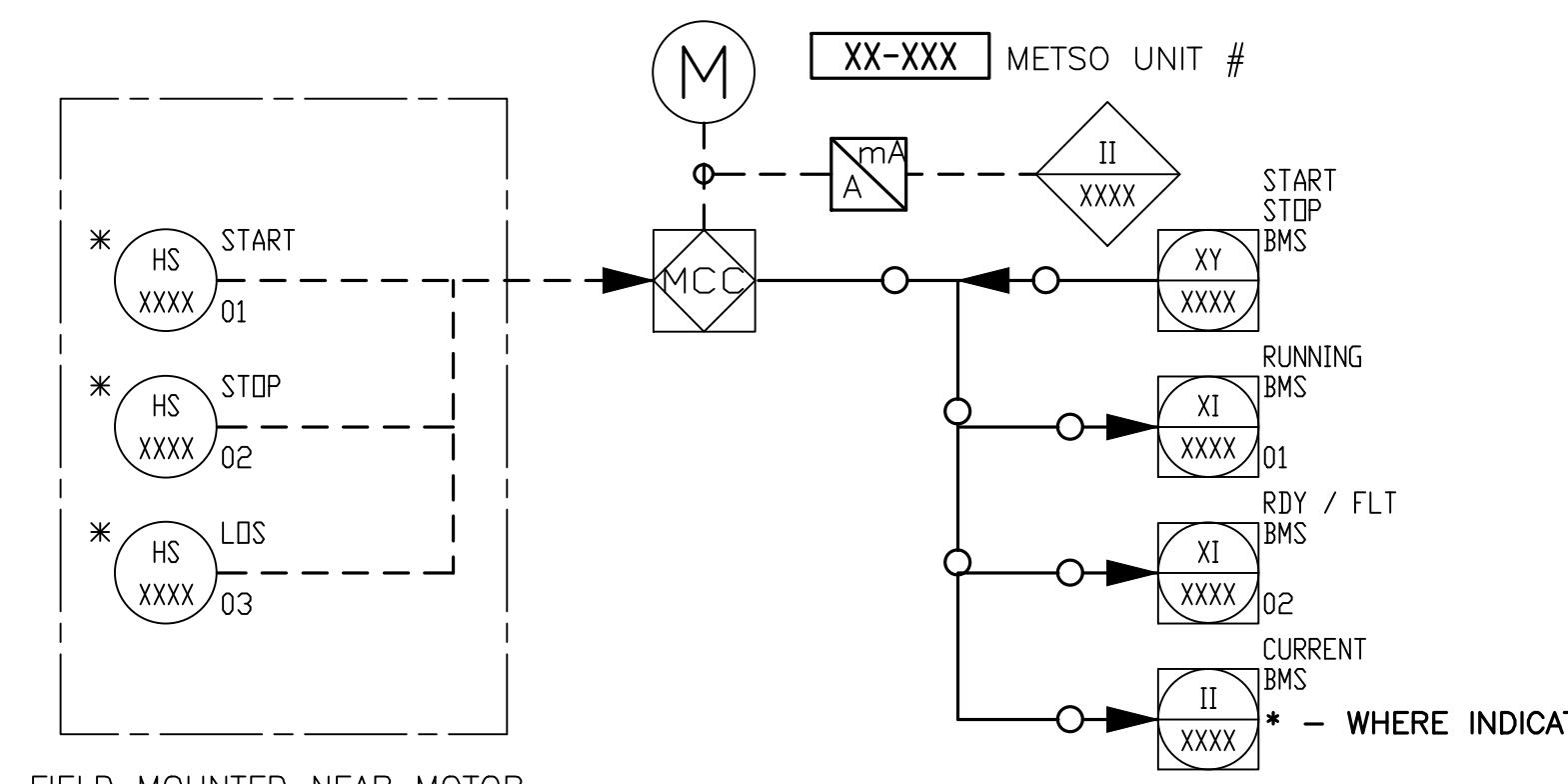


## MOTOR DETAIL #4

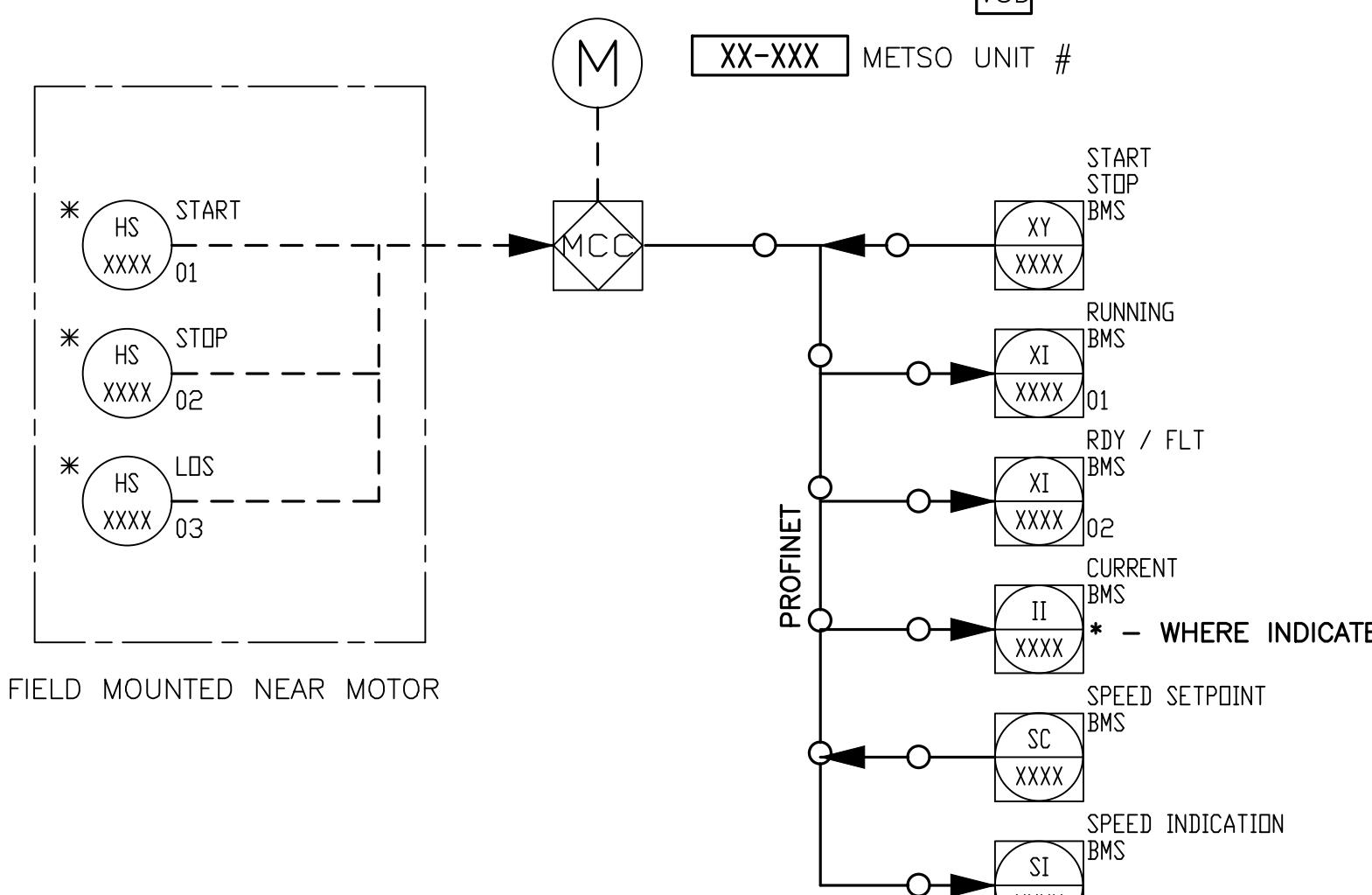
VARIABLE SPEED DRIVE



## MOTOR DETAIL #2

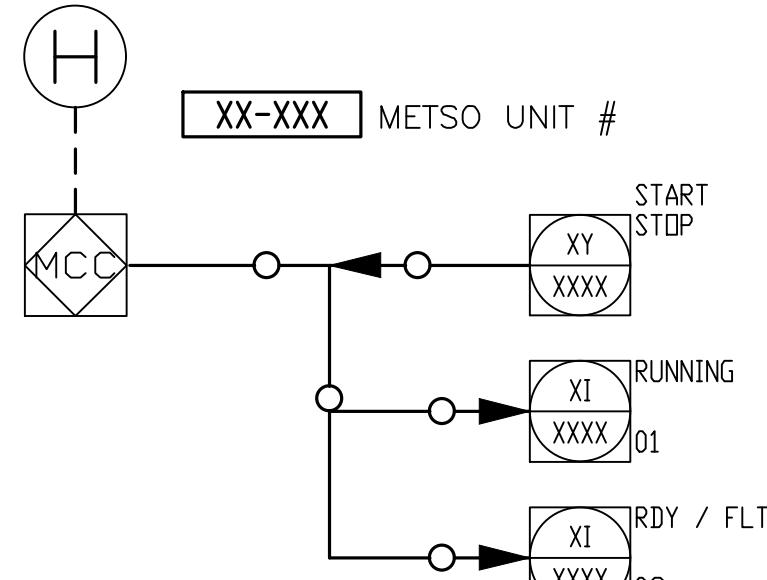
NON-REVERSING STARTER  
CONTROLLED BY BMS  
SIS INDEPENDENT MONITORING OF CURRENT

## MOTOR DETAIL #5

VARIABLE SPEED DRIVE  
CONTROLLED BY BMS

## HEATER DETAIL #3

CONTACTOR / HEATER



## MOTOR/HEATER LIST

METSO UNIT #	DESCRIPTION	DETAIL #	CURRENT INDICATION	EMERGENCY POWER FEED	P&ID REFERENCE
2111-BE-001A	BUCKET ELEVATOR	4	NO	NO	10262849-006
2111-BE-001B	BUCKET ELEVATOR	4	NO	NO	10262849-006
2111-CV-001	HOPPER PULL-OUT BELT CONVEYOR	4	NO	NO	10262849-006
2111-CV-002	BELT CONVEYOR	4	NO	NO	10262849-006
2111-FA-001	DUST COLLECTOR EXHAUST FAN	1	NO	NO	10262849-007
2111-HT-001A	BUCKET ELEVATOR MAINTENANCE HOIST	N/A	NO	NO	10262849-006
2111-HT-001B	BUCKET ELEVATOR MAINTENANCE HOIST	N/A	NO	NO	10262849-006
2111-WF-001	ALPHA SPODUMENE WEIGH FEEDER	4	NO	NO	10262849-007
2111-XM-010A	BUCKET ELEVATOR INCHING DRIVE	1	NO	NO	10262849-006
2111-XM-010B	BUCKET ELEVATOR INCHING DRIVE	1	NO	NO	10262849-006
2121-CV-001	KILN EXHAUST BAGHOUSE SCREW CONVEYOR	1	NO	NO	10262849-009
2121-CV-002	KILN EXHAUST BAGHOUSE SCREW CONVEYOR	1	NO	NO	10262849-009
2121-FA-001	KILN I.D. FAN	5	YES	NO	10262849-018
2121-FA-003	KILN BURNER PRIMARY AIR FAN	5	YES	YES	10262849-015
2121-FA-004	NOSE RING COOLING FAN	1	NO	YES	10262849-010
2121-FA-005	NOSE RING COOLING FAN	1	NO	YES	10262849-010
2121-FA-006	KILN BURNER PILOT AIR FAN	2	NO	YES	10262849-016
2121-FA-007	SCRUBBER SPARGING AIR FAN	1	NO	NO	10262849-017
2121-FE-001	KILN INLET SCREW FEEDER	4	NO	NO	10262849-007
2121-PP-001A	COOLER WATER PUMP	4	NO	YES	10262849-013
2121-PP-001B	COOLER WATER PUMP	4	NO	YES	10262849-013
2121-PP-002A	SCRUBBER RECYCLE PUMP	1	YES	YES	10262849-017
2121-PP-002B	SCRUBBER RECYCLE PUMP	1	YES	YES	10262849-017
2121-PP-003	KILN CO ANALYZER SAMPLE PUMP	2	NO	YES	10262849-019
2121-VV-001	KILN EXHAUST BAGHOUSE ROTARY VALVE	1	NO	NO	10262849-009
2121-VV-002	KILN EXHAUST BAGHOUSE ROTARY VALVE	1	NO	NO	10262849-009
2121-XM-003	KILN DRIVE	4	YES	NO	10262849-010
2121-XM-004	KILN INCHING DRIVE	1	NO	YES	10262849-010
2121-XM-005	COOLER DRIVE	4	YES	NO	10262849-012
2121-XM-006	COOLER AUXILIARY DRIVE	1	NO	YES	10262849-012

## NOTES:

- 1 - MAINTENANCE ALLOWS FIELD START AND STOP WITH LOCK OFF STOP.
- 2 - REMOTE ALLOWS PCS (AUTO) RUNNING OF DRIVES (LOCK OFF STOP REMAINS ACTIVE)

<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
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EPCM Project Document Number	Revision
EPCM Signature: Date:	

CLASSIFICATION: RESTRICTED

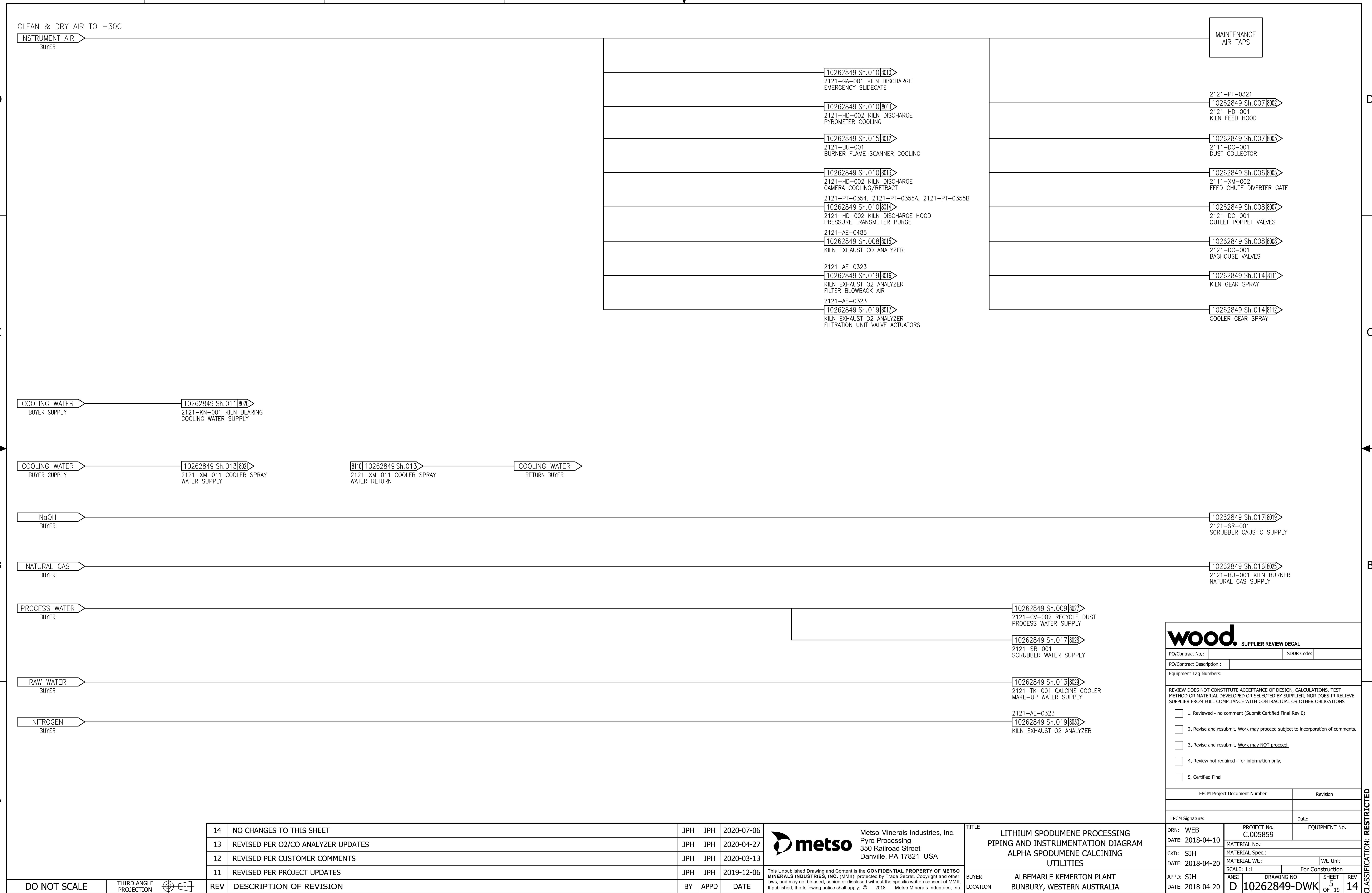
14	ADDED EQUIPMENT 2111-CV-001	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE

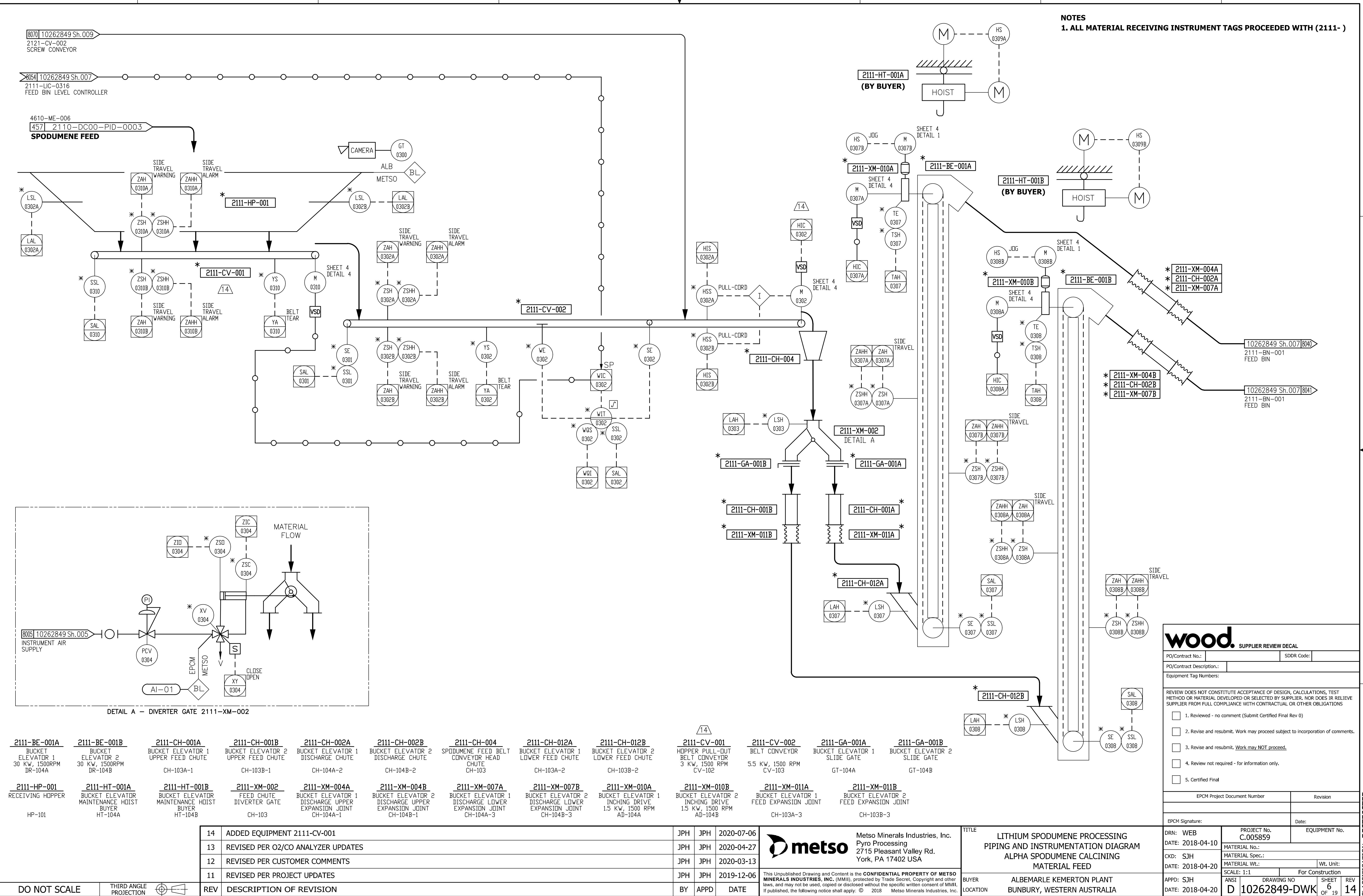
**metso** Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
MOTOR DETAILS

BUYER ALBEMARLE KEMERTON PLANT  
LOCATION BUNBURY, WESTERN AUSTRALIA

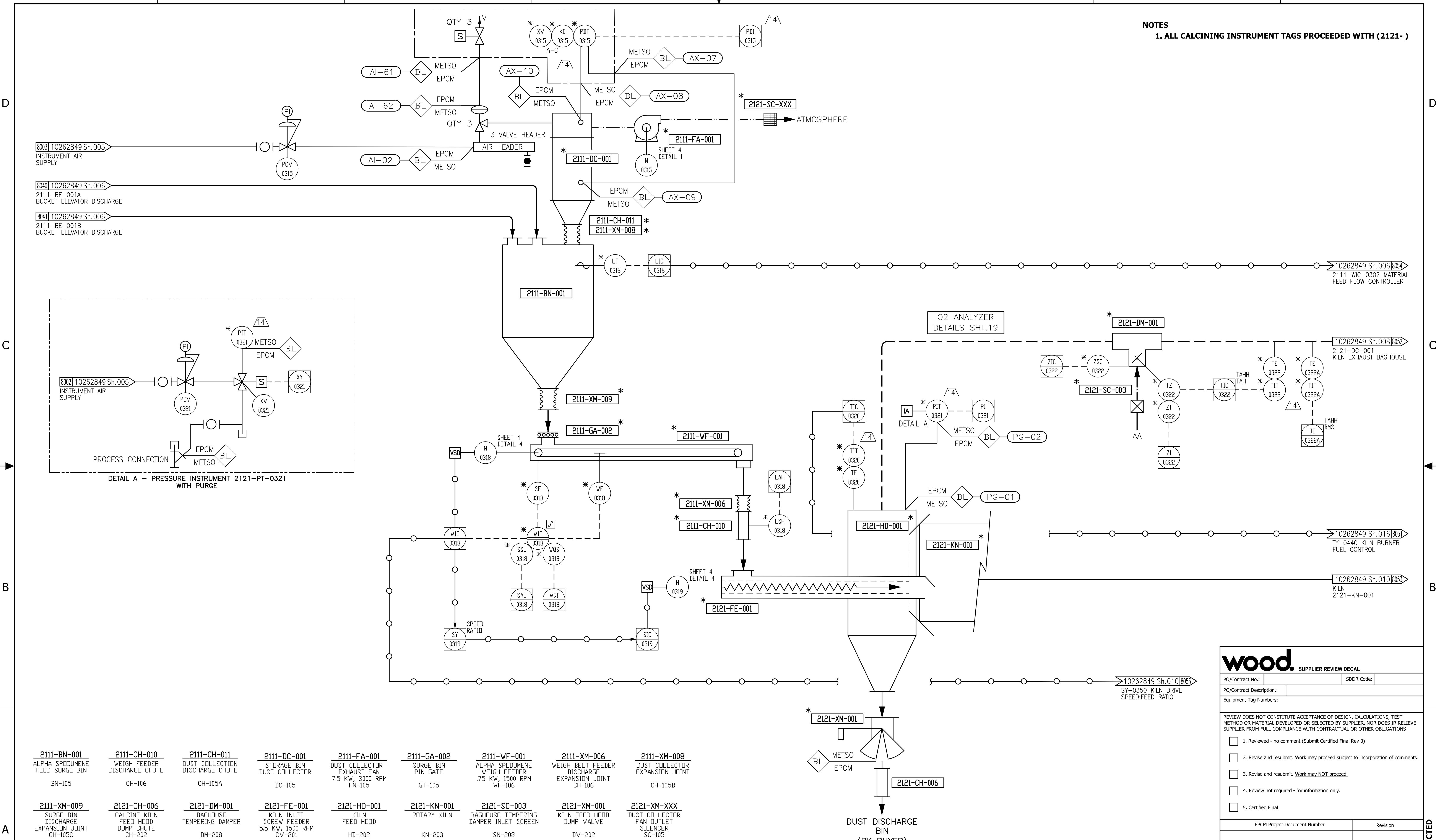
DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-10	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
SCALE: 1:1	For Construction	
APPD: SJH	DRAWING NO. D 10262849-DWK	REV 14
DATE: 2018-04-20	ANSI 4	OF 19





## NOTES

1. ALL CALCINING INSTRUMENT TAGS PROCEEDED WITH (2121- )



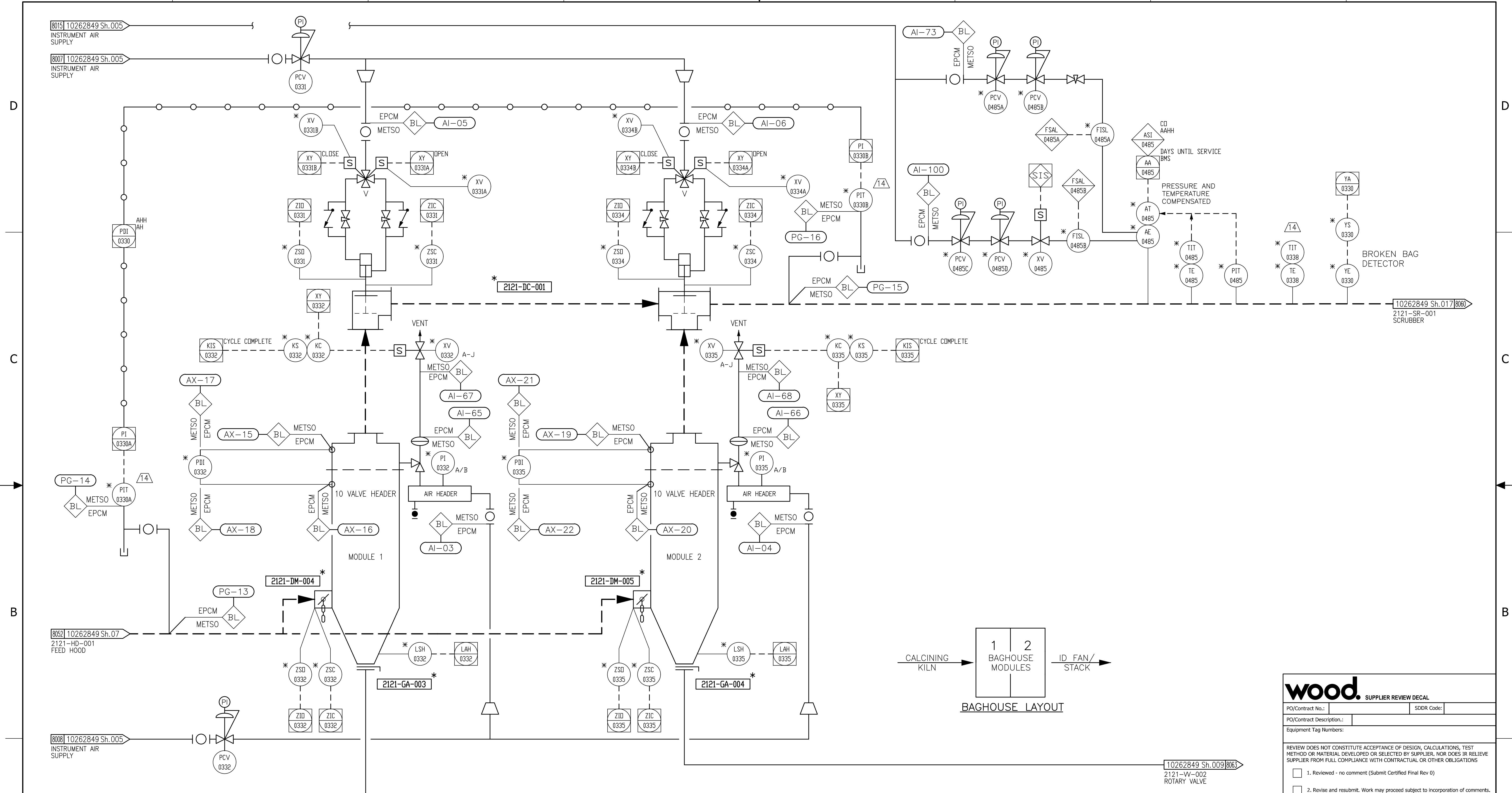
<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
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<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: Date:	
PROJECT No. C.005859	
DATE: 2018-04-10	MATERIAL No.:
CKD: SJH	MATERIAL Spec.:
DATE: 2018-04-20	MATERIAL Wt. Wt. Unit:
SCALE: 1:1	For Construction
APPD: SJH	ANSI DRAWING NO. D 10262849-DWK
DATE: 2018-04-20	SHEET OF 14

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14	REVISED DUST COLLECTOR SYSTEM	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY APPD	DATE	
REV	DESCRIPTION OF REVISION			



2121-DC-001 KILN EXHAUST BAGHOUSE (2) MODULE DC-208  
2121-DM-004 BAGHOUSE MODULE 1 INLET DAMPER DM-208A  
2121-DM-005 BAGHOUSE MODULE 2 INLET DAMPER DM-208B  
2121-GA-003 BAGHOUSE ROTARY AIRLOCK SLIDE GATE 1 GT-208A  
2121-GA-004 BAGHOUSE ROTARY AIRLOCK SLIDE GATE 2 GT-208B

14	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06

DO NOT SCALE    THIRD ANGLE PROJECTION    REV    DESCRIPTION OF REVISION    BY APPD DATE



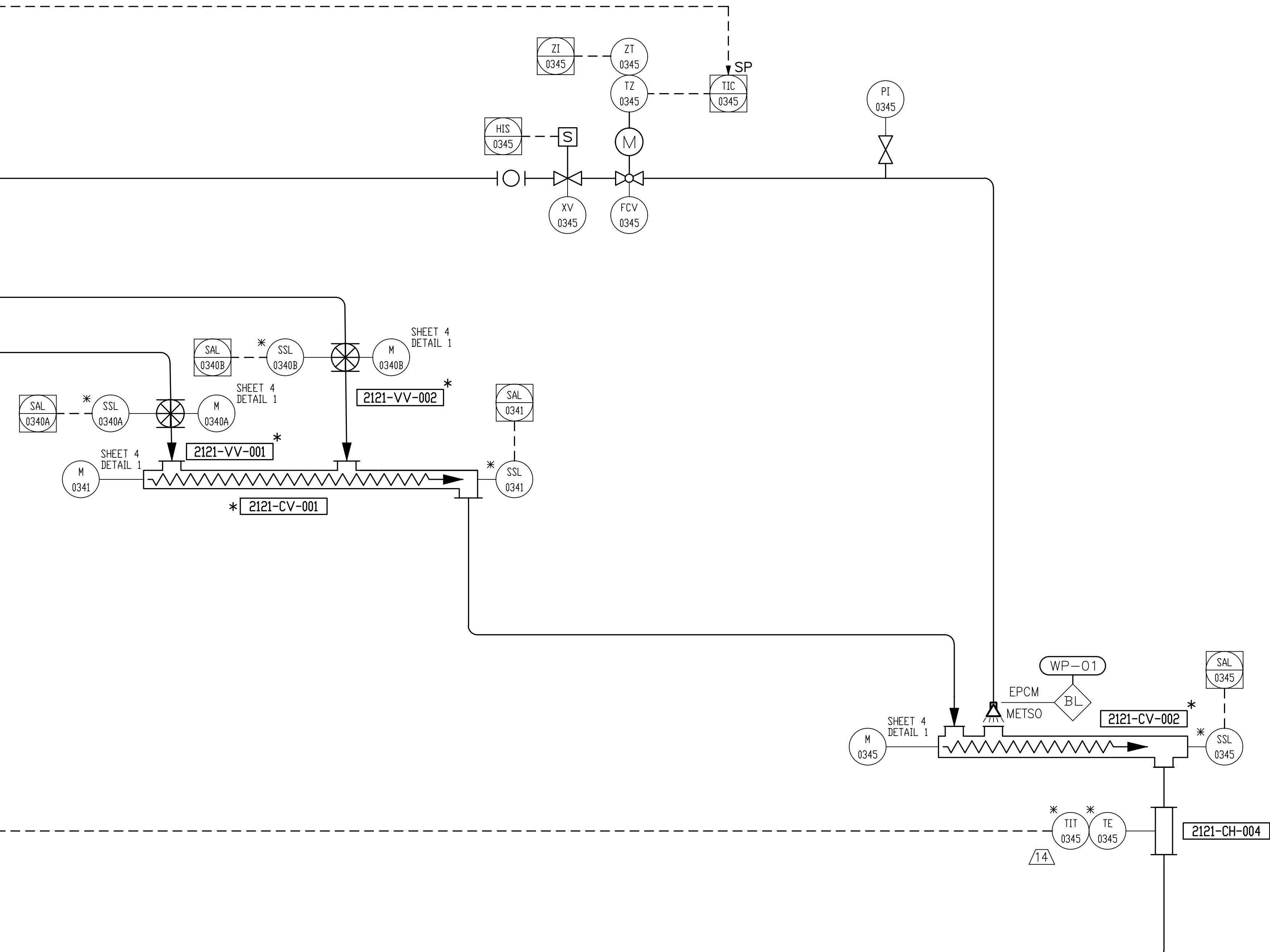
Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE  
LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
CALCINING BAGHOUSE

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-10	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
BUYER LOCATION ALBEMARLE KEMERTON PLANT BUNBURY, WESTERN AUSTRALIA	SCALE: 1:1	For Construction
APPD: SJH	DRAWING NO. D 10262849-DWK	SHEET 8 OF 19
DATE: 2018-04-20	REV 14	

D

D

8027|10262849 Sh.005  
PROCESS WATER SUPPLY8063|10262849 Sh.008  
2121-DC-001  
BAGHOUSE MODULE 28064|10262849 Sh.008  
2121-DC-001  
BAGHOUSE MODULE 110262849 Sh.006|8070  
2111-CV-002  
BELT CONVEYOR

<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
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EPCM Project Document Number	Revision
EPCM Signature: Date:	

2121-CH-004	2121-CV-001	2121-CV-002	2121-VV-001	2121-VV-002
DUST RETURN SCREW CONVEYOR DISCHARGE CHUTE CH-208C	KILN EXHAUST BAGHOUSE SCREW CONVEYOR 5.5 KW, 1500 RPM CV-208A	KILN EXHAUST BAGHOUSE SCREW CONVEYOR 5.5 KW, 1500 RPM CV-208C	KILN EXHAUST BAGHOUSE ROTARY VALVE .75 KW, 1500 RPM RV-208A	KILN EXHAUST BAGHOUSE ROTARY VALVE .75 KW, 1500 RPM RV-208B

14	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			

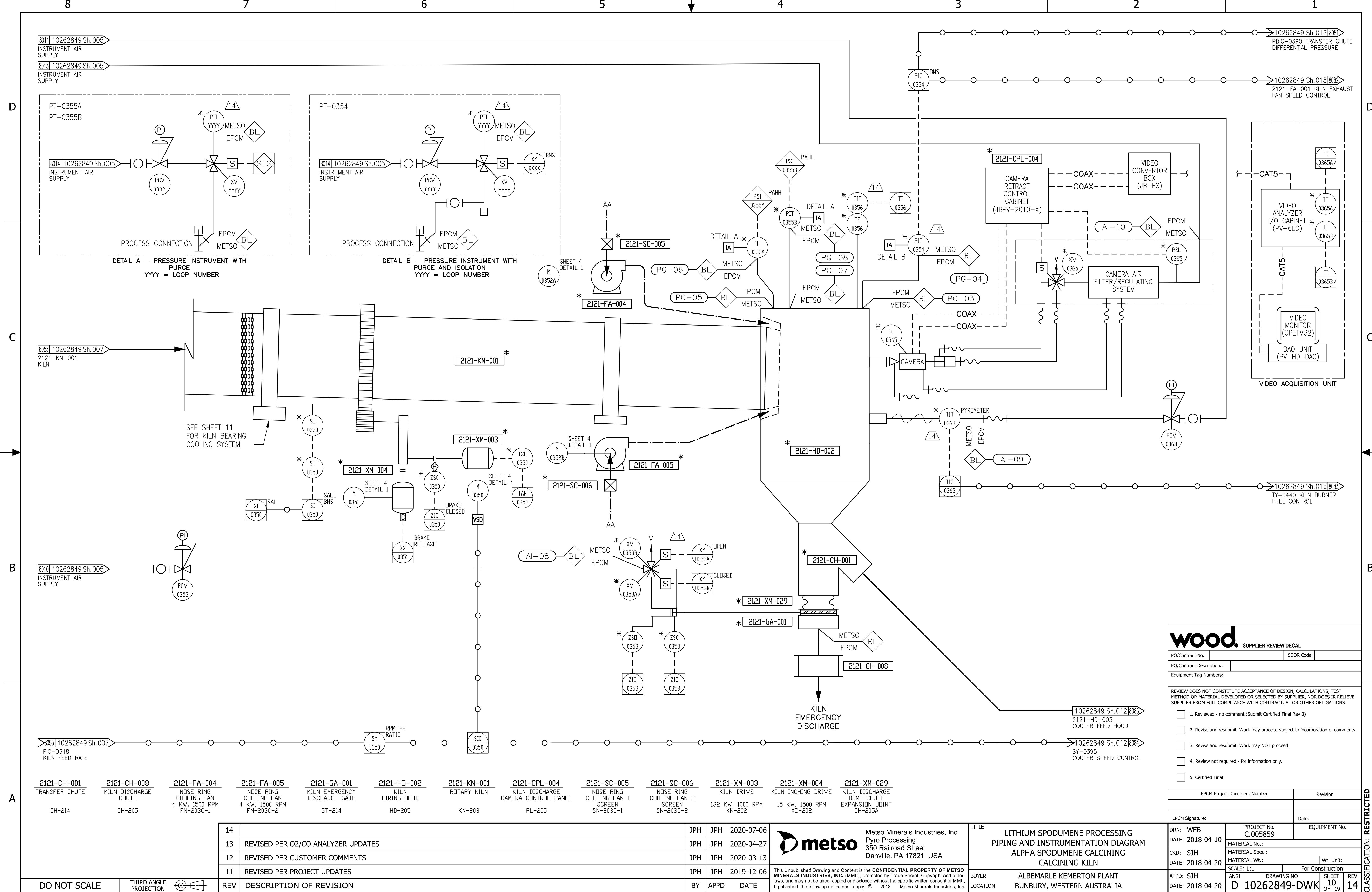


Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
DUST TAKE-AWAY

DRN: WEB PROJECT No. C.005859 EQUIPMENT No.  
DATE: 2018-04-10 MATERIAL No.:  
CKD: SJH MATERIAL Spec.:  
BUYER ALBEMARLE KEMERTON PLANT MATERIAL Wt.:  
LOCATION BUNBURY, WESTERN AUSTRALIA SCALE: 1:1 For Construction  
APPD: SJH DATE: 2018-04-20 ANSI DRAWING NO. SHEET 9 REV  
DATE: 2018-04-20 D 10262849-DWK OF 19 14

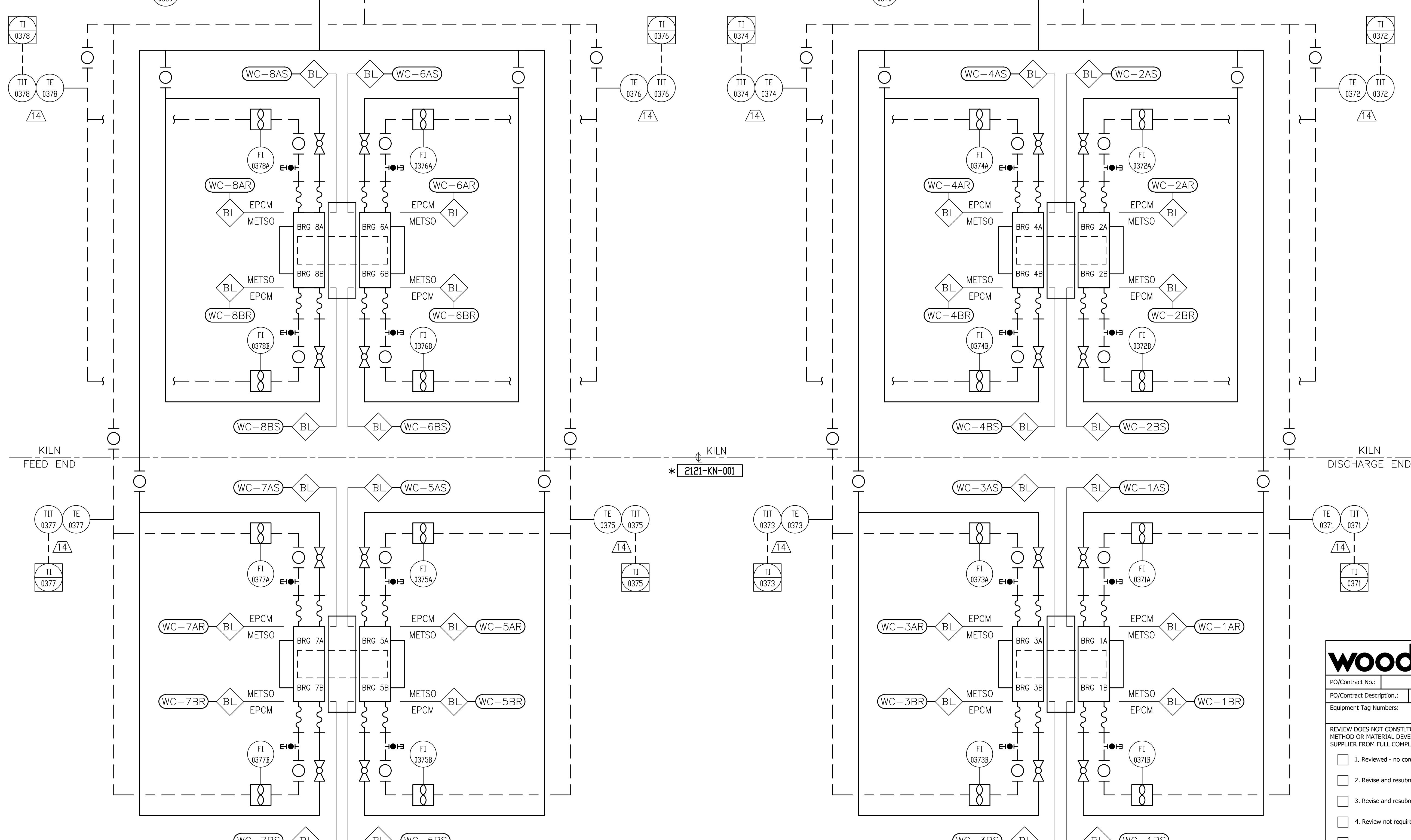
CLASSIFICATION: RESTRICTED



8020|10262849 Sh.005  
COOLING WATER SUPPLY

TO AID READABILITY, COOLING WATER RETURN LINES  
ON THIS SHEET ARE INDICATED WITH DASHED LINES.

10262849 Sh.013|809  
COOLING WATER RETURN



2121-KN-001  
ROTARY KILN

KN-203

14	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06

DO NOT SCALE    THIRD ANGLE PROJECTION    REV    DESCRIPTION OF REVISION    BY APPD DATE



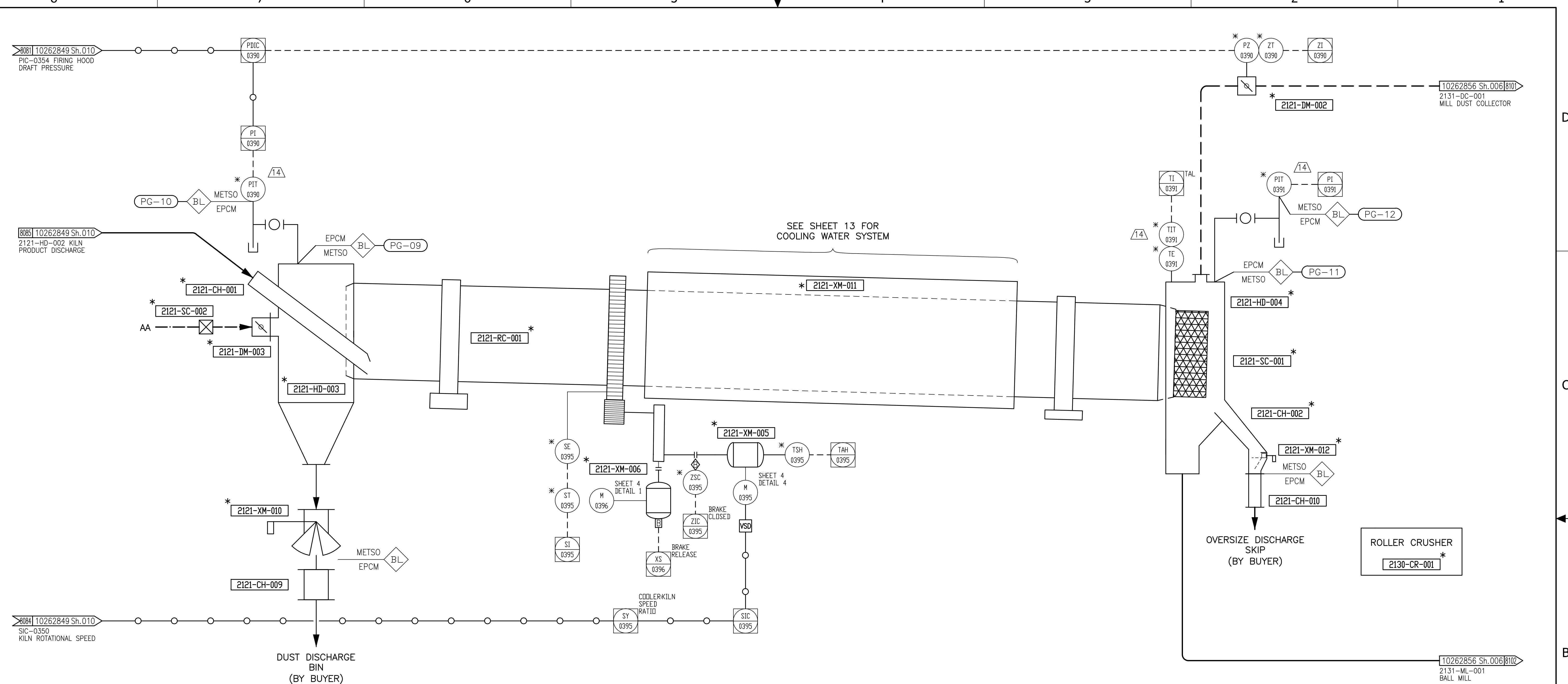
Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

TITLE: LITHIUM SPODUMENE PROCESSING  
PIPELINE AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
BEARING COOLING WATER

BUYER LOCATION: ALBEMARLE KEMERTON PLANT  
BUNBURY, WESTERN AUSTRALIA

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-10	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
SCALE: 1:1	For Construction	
APPD: SJH	ANSI	DRAWING NO. D 10262849-DWK
DATE: 2018-04-20	SHEET 11 OF 19	REV 14

CLASSIFICATION: RESTRICTED



<u>2121-CH-001</u> TRANSFER CHUTE CH-214	<u>2121-CH-002</u> COOLER DISCHARGE OVERSIZE CH-218A	<u>2121-CH-009</u> CALCINE COOLER FEED HOOD DUMP CHUTE CH-215	<u>2121-CH-010</u> CALCINE COOLER OVERSIZE DUMP CHUTE CH-218B	<u>2121-DM-002</u> COOLER DISCHARGE HOOD DAMPER CH-218	<u>2121-DM-003</u> SWEEP AIR DAMPER DM-218	<u>2121-HD-003</u> COOLER FEED HOOD HD-215	<u>2121-HD-004</u> COOLER DISCHARGE HOOD HD-218
<u>2121-RC-001</u> ROTARY COOLER CD-215	<u>2121-SC-002</u> SWEEP AIR DAMPER SCREEN SC-215	<u>2121-SC-001</u> COOLER DISCHARGE TROMMEL SN-218	<u>2121-XM-005</u> COOLER DRIVE 55 KW, 1000 RPM DR-215	<u>2121-XM-006</u> COOLER AUX DRIVE 7.5 KW, 1500 RPM AD-215	<u>2121-XM-006</u> COOLER DRIVE 55 KW, 1000 RPM DR-215	<u>2121-XM-010</u> COOLER AUX DRIVE 7.5 KW, 1500 RPM AD-215	<u>2121-XM-011</u> COOLER SHROUD DV-215

14	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06

DO NOT SCALE    THIRD ANGLE PROJECTION    REV    DESCRIPTION OF REVISION    BY APPD DATE



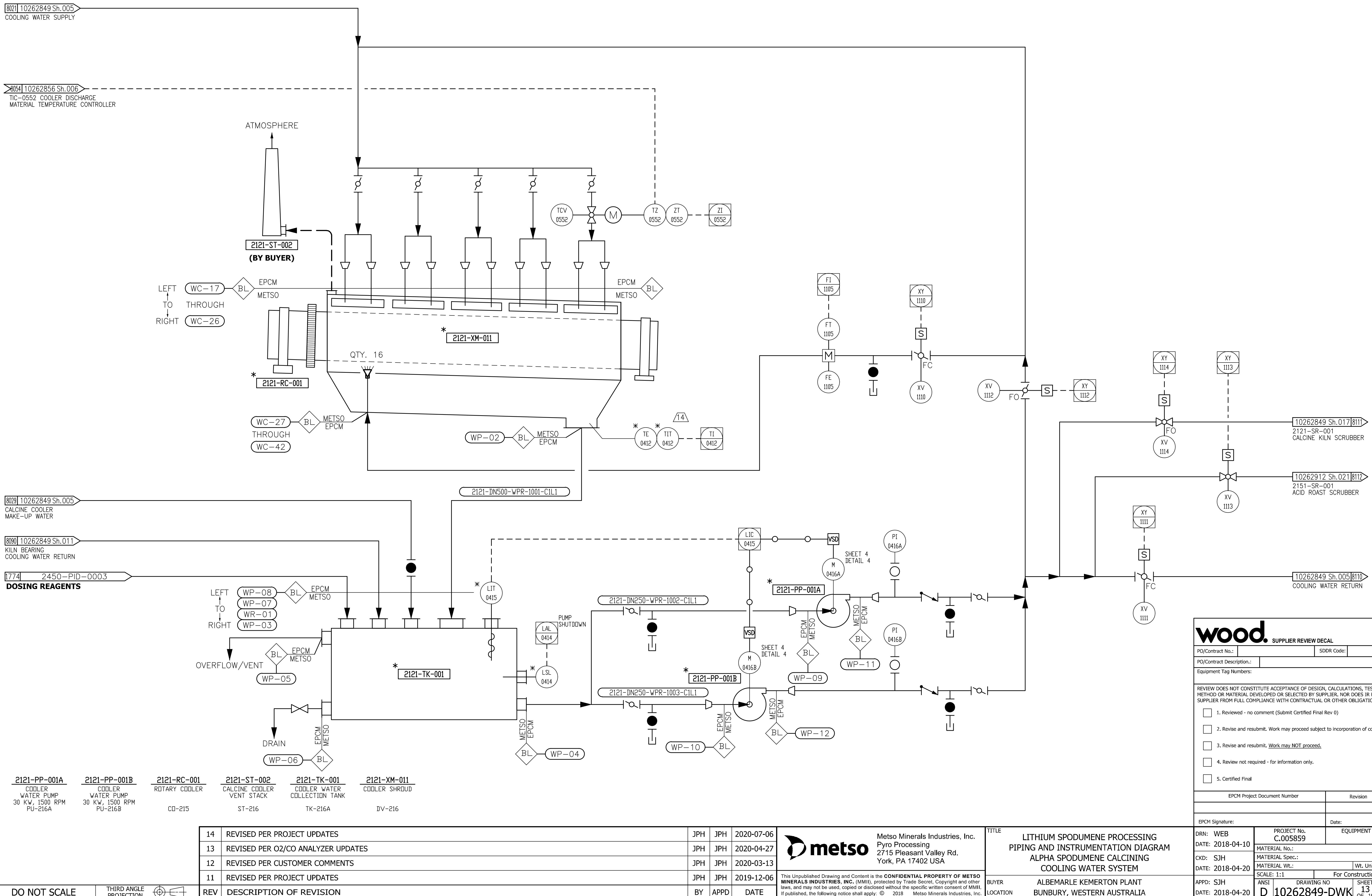
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York, PA 17402 USA

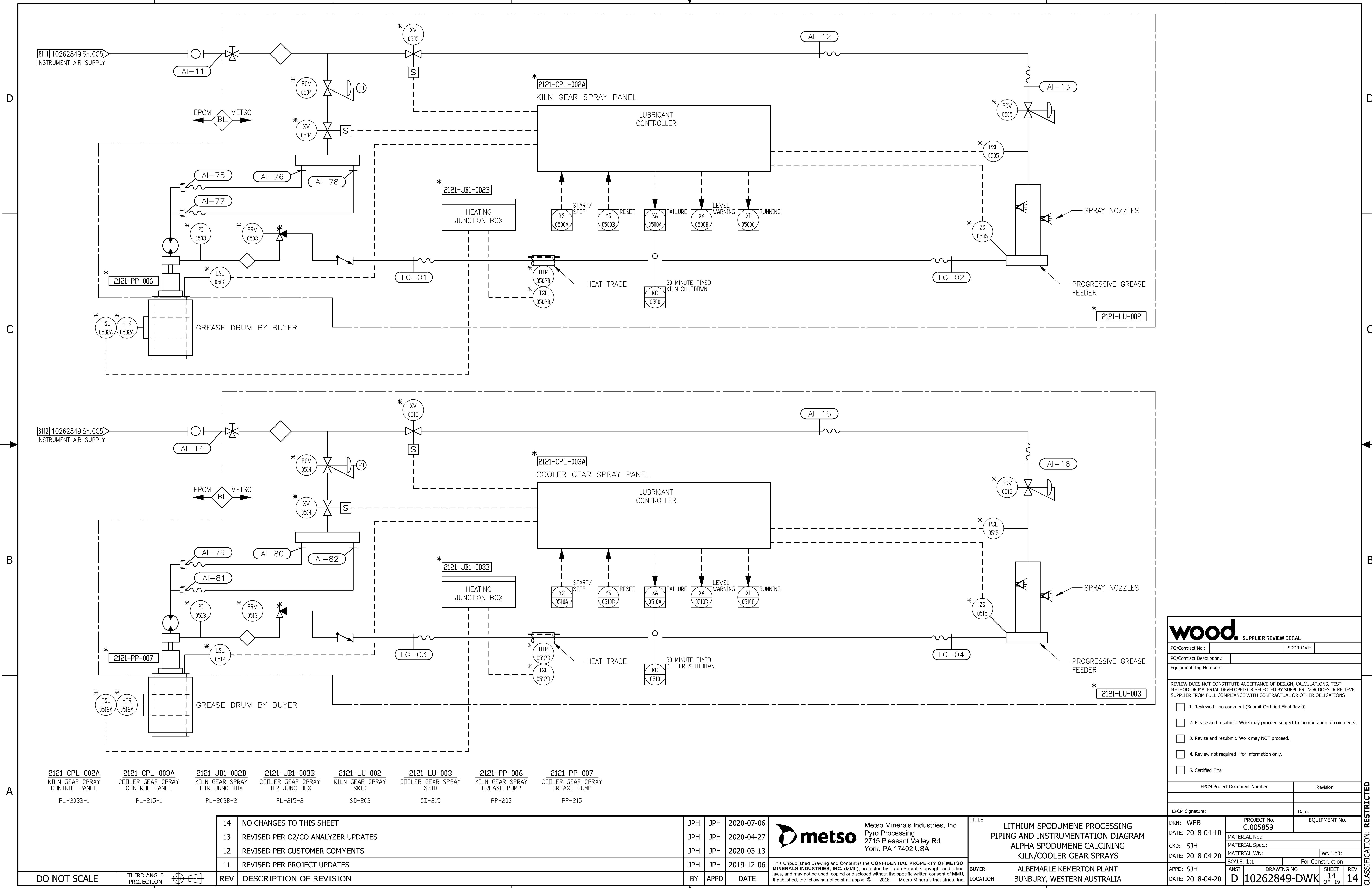
TITLE LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
CALCINE COOLER

DRN: WEB    PROJECT No. C.005859    EQUIPMENT No.

DATE: 2018-04-10    MATERIAL No.:  
CKD: SJH    MATERIAL Spec.:  
BUYER ALBEMARLE KEMERTON PLANT    MATERIAL Wt.:  
LOCATION BUNBURY, WESTERN AUSTRALIA    Wt. Unit:  
APPD: SJH    SCALE: 1:1    For Construction  
DATE: 2018-04-20    ANSI D 10262849-DWK SHEET 12 OF 19 REV 14

CLASSIFICATION: RESTRICTED





<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDR Code:
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EPCM Project Document Number	Revision
EPCM Signature: Date:	
PROJECT No. C.005859 EQUIPMENT No.	
DRN: WEB	DATE: 2018-04-10
MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:
MATERIAL Wt.:	
Wt. Unit:	
SCALE: 1:1	For Construction
APPD: SJH	DRAWING NO. D 10262849-DWK
DATE: 2018-04-20	SHEET 14 OF 19 REV 14

2121-CPL-002A      2121-CPL-003A      2121-JB1-002B      2121-JB1-003B      2121-LU-002      2121-LU-003      2121-PP-006      2121-PP-007  
 KILN GEAR SPRAY CONTROL PANEL      COOLER GEAR SPRAY CONTROL PANEL      KILN GEAR SPRAY HTR JUNC BOX      COOLER GEAR SPRAY HTR JUNC BOX      KILN GEAR SPRAY SKID      COOLER GEAR SPRAY SKID      KILN GEAR SPRAY GREASE PUMP      COOLER GEAR SPRAY GREASE PUMP  
 PL-203B-1      PL-215-1      PL-203B-2      PL-215-2      SD-203      SD-215      PP-203      PP-215

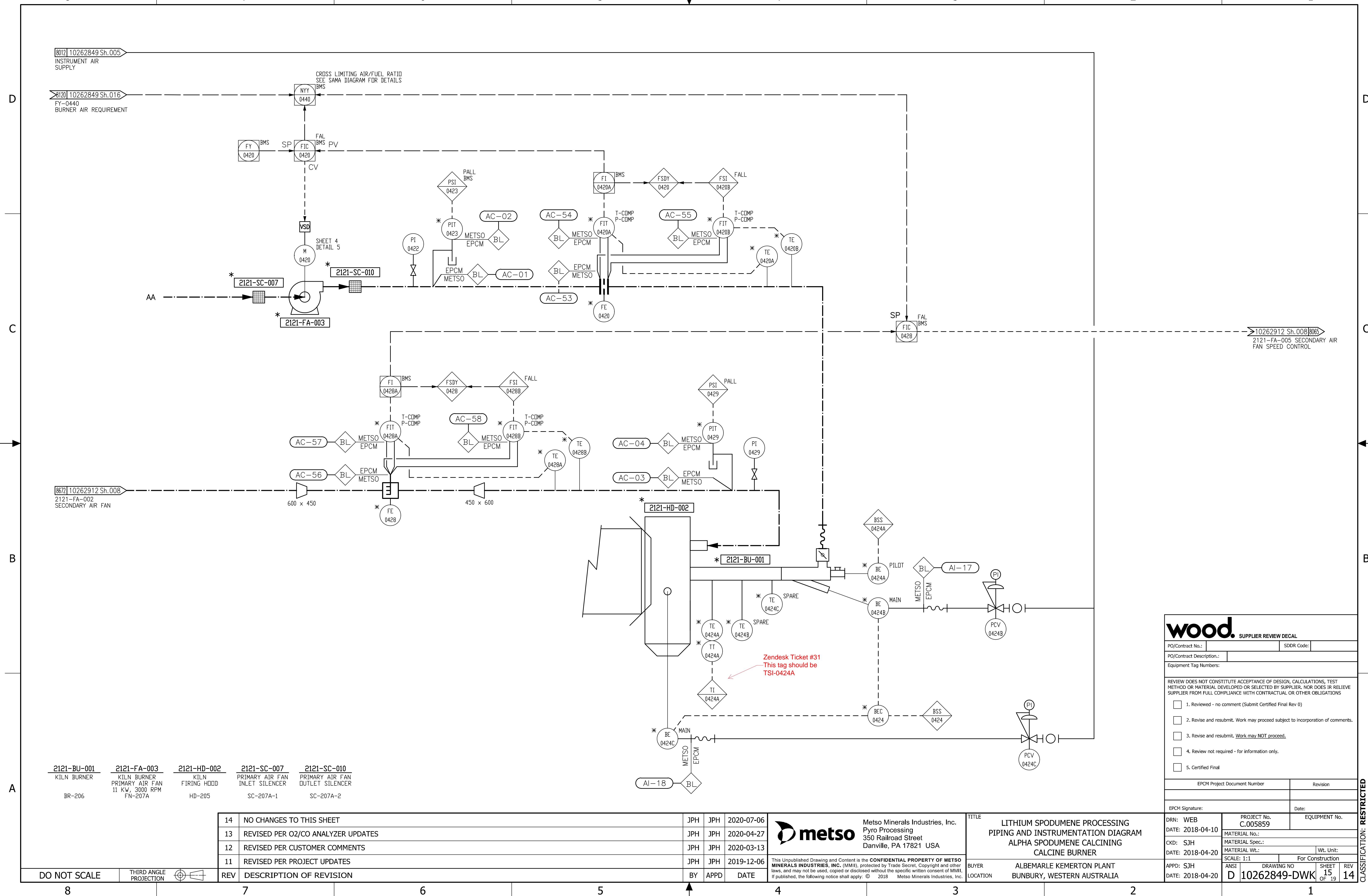
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13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			

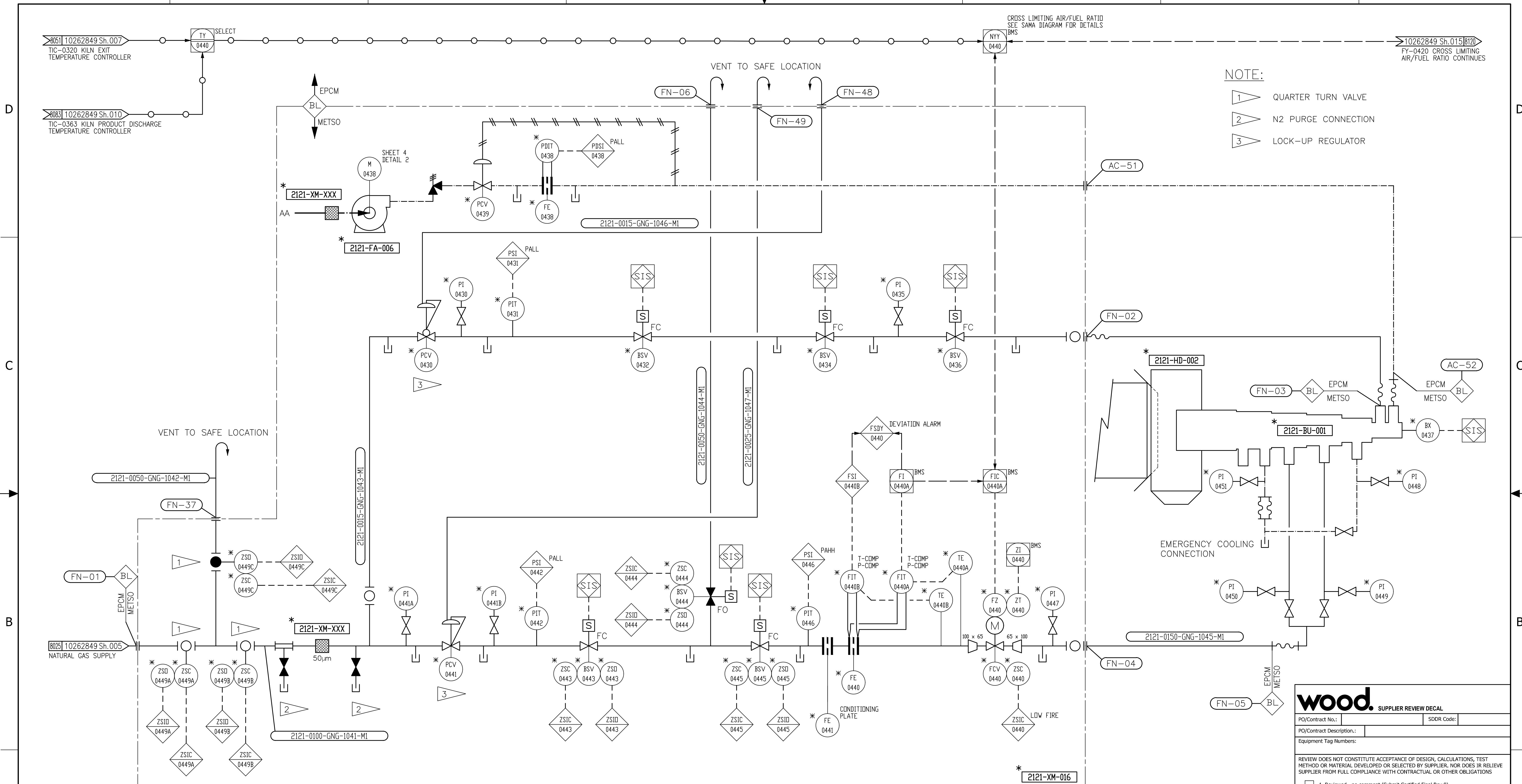


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TITLE LITHIUM SPUDOMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPUDOMENE CALCINING  
KILN/COOLER GEAR SPRAYS  
BUYER ALBEMARLE KEMERTON PLANT  
LOCATION BUNBURY, WESTERN AUSTRALIA

DRN: WEB PROJECT No. C.005859 EQUIPMENT No.  
 DATE: 2018-04-10 MATERIAL No.:  
 MATERIAL Spec.:  
 CKD: SJH MATERIAL Wt.:  
 DATE: 2018-04-20 Wt. Unit:  
 SCALE: 1:1 For Construction  
 APPD: SJH DRAWING NO. D 10262849-DWK  
 DATE: 2018-04-20 SHEET 14 OF 19 REV 14





2121-BU-001	2121-FA-006	2121-HD-002	2121-XM-016	2121-XM-XXX	2121-XM-XXX
KILN BURNER	KILN BURNER PILOT AIR FAN .55 KV, 3000 RPM	KILN FIRING HOOD	KILN BURNER PILOT AIR FAN RA-206	KILN BURNER GAS RACK	KILN BURNER GAS RACK INLET FILTER FL-206B
BR-206		HD-205		RA-206	FL-206A

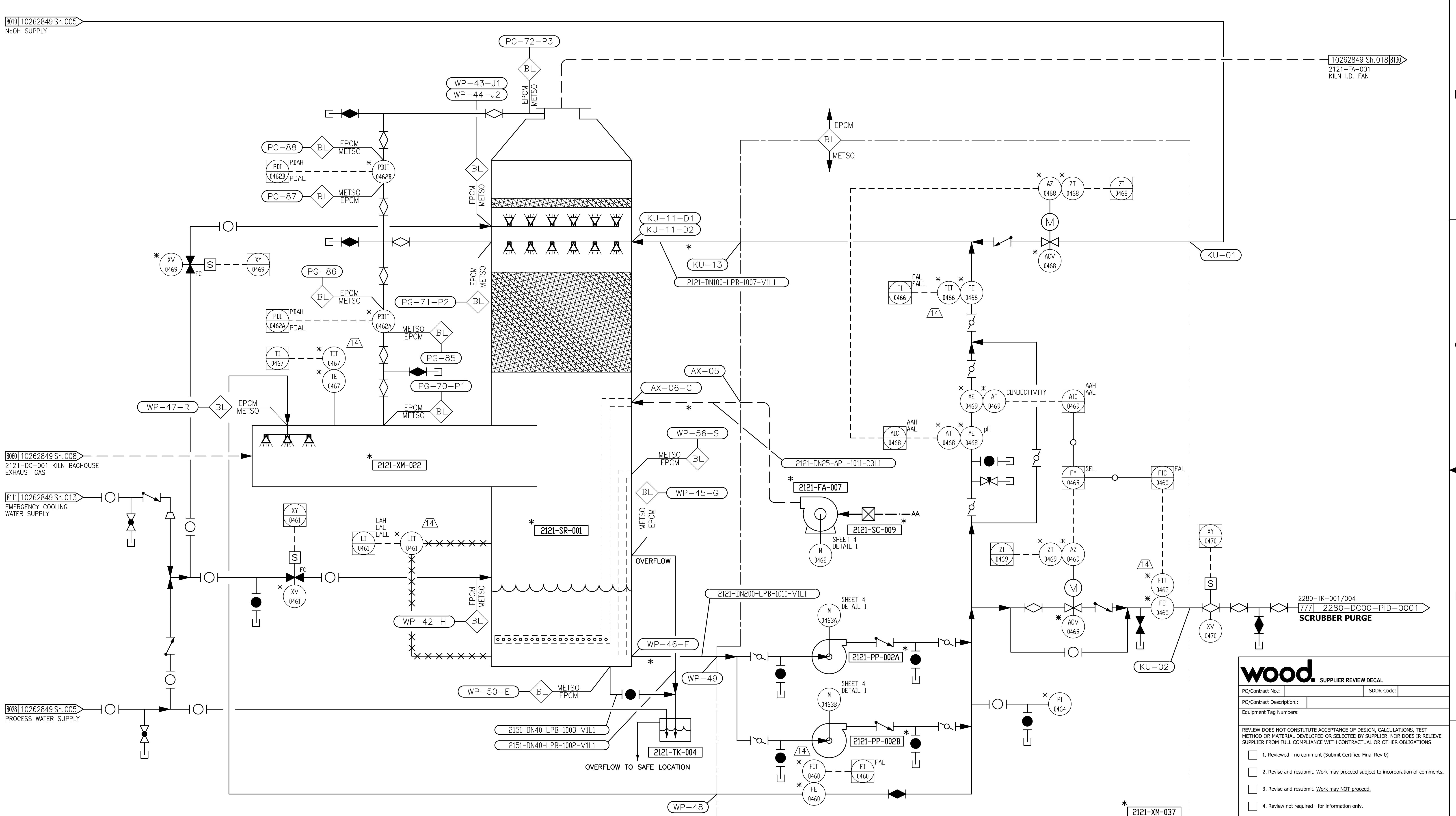
14	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			



Metso Minerals Industries, Inc.  
Pyro Processing  
350 Railroad Street  
Danville, PA 17821 USA

TITLE LITHIUM SPUDOMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPUDOMENE CALCINING  
BURNER FUEL TRAIN

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-10	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
BUYER ALBEMARLE KEMERTON PLANT	SCALE: 1:1	For Construction
LOCATION BUNBURY, WESTERN AUSTRALIA	APPD: SJH	DRAWING NO D 10262849-DWK
	DATE: 2018-04-20	SHEET 16 OF 19 REV 14



<u>2121-FA-007</u>	<u>2121-PP-002A</u>	<u>2121-PP-002B</u>
SPARGING AIR FAN 3.7 KW, 3000 RPM FN-212	SCRUBBER RECYCLE PUMP 15 KW, 1500 RPM PU-212A	SCRUBBER RECYCLE PUMP 15 KW, 1500 RPM PU-212B

<u>2121-SC-009</u>	<u>2121-SR-001</u>	<u>2121-</u>
PARGING AIR FAN INLET SCREEN	S <sub>0</sub> x / HF SCRUBBER	CALCINE SEA
SN-212	SB-212	TH

004      2121-  
RUBBER    QUENCH  
    JT

022      21  
NUMBER    CALC  
RECIR

**KM-037**  
**SCRUBBER**  
**ATION SKID**

REV	DESCRIPTION OF REVISION	BY	APPD	DATE
14	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-0
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-2
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-1
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-0



Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

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# LITHIUM SPODUMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM

## ALPHA SPODUMENE CALCINING SCRUBBER

**ALBEMARLE KEMERTON PLANT  
BUNBURY, WESTERN AUSTRALIA**

<b>wood.</b>		<b>SUPPLIER REVIEW DECAL</b>
PO/Contract No.:		SDDR Code:
PO/Contract Description.:		
Equipment Tag Numbers:  		
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER. NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS		
<input type="checkbox"/>	1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/>	2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/>	3. Revise and resubmit. <u>Work may NOT proceed.</u>	
<input type="checkbox"/>	4. Review not required - for information only.	
<input type="checkbox"/>	5. Certified Final	
EPCM Project Document Number		Revision
EPCM Signature:		Date:
RETIRED		

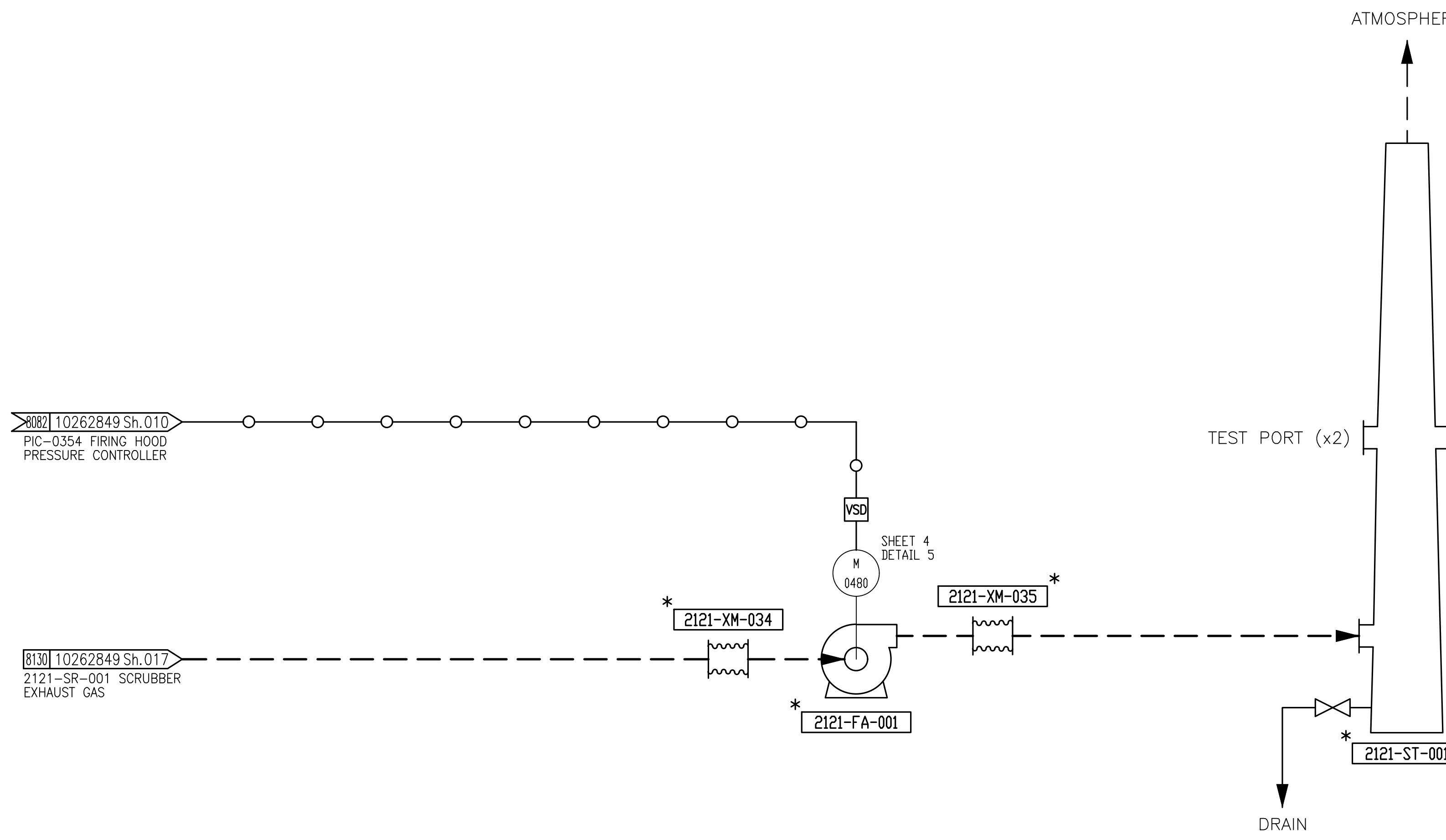
הַתְּבִיבָה וְעַמְּקֹםָה: אֶתְּנָאָרָה

D

D

C

C



B

B

A

A

2121-FA-001      2121-ST-001      2121-XM-034      2121-XM-035  
 KILN I.D. FAN EXHAUST STACK I.D. FAN INLET EXPANSION JOINT I.D. FAN OUTLET EXPANSION JOINT  
 110 KW, 3000 RPM SK-213 CH-211A CH-211B

14	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
13	REVISED PER O2/CO ANALYZER UPDATES	JPH	JPH	2020-04-27
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-03-13
11	REVISED PER PROJECT UPDATES	JPH	JPH	2019-12-06
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE
REV	DESCRIPTION OF REVISION			

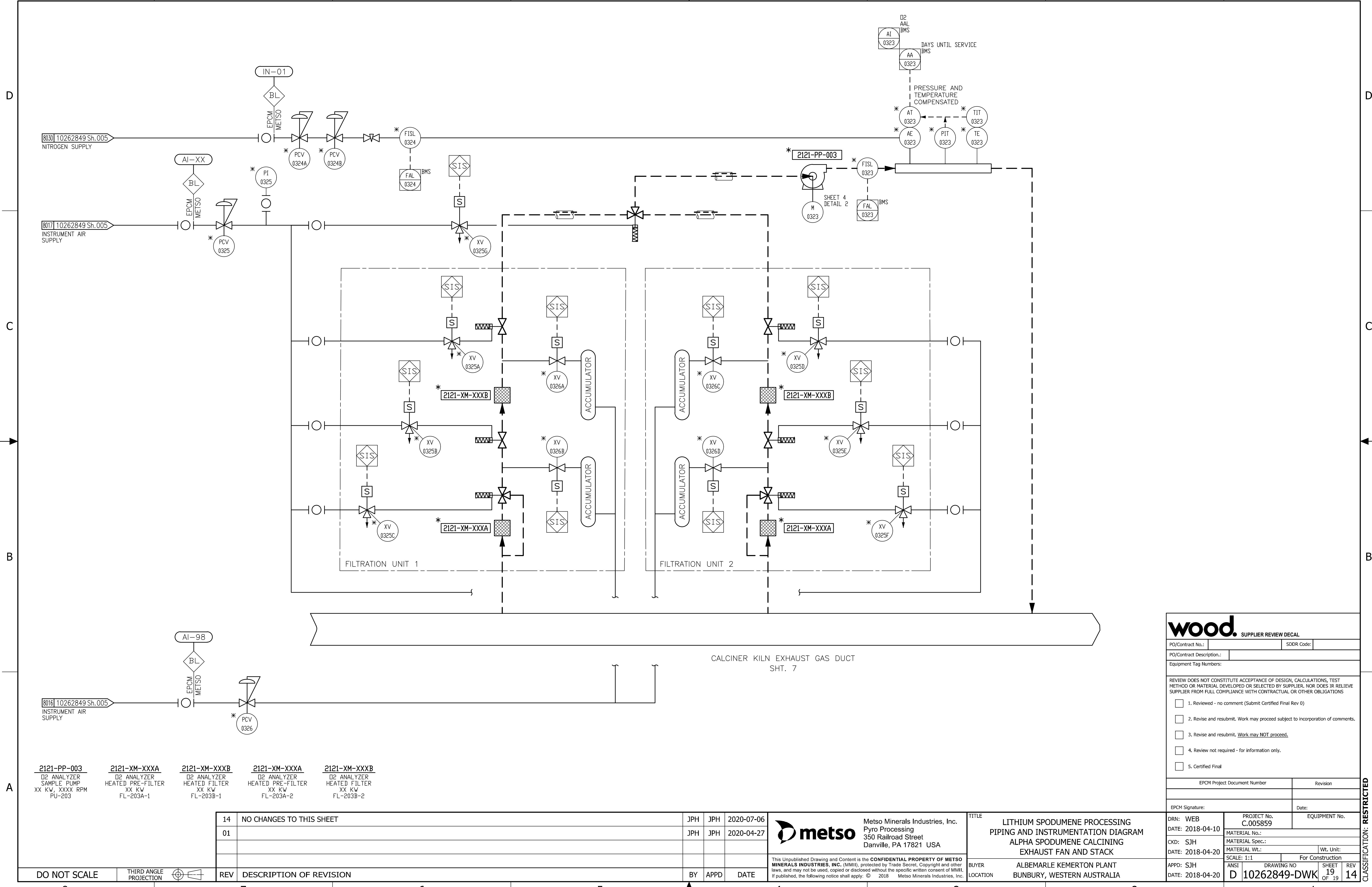


Metso Minerals Industries, Inc.  
Pyro Processing  
350 Railroad Street  
Danville, PA 17821 USA

TITLE LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
ALPHA SPODUMENE CALCINING  
EXHAUST FAN AND STACK

DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
DATE: 2018-04-10	MATERIAL No.:	
CKD: SJH	MATERIAL Spec.:	
DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
BUYER ALBEMARLE KEMERTON PLANT	SCALE: 1:1	For Construction
LOCATION BUNBURY, WESTERN AUSTRALIA	APPD: SJH	
DATE: 2018-04-20	ANSI D 10262849-DWK	SHEET 18 OF 19 REV 14

CLASSIFICATION: RESTRICTED





EQUIPMENT LETTER CODES		
CODE	MAIN CATEGORY	SUB CATEGORY / APPLICATION / COMMENT
AC	AIR COMPRESSOR	
AD	AUXILIARY DRIVE	
AI	ACIDIFICATION	
AN	AIR CONDITIONER	
AP	AERATION PAD	
AR	AIR RECEIVER	
AY	AIR DRYER	
BD	BALLING DRUM	
BE	BUCKET ELEVATOR	Bucket Conveyor
BG	BEARING	Roller, Drive
BL	BLOWER	
BN	BIN	Stone, Walking Floor, Feed, Bunker (Solid material storage)
BO	BOILER	Steam, Waste Heat, Steam Generating Drum
BR	BURNER	Secondary, Primary, Kiln, Waste, Incinerator, Preheat
BX	BOX	Mixing, Collection
CD	CART DUMPER	
CH	CHUTE	Transfer, Stone, Feed, Feed Pipe, Expansion Joint
CL	CLASSIFIER	
CM	COMBS	Pellet
CN	CALCINER	Rotary, Fluid Bed
CO	COOLER	Annular, NEIMS, Rotary (Only for main process materials. Use HX for secondary process or WQ for cooling with water spray.)
CPL	CONTROL PANEL	
CR	CRUSHER	Stone, Primary, Secondary
CV	CONVEYOR	Belt, Screw, Vibrating, Drag, Chain, Wet Ash, Reversing Belt, Roller, Box, Discharge Auger, Auger, Tubular, Pan, Pneumatic, Air Float (For Bucket Conveyor use BE)
CY	CYCLONE	Multicyclone
DC	DUST COLLECTOR	Baghouse, Scrubber
DD	DAM	Pond, Tailings
DE	DENSIFIER	
DI	DISTRIBUTOR	Stone, Splitter, Diverter (solids)
DM	DAMPER	
DR	DRIVE	Kiln, Cooler, Travelling Grate, etc.
DS	DISPOSAL RECEPTACLE	(Waste material)
DU	DUCT	Air, Gas, Dust
DV	DUMP VALVE	Double, Single, Trap
DZ	DEMINERALIZER	
EL	ELEVATOR	Lift, Freight, Passenger (For Bucket Elevator use BE)
EP	ELECTROSTATIC	
EV	EXPLOSION VENT	
FE	FEEDER	Vibrating, Volumetric, Tube, Tubular, Rotary
FL	FILTER	Air, Fluid, Dust
FN	FAN	Vent, ID, Cooler, Combustion Air, Secondary, Tertiary
FR	FRAME	Supporting Structure for Multiple Racks - See RA
FS	FEED SPOUT	Retractable
FU	FURNACE	Combustion Chamber, Primary Chamber, Secondary Chamber, Roaster, Incinerator, Fluid Bed, Calciner
GT	GATE	Slide, Knife, Isolation
HD	HOOD	Firing, Feed, Discharge, Exhaust
HE	HEATER	
HP	HOPPER	Discharge, Dust
HT	HOIST	Winch, Chain, Crane, Derrick, Jib, Lift

EQUIPMENT TAG NUMBER STRUCTURES		
<b>INDIVIDUAL ITEM</b>  FN-105 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEMS</b>  BG-105-1 EQUIPMENT CODE — PYRO UNIT NUMBER	<b>MULTIPLE ITEM GROUPS</b>  PU-105-2A EQUIPMENT CODE — PYRO UNIT NUMBER — ITEM WITHIN GROUP SEQUENTIAL IDENTIFIER
IDENTIFIES AN ITEM WITHIN A PYRO NUMBERED UNIT WHERE NO OTHER ITEM WITHIN THAT UNIT HAS THE SAME EQUIPMENT CODE. Example: A single Fan in Unit 105 as FN-105	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE THERE ARE TWO OR MORE ITEMS WITHIN THAT UNIT HAVING THE SAME EQUIPMENT CODE. Example: Four bearings in Unit 105 as BG-105-1 thru BG-105-4	IDENTIFIES MULTIPLE ITEMS WITHIN A PYRO NUMBERED UNIT WHERE IT MAY BE BENEFICIAL TO GROUP LIKE ITEMS. Example: Unit 105 contains 3 pumps. The service of the first is different than that of the other two, and the third serves as a backup for the second. The first pump is identified as PU-105-1. The second and third are PU-105-2A and PU-105-2B.

DO NOT SCALE	THIRD ANGLE PROJECTION	13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
		12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-04-27
		11	REVISED PER PROJECT UPDATES	JPH	JPH	2020-03-03
		10	NO CHANGES TO THIS SHEET	JPH	JPH	2019-11-26
REV	DESCRIPTION OF REVISION	BY	APPD	DATE		

### 12 METSO FLUID CODES

CODE	FLUID	CATEGORY	UNIT
AA	AMBIENT AIR	Air	
AC	COMBUSTION AIR	Air	
AI	INSTRUMENT AIR	Air	001
AP	PLANT AIR	Air	002
AX	AIR - NON-SPECIFIC	Air	003
DN	NUISANCE DUST	Dust	
CO	COAL	Fuel	010
CP	COAL - PULVERIZED	Fuel	011
FB	BLAST FURNACE GAS	Fuel	012
FF	BASIC OXYGEN FURNACE GAS	Fuel	013
FH	FUEL OIL HEAVY	Fuel	014
FK	COKE OVEN GAS	Fuel	015
FL	FUEL OIL LIGHT	Fuel	016
FN	NATURAL GAS	Fuel	017
FP	PROPANE	Fuel	018
FR	REFINERY GAS	Fuel	019
GC	CALIBRATION GAS	Gas	020
GH	HYDROGEN	Gas	021
GM	CARBON MONOXIDE	Gas	022
GR	REFRIGERANT	Gas	023
GS	HYDROGEN SULFIDE	Gas	024
GX	GAS - NON-SPECIFIC COMBUSTABLE	Gas	025
GY	OXYGEN	Gas	026
IA	ARGON	Gas, Inert	030
IC	CARBON DIOXIDE	Gas, Inert	031
IH	HELIUM	Gas, Inert	032
IL	HALON	Gas, Inert	033
IN	NITROGEN	Gas, Inert	034
IX	INERT GAS - NON-SPECIFIC	Gas, Inert	035
KA	AMMONIA SOLUTION	Chemical	040
KF	CHEMICAL FLOW	Chemical	041
KL	LIME	Chemical	042
KU	CAUSTIC	Chemical	043
KV	SOLVENT	Chemical	044
LG	LUBRICATING GREASE	Lubrication	045
LO	LUBE OIL	Lubrication	046
OD	DEDUSTING OIL	Oil	048
OH	HYDRAULIC OIL	Oil	049
OS	SEAL OIL	Oil	050
OX	OIL - NON-SPECIFIC	Oil	051
PM1	PROCESS MATERIAL - PRIMARY	Process	
PM2	PROCESS MATERIAL - SECONDARY	Process	
PG1	PROCESS GAS - PRIMARY	Process	
PG2	PROCESS GAS - SECONDARY	Process	
PP	PETROLEUM COKE	Process	
PS	SLURRY	Process	
PC	CALCINED COKE	Product	
BB	BOILER BLOWDOWN	Steam	
CD	CONDENSATE	Steam	
ST	STEAM	Steam	
VA	VACUUM	Vacuum	
EF	EFFLUENT	Waste	
SS	SANITARY SEWER	Waste	
YD	WASTE SLUDGE	Waste	
YG	WASTE GAS	Waste	
YL	WASTE LIQUID	Waste	
YO	WASTE OIL	Waste	
YS	WASTE SOLID	Waste	
YY	WASTE SOLVENT	Waste	
YW	WASTE WATER	Waste	
YX	WASTE - NON-SPECIFIC	Waste	
WA	POTABLE WATER	Water	070
WB	BOILER FEED WATER	Water	071
WC	COOLING WATER	Water	072
WD	DEMINERALIZED WATER	Water	073
WF	FIRE WATER	Water	074
WG	WATER GLYCOL	Water	075
WL	GLAND SEAL WATER	Water	076
WP	PROCESS WATER	Water	077
WR	RAW WATER	Water	078
WS	SEA WATER	Water	079
WX	WATER - NON-SPECIFIC	Water	080

### PIPE LINE NUMBER DESIGNATION

XXXX-NNNN-XXX-NNNN-XXXX-X  
 PLANT AREA \_\_\_\_\_  
 SIZE \_\_\_\_\_  
 SERVICE CODE \_\_\_\_\_  
 LINE-TRAIN NO. \_\_\_\_\_  
 LINE-SEQUENTIAL NO. \_\_\_\_\_  
 MATERIAL SPECIFICATION CODE \_\_\_\_\_  
 INSULATION CODE \_\_\_\_\_

PIPE LINE NUMBER DESIGNATION ACCORDING TO SECTION 4. OF THE WOOD TECHNICAL SPECIFICATION DOCUMENT 606541-0000-DE20-SPC-0001.

### FIELD CONNECTION NUMBER STRUCTURE

TYPICAL FIELD CONNECTION # ID TAG **XX-XX-XX**  
 FLUID CODE \_\_\_\_\_  
 SEQUENCE No. \_\_\_\_\_  
 VENDOR'S IDENTIFIER (OPTIONAL) \_\_\_\_\_

REFERENCE DOCUMENT 900107213-NCD FOR FIELD CONNECTION DETAILS.

P&I DRAWING SHEET LIST		
SHEET	REV	TITLE
1	11	LEGEND
2	11	LEGEND
3	11	OVERVIEW
4	11	MOTOR DETAILS
5	11	UTILITIES
6	11	GRINDING BALL MILL DISCHARGE
7	11	GRINDING MATERIAL PREPARATION
8	11	GRINDING BALL MILL DETAIL
9	11	GRINDING BALL MILL LUBE OIL PUMPS
10	11	GRINDING BALL MILL GEAR SPRAY
11	11	GRINDING BALL MILL MOTOR AND REDUCER
12	11	GRINDING BALL MILL REDUCER LUBE SYSTEM
13	11	GRINDING BALL MILL BAGHOUSE

NOTE:  
 1. ALL PIPING INCLUDING VALVES, GAUGES, TUBING, FITTINGS, PIPE SUPPORTS AND HOSES ARE BY BUYER UNLESS NOTED BY METSO.

wood. SUPPLIER REVIEW DECAL	
PO/Contract No. _____ SDR Code. _____	
PO/Contract Description: _____	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0)	
<input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments.	
<input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed.	
<input type="checkbox"/> 4. Review not required - for information only.	
<input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: _____ Date: _____	

**metso**  
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 Pyro Processing  
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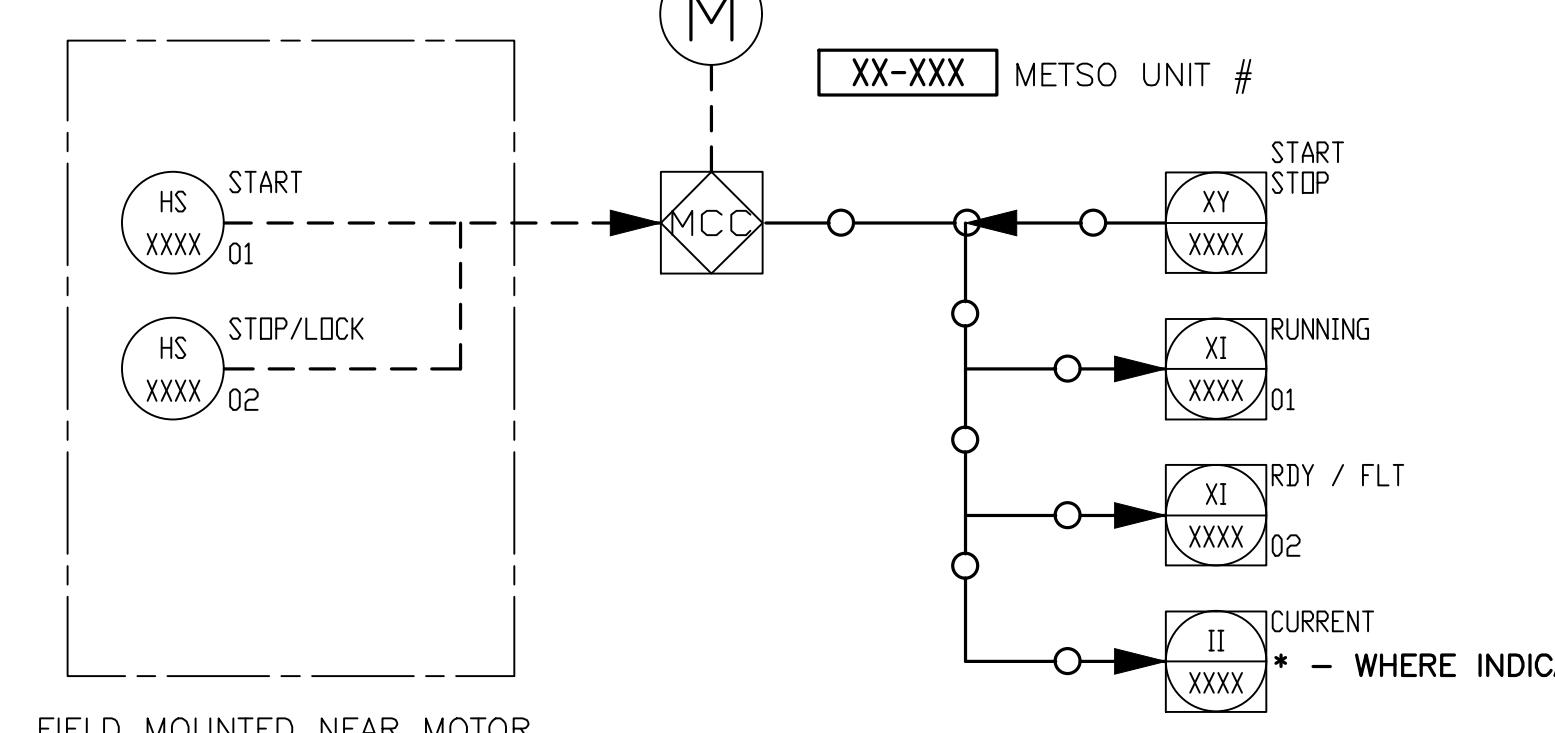
TITLE: LITHIUM SPUDOMENE PROCESSING  
 PIPING AND INSTRUMENTATION DIAGRAM  
 GRINDING  
 LEGEND  
 BUYER: ALBEMARLE KEMERTON PLANT  
 LOCATION: BUNBURY, WESTERN AUSTRALIA

DRN: WEB DATE: 2018-04-11 PROJECT No. C.005859  
 CKD: SJH MATERIAL No.:  
 DATE: 2018-04-20 MATERIAL Spec.:  
 SCALe: 1:1 Wt. Unit:  
 APPD: SJH For Construction  
 ANSI: D 10262856-DWK DRAWING NO. SHEET OF 13 REV 13  
 DATE: 2018-04-20



## MOTOR DETAIL #1

NON-REVERSING STARTER

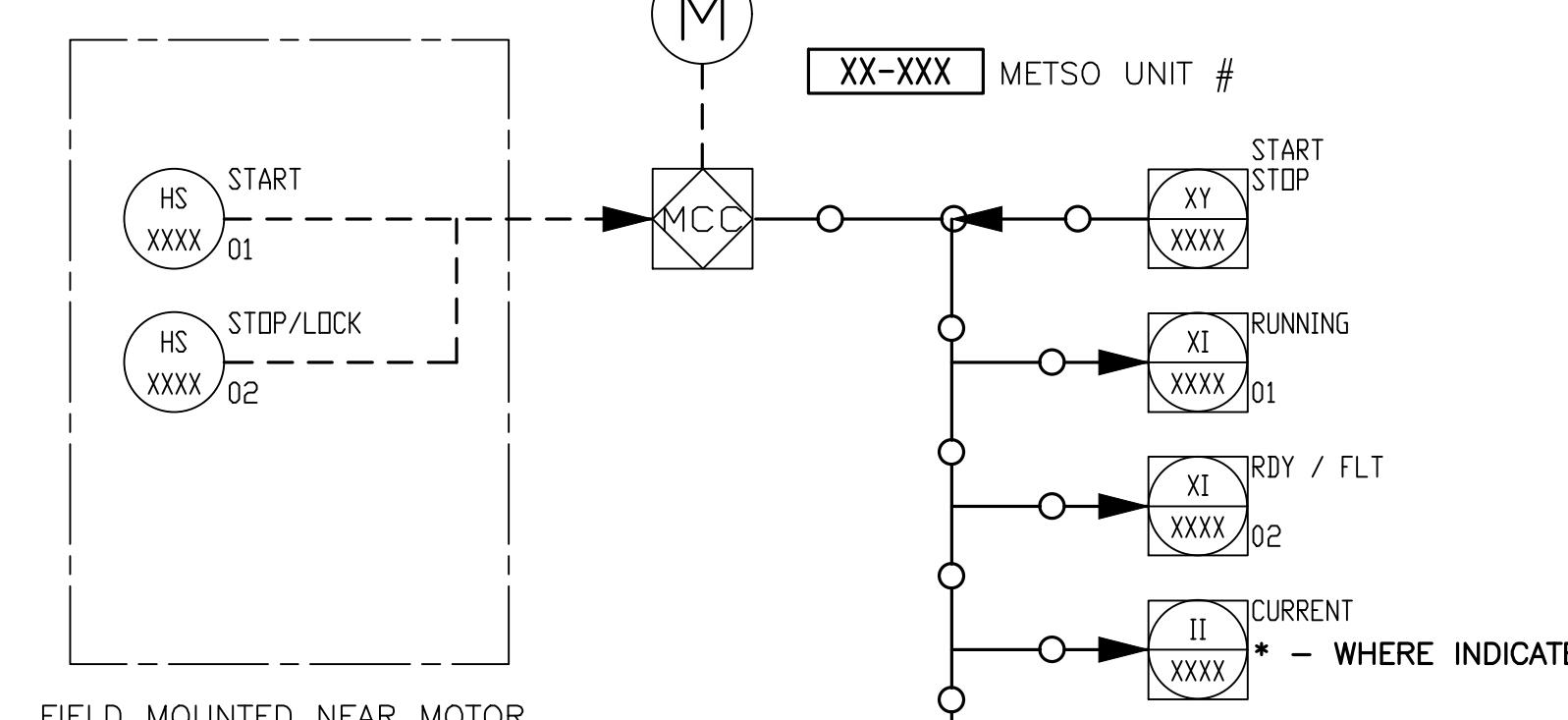


\* IT - CURRENT INDICATION  
DETAIL 1

M  
XXXX

## MOTOR DETAIL #4

VARIABLE SPEED DRIVE



\* IT - CURRENT INDICATION  
DETAIL 4

M  
XXXX

VSD

## MOTOR/HEATER LIST

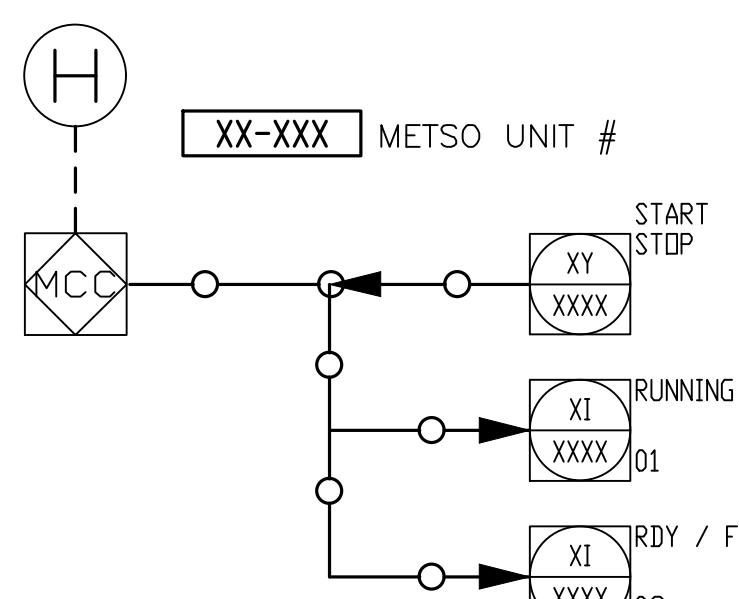
METSO UNIT #	DESCRIPTION	DETAIL #	CURRENT INDICATION	EMERGENCY POWER FEED	P&ID REFERENCE
2130-LH-001	BALL MILL LINER HANDLER	1	NO	NO	10262856-008
2131-CV-001A	BALL MILL DISCHARGE SCREW CONVEYOR	1	NO	NO	10262856-006
2131-CV-001B	BALL MILL DISCHARGE SCREW CONVEYOR	1	NO	NO	10262856-006
2131-CV-002	BAG HOUSE DUST SCREW CONVEYOR 1	1	NO	NO	10262856-013
2131-CV-003	BAG HOUSE DUST SCREW CONVEYOR 2	1	NO	NO	10262856-013
2131-CV-004	BAG HOUSE DUST SCREW CONVEYOR 3	1	NO	NO	10262856-006
2131-FA-001	BALL MILL BAGHOUSE FAN	4	YES	NO	10262856-013
2131-FA-002	MILL REDUCER LUBE OIL HEAT EXCHANGER FAN	1	NO	NO	10262856-012
2131-FA-005	BALL MILL MOTOR COOLING FAN 1	1	NO	NO	10262856-011
2131-FA-006	BALL MILL MOTOR COOLING FAN 2	1	NO	NO	10262856-011
2131-FA-007	BALL MILL SOUND ENCLOSURE EXHAUST FAN	1	NO	NO	10262856-006
2131-HE-001	BALL MILL REDUCER SUMP HEATER	3	NO	NO	10262856-011
2131-HE-002	BALL MILL TRUNNION BEARING LUBE RESERVOIR HEATER	3	NO	NO	10262856-009
2131-HT-001	BALL MILL BALL CHARGE LOADING HOIST	N/A	NO	NO	10262856-008
2131-PP-001	BALL MILL REDUCER LUBE PUMP	1	NO	YES	10262856-012
2131-PP-002A	BALL MILL TRUNNION BEARING L.P. LUBE PUMP 1	1	NO	YES	10262856-009
2131-PP-002B	BALL MILL TRUNNION BEARING L.P. LUBE PUMP 2	1	NO	YES	10262856-009
2131-PP-003	BALL MILL TRUNNION BEARING H.P. LUBE PUMP	1	NO	YES	10262856-009
2131-WV-001	BAGHOUSE ROTARY AIRLOCK	1	NO	NO	10262856-013
2131-WV-002	BAGHOUSE ROTARY AIRLOCK	1	NO	NO	10262856-013
2131-XM-005	BALL MILL DRIVE	4	YES	NO	10262856-011
2131-XM-006	BALL MILL INCHING DRIVE	1	NO	YES	10262856-011
2141-BE-001A	BALL MILL DISCHARGE BUCKET ELEVATOR 1	4	NO	NO	10262856-006
2141-BE-001B	BALL MILL DISCHARGE BUCKET ELEVATOR 2	4	NO	NO	10262856-006
2141-FA-002	FEED BIN DUST COLLECTOR FAN	1	NO	NO	10262856-006
2141-FE-002	ACID MIXER 1 DISCHARGE SCREW CONVEYOR (MOTOR QTY:2)	4	NO	NO	10262856-007
2141-FE-003	ACID MIXER 2 DISCHARGE SCREW CONVEYOR (MOTOR QTY:2)	4	NO	NO	10262856-007
2141-HT-001A	BALL MILL DISCHARGE BUCKET ELEVATOR MAINTENANCE HOIST	N/A	NO	NO	10262856-006
2141-HT-001B	BALL MILL DISCHARGE BUCKET ELEVATOR MAINTENANCE HOIST	N/A	NO	NO	10262856-006
2141-MX-001	ACID MIXER 1 (MOTOR QTY:2)	4	YES	NO	10262856-007
2141-MX-002	ACID MIXER 2 (MOTOR QTY:2)	4	YES	NO	10262856-007
2141-WF-001	ACID MIXER 1 WEIGH FEEDER	4	NO	NO	10262856-007
2141-WF-002	ACID MIXER 2 WEIGH FEEDER	4	NO	NO	10262856-007
2141-XM-XXX	BUCKET ELEVATOR 1 INCHING DRIVE	1	NO	NO	10262856-006
2141-XM-XXX	BUCKET ELEVATOR 2 INCHING DRIVE	1	NO	NO	10262856-006

## NOTES:

- 1 – MAINTENANCE ALLOWS FIELD START AND STOP WITH LOCK OFF STOP.
- 2 – REMOTE ALLOWS DCS (AUTO) RUNNING OF DRIVES (FIELD STOP REMAINS ACTIVE)

## HEATER DETAIL #3

CONTACTOR / HEATER



DETAIL 3

HT  
XXXX

wood. SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
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EPCM Project Document Number	Revision
EPCM Signature: Date:	
EPCM Signature: Date:	

CLASSIFICATION: RESTRICTED

13	REVISED PER PROJECT UPDATES	JPH	JPH	2020-07-06
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-04-27
11	REVISED PER PROJECT UPDATES	JPH	JPH	2020-03-03
10	NO CHANGES TO THIS SHEET	JPH	JPH	2019-11-26

DO NOT SCALE

THIRD ANGLE PROJECTION

REV

DESCRIPTION OF REVISION



Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

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TITLE LITHIUM SPODUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
GRINDING  
MOTOR DETAILS

BUYER ALBEMARLE KEMERTON PLANT  
LOCATION BUNBURY, WESTERN AUSTRALIA

DRN: WEB DATE: 2018-04-11 MATERIAL No.:

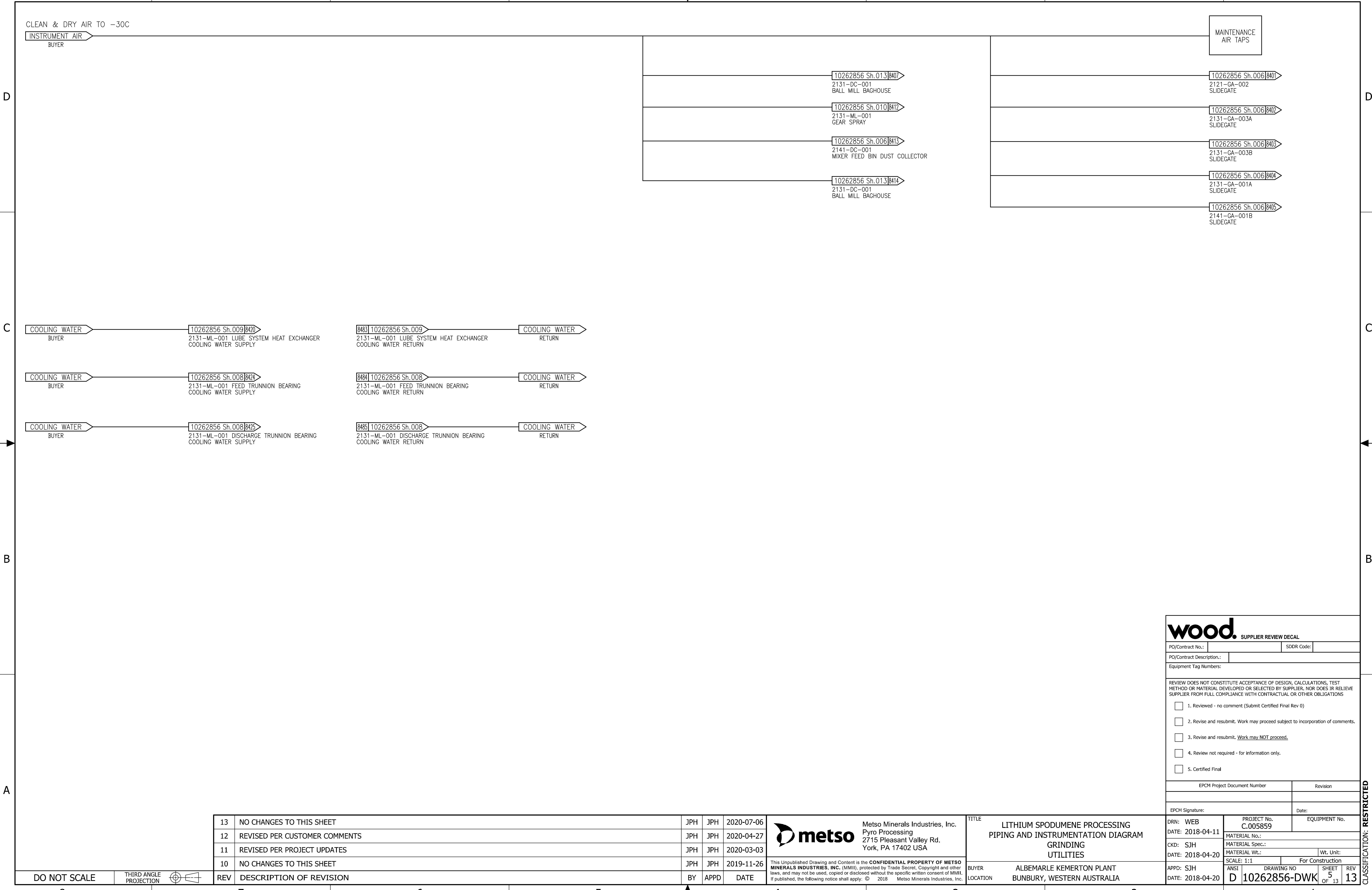
CKD: SJH MATERIAL Spec.:

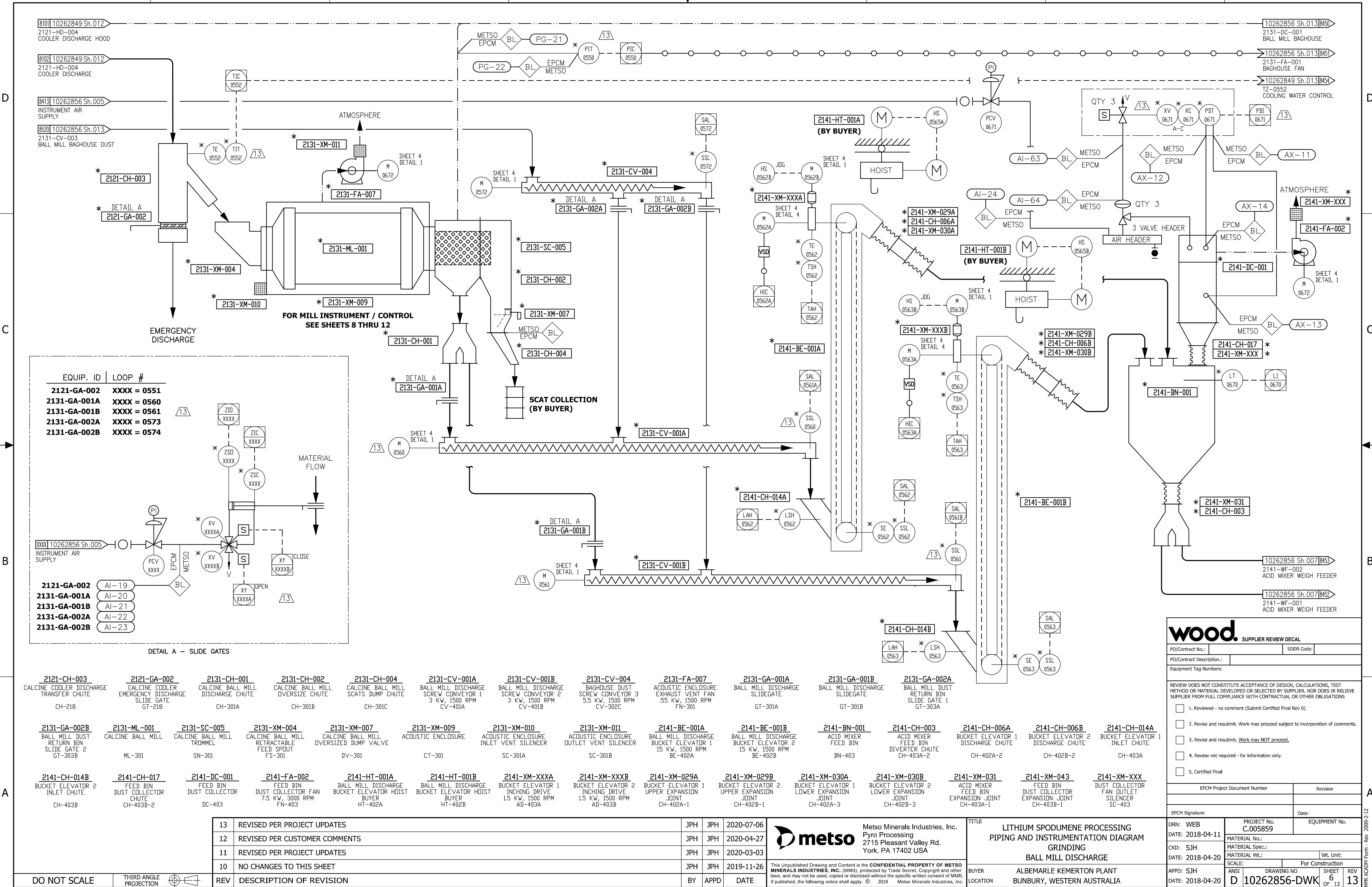
DATE: 2018-04-20 MATERIAL Wt.:

SCALE: 1:1 Wt. Unit: For Construction

APPD: SJH DATE: 2018-04-20 ANSI DRAWING NO. SHEET 4 REV. 13

D 10262856-DWK OF 13





wood. SUPPLIER REVIEW DECAL

PO/Contract No.: SDDR Code:

PO/Contract Description:

Equipment Tag Numbers:

REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS

- 1. Reviewed - no comment (Submit Certified Final Rev 0)
- 2. Revise and resubmit. Work may proceed subject to incorporation of comments.
- 3. Revise and resubmit. Work may NOT proceed.
- 4. Review not required - for information only.
- 5. Certified Final

EPCM Project Document Number Revision

EPCM Signature: Date:

PROJECT No. C.005859 EQUIPMENT No.

DATE: 2018-04-11 MATERIAL No.:

CKD: SJH MATERIAL Spec.:

DATE: 2018-04-20 MATERIAL Wt.:

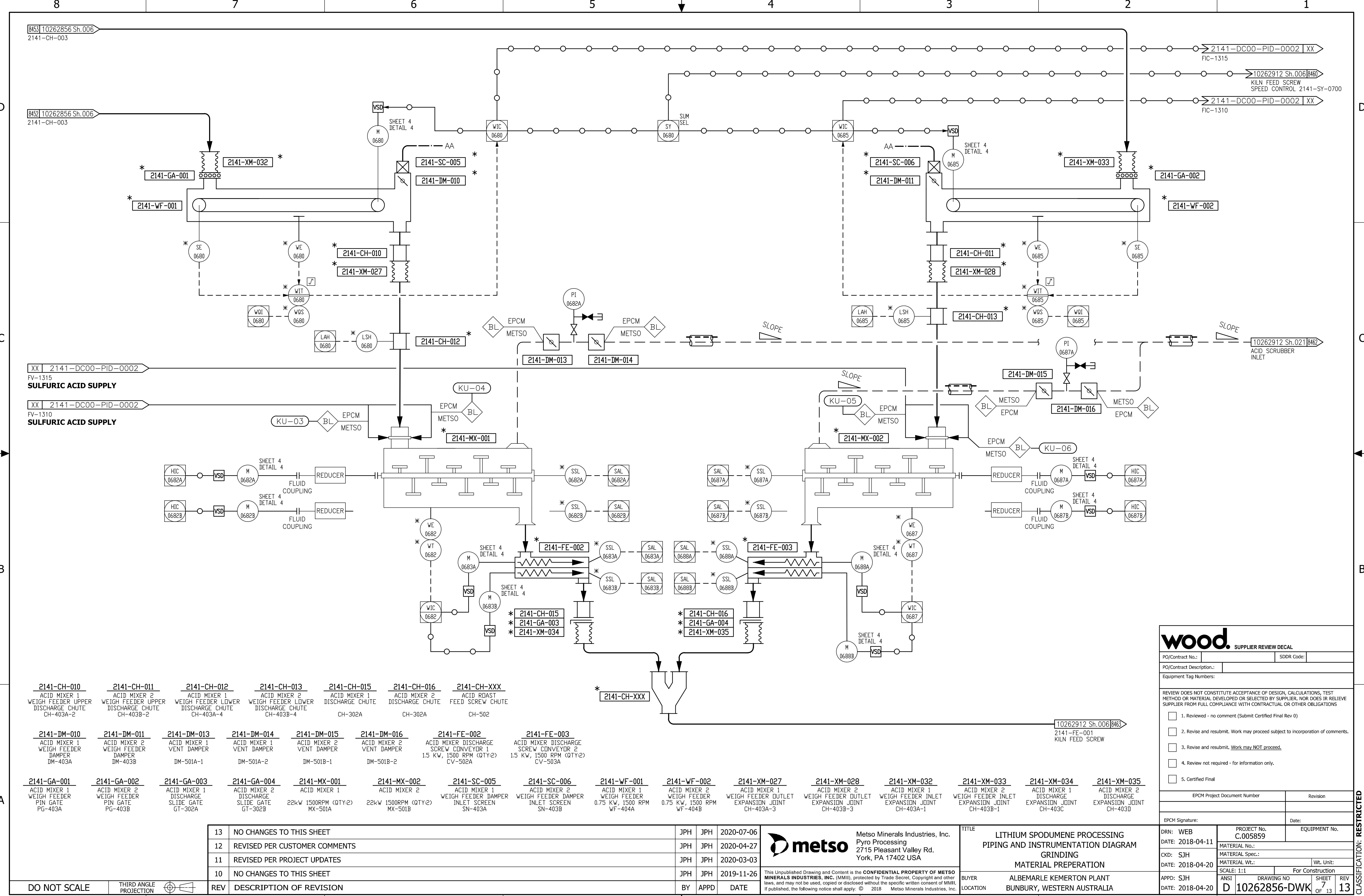
SCALE: Wt. Unit:

APPD: SJH For Construction

ANSI DRAWING NO. D 10262856-DWK SHEET 6 REV 13

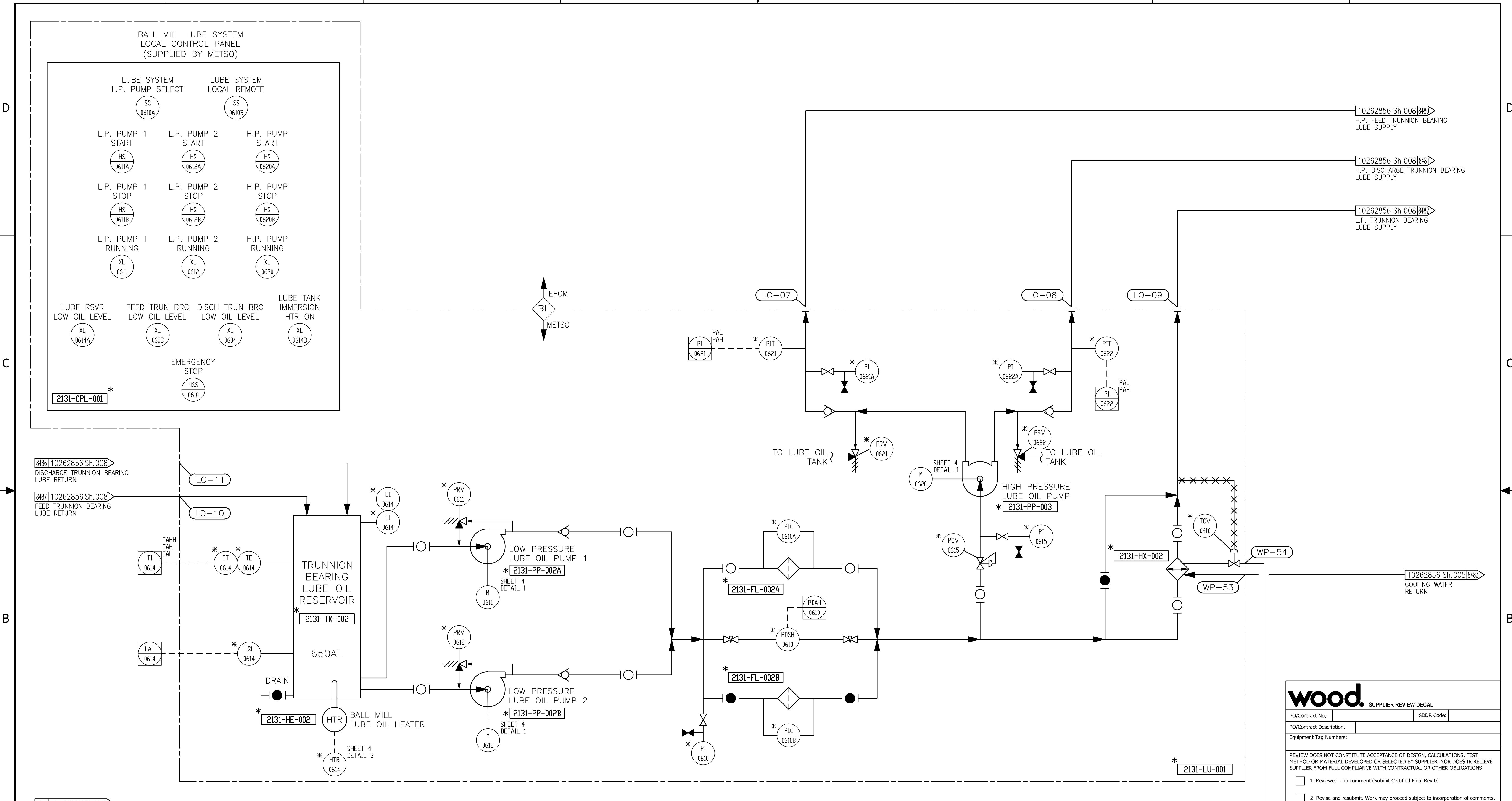
DATE: 2018-04-20

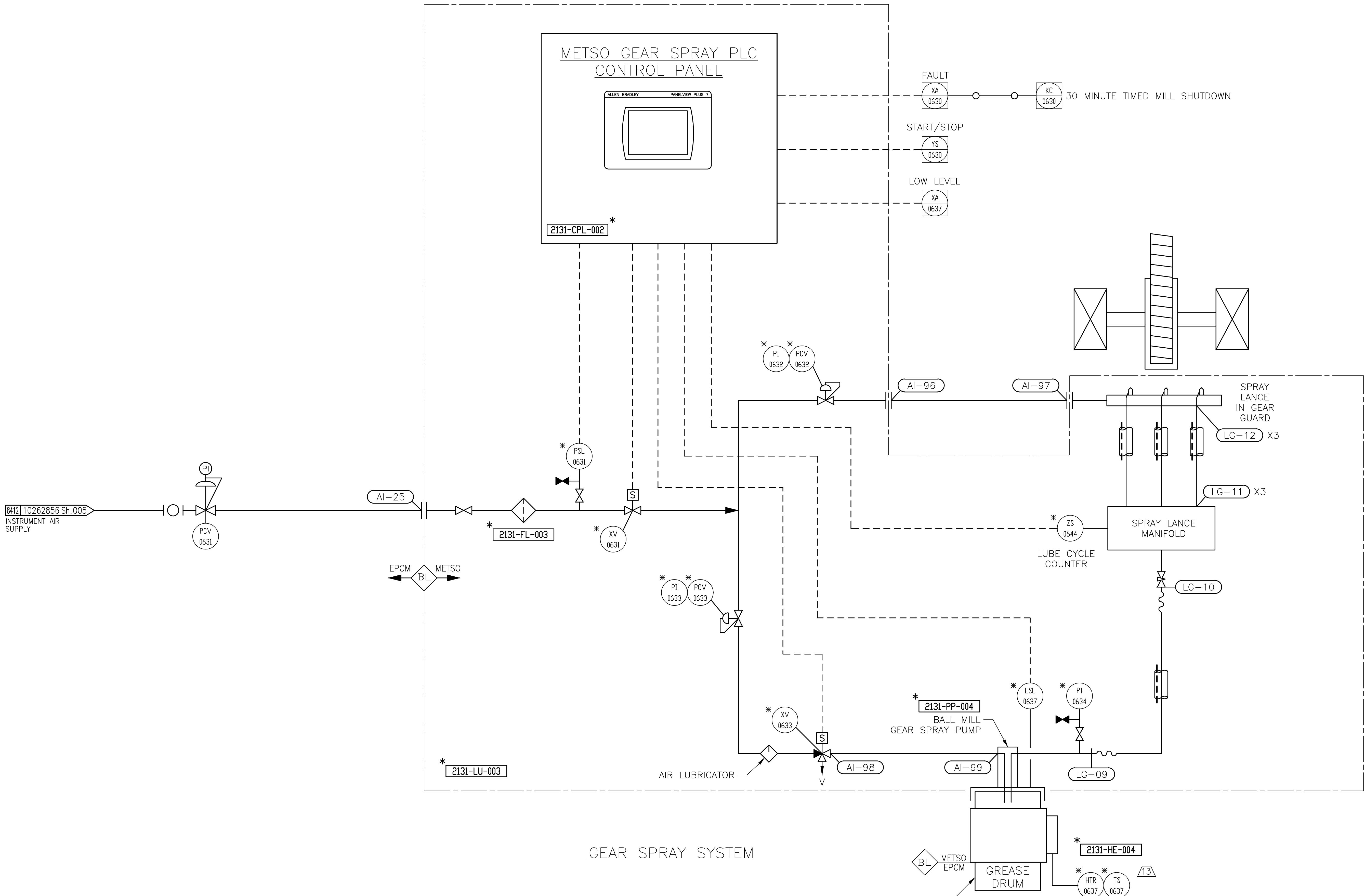
MR ACADM Form Rev 2009-2-12



Compendium Rev AAB 25-09-2020. Only to be read in conjunction with other compendium Rev AAB documents.







13  
2131-FL-003 BALL MILL GEAR SPRAY AIR FILTER FL-301  
2131-HE-004 BALL MILL GREASE DRUM HEATER 1 KW HE-301B  
2131-LU-003 BALL MILL GEAR SPRAY SYSTEM SKID SD-301C  
2131-CPL-002 CALCINE BALL MILL GEAR SPRAY CONTROL PANEL PL-301A  
2131-PP-004 BALL MILL GEAR SPRAY PUMP PU-304

13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-04-27
11	REVISED PER PROJECT UPDATES	JPH	JPH	2020-03-03
10	NO CHANGES TO THIS SHEET	JPH	JPH	2019-11-26
DO NOT SCALE	THIRD ANGLE PROJECTION	BY APPD	DATE	
REV	DESCRIPTION OF REVISION			



Metso Minerals Industries, Inc.  
Pyro Processing  
2715 Pleasant Valley Rd.  
York, PA 17402 USA

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**TITLE** LITHIUM SPUDUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
GRINDING  
BALL MILL GEAR SPRAY  
**DRN:** WEB **PROJECT No.** C.005859  
**DATE:** 2018-04-11 **EQUIPMENT No.**  
**MATERIAL No.:**  
**CKD:** SJH **MATERIAL Spec.:**  
**MATERIAL Wt.:** **Wt. Unit:**  
**DATE:** 2018-04-20 **SCALE:** 1:1 **For Construction**  
**BUYER LOCATION:** ALBEMARLE KEMERTON PLANT BUNBURY, WESTERN AUSTRALIA  
**APPD:** SJH **ANSI DRAWING NO.** D 10262856-DWK **SHEET** 10 **REV** 13  
**LOCATION:** BUNBURY, WESTERN AUSTRALIA **DATE:** 2018-04-20



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C

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B

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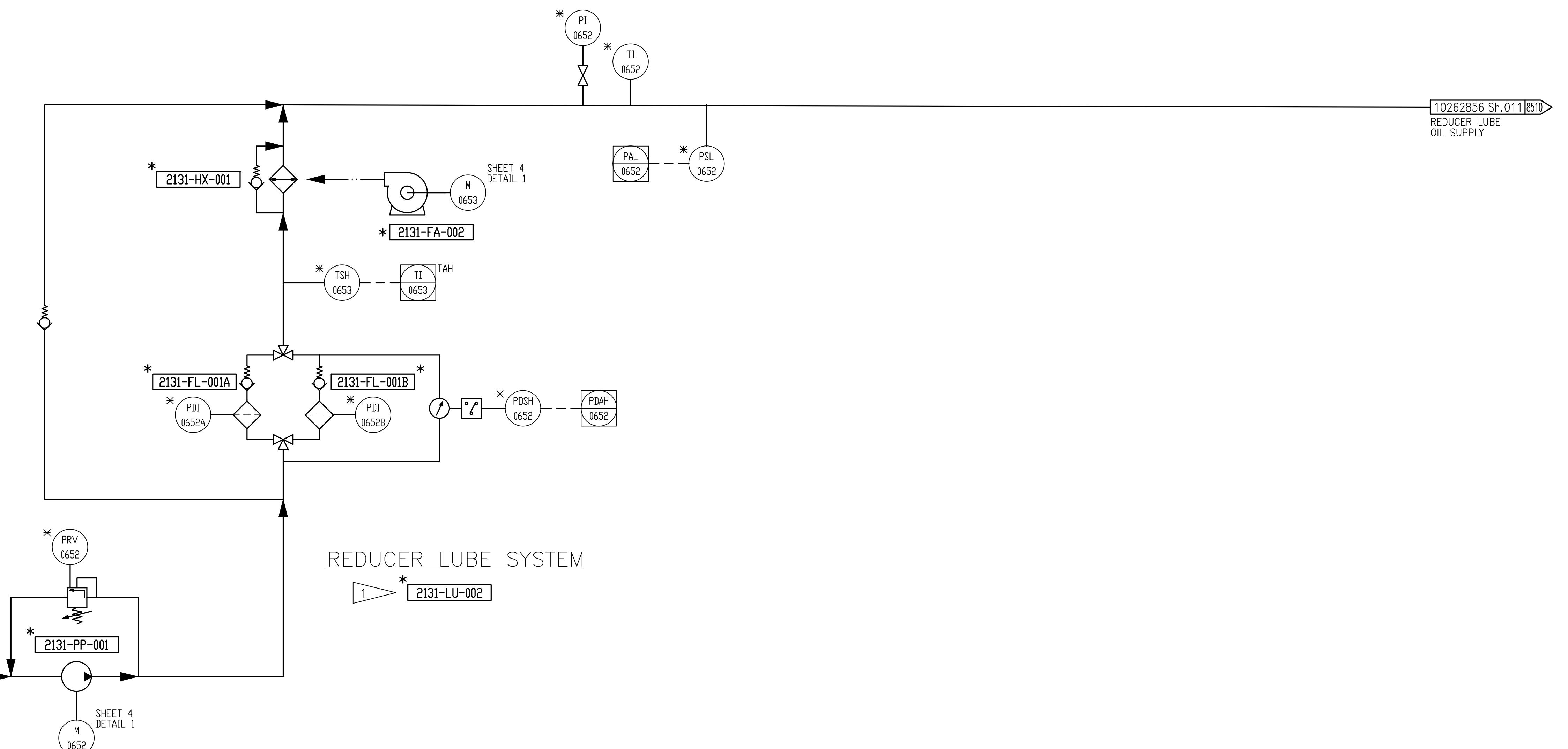
A

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8500|10262856 Sh.011

REDUCER LUBE

OIL RETURN

NOTE:

1) REDUCER LUBE RESERVOIR 2131-TK-001 IS INCORPORATED INTO SKID 2131-LU-002.

<b>wood.</b> SUPPLIER REVIEW DECAL	
PO/Contract No.:	SDDR Code:
PO/Contract Description:	
Equipment Tag Numbers:	
REVIEW DOES NOT CONSTITUTE ACCEPTANCE OF DESIGN, CALCULATIONS, TEST METHOD OR MATERIAL DEVELOPED OR SELECTED BY SUPPLIER, NOR DOES IT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS	
<input type="checkbox"/> 1. Reviewed - no comment (Submit Certified Final Rev 0) <input type="checkbox"/> 2. Revise and resubmit. Work may proceed subject to incorporation of comments. <input type="checkbox"/> 3. Revise and resubmit. Work may NOT proceed. <input type="checkbox"/> 4. Review not required - for information only. <input type="checkbox"/> 5. Certified Final	
EPCM Project Document Number	Revision
EPCM Signature: Date:	

2131-FA-002	2131-FL-001A	2131-FL-001B	2131-HX-001	2131-LU-002	2131-PP-001
MILL REDUCER LUBE OIL HEAT EXCHANGER FAN .37 KW, 1500 RPM FN-301A	MILL REDUCER LUBE OIL FILTER 1	MILL REDUCER LUBE OIL FILTER 2	MILL REDUCER LUBE OIL HEAT EXCHANGER	MILL REDUCER LUBE SYSTEM SKID	MILL REDUCER LUBE OIL PUMP 1.1 KW, 1500 RPM PU-301A

13	NO CHANGES TO THIS SHEET	JPH	JPH	2020-07-06
12	REVISED PER CUSTOMER COMMENTS	JPH	JPH	2020-04-27
11	REVISED PER PROJECT UPDATES	JPH	JPH	2020-03-03
10	NO CHANGES TO THIS SHEET	JPH	JPH	2019-11-26
DO NOT SCALE	THIRD ANGLE PROJECTION	BY	APPD	DATE



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**TITLE** LITHIUM SPUDUMENE PROCESSING  
PIPING AND INSTRUMENTATION DIAGRAM  
GRINDING  
BALL MILL REDUCER LUBE

**DRN:** WEB **PROJECT NO.** C.005859 **EQUIPMENT NO.**

**DATE:** 2018-04-11 **MATERIAL NO.:**

**CKD:** SJH **MATERIAL Spec.:**

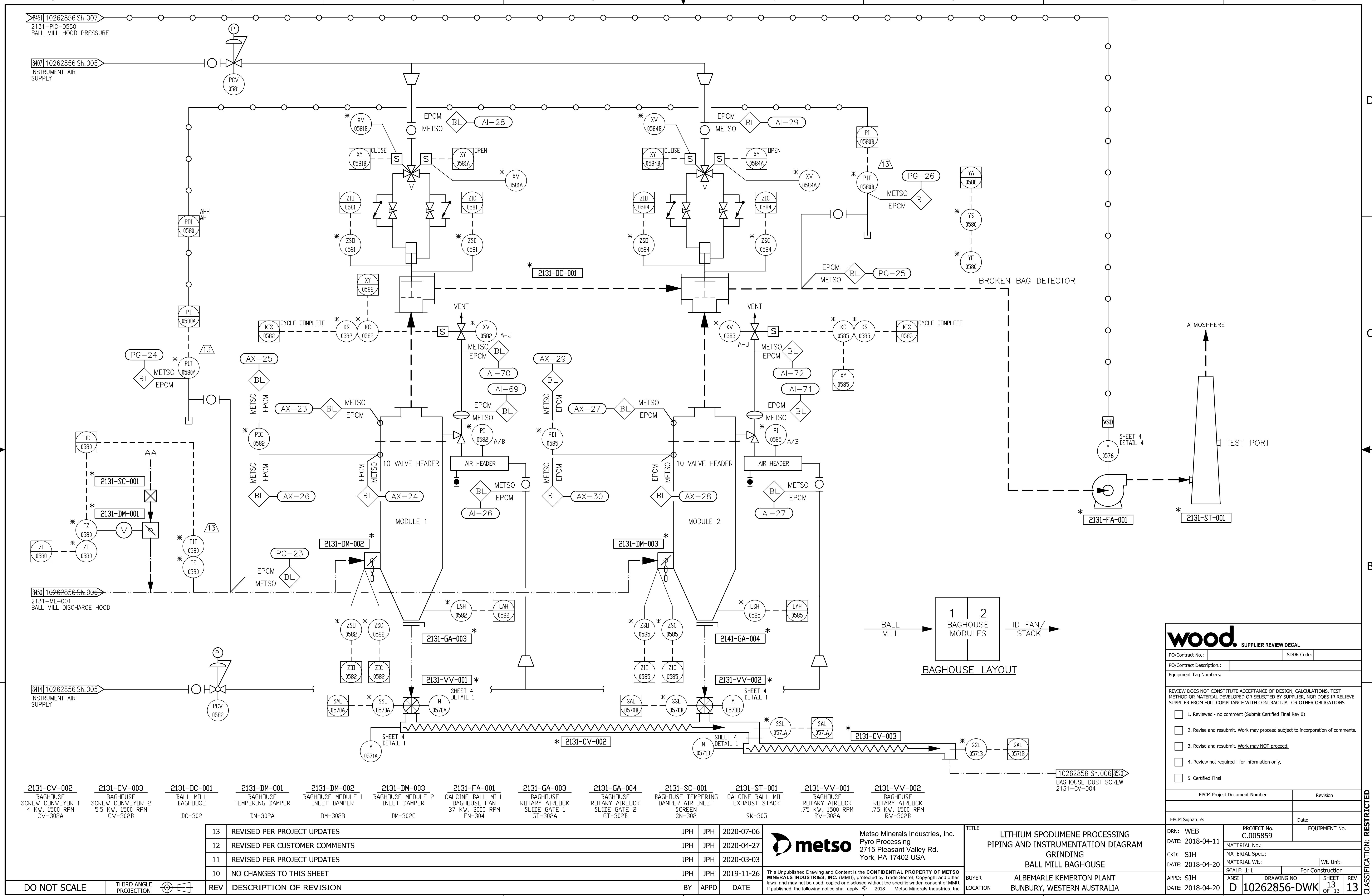
**BUYER** ALBEMARLE KEMERTON PLANT **MATERIAL WT.:**

**LOCATION** BUNBURY, WESTERN AUSTRALIA **Wt. Unit:**

**SCALE:** 1:1 **For Construction**

**APPD:** SJH **ANSI DRAWING NO.** D 10262856-DWK **SHEET** 12 **REV** 13

**DATE:** 2018-04-20 **DATE:** 2018-04-20



13 REVISED PER PROJECT UPDATES		JPH	JPH	2020-07-06	metso	Metso Minerals Industries, Inc. Pyro Processing 2715 Pleasant Valley Rd. York, PA 17402 USA	TITLE LITHIUM SPUDOMENE PROCESSING PIPING AND INSTRUMENTATION DIAGRAM GRINDING BALL MILL BAGHOUSE	DRN: WEB	PROJECT No. C.005859	EQUIPMENT No.
12 REVISED PER CUSTOMER COMMENTS		JPH	JPH	2020-04-27				DATE: 2018-04-11	MATERIAL No.:	
11 REVISED PER PROJECT UPDATES		JPH	JPH	2020-03-03				CKD: SJH	MATERIAL Spec.:	
10 NO CHANGES TO THIS SHEET		JPH	JPH	2019-11-26		This Unpublished Drawing and Content is the CONFIDENTIAL PROPERTY OF METSO MINERALS INDUSTRIES, INC. (MMI), protected by Trade Secret, Copyright and other laws, and may not be used, copied or disclosed without the specific written consent of MMI. If published, the following notice shall apply. © 2018 Metso Minerals Industries, Inc.		DATE: 2018-04-20	MATERIAL Wt.:	Wt. Unit:
DO NOT SCALE	THIRD ANGLE PROJECTION	REV	DESCRIPTION OF REVISION	BY APPD DATE			BUYER ALBEMARLE KEMERTON PLANT LOCATION BUNBURY, WESTERN AUSTRALIA	SCALE: 1:1	For Construction	ANSI D 10262856-DWK DRAWING NO. 13 OF 13 REV 13

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor	
2111-HP-001	2111-GT-0300	10262849-06	14	E&I Contractor Installed	Buyer	Alpha Spodumene Feed Hopper Area Camera							Supplier Standard	
2111-CV-002	2111-SE-0301	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Tachometer	Wired to 2111-SSL-0301	Discrete Input	3C (24VDC)	IFM Efector	IIM210		Supplier Standard	
2111-CV-002	2111-SSL-0301	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Zero Speed Alarm	Main Plant PCS	Discrete Input	3C (24VDC)	IFM Efector	DD2503		Supplier Standard	
2111-CV-002	2111-SE-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Tachometer	Wired to 2111-WIT-0302	Discrete Input	3C (24VDC)	IFM Efector	IIM210		Supplier Standard	
2111-CV-002	2111-SSL-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Zero Speed Alarm	Main Plant PCS	Discrete Input	3C (24VDC)	IFM Efector	DD2503		Supplier Standard	
2111-CV-002	2111-WE-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Weight Element							Supplier Standard	
2111-CV-002	2111-WIT-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Weight Integrator	Main Plant PCS	Analog Input 4-20mA	0-35 TPH	1P Shielded (24VDC), 2C+E (220VAC)	Thayer	Series 5200	Supplier Standard	
2111-CV-002	2111-WQS-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Weight Integrator Totalizer Pulse	Main Plant PCS	Discrete Input	2C (24VDC)	Thayer	Series 5200		Supplier Standard	
2111-CV-002	2111-YS-0302	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Belt Tear Alarm	Main Plant PCS	Discrete Input	2C (24VDC)	KBT	NSR66-BD3		Supplier Standard	
2111-CV-002	2111-HSS-0302A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Safety Pull Cord	Main Plant PCS	Discrete Input	2C (24VDC)	Conveyor Components	RS-2		Supplier Standard	
2111-HP-001	2111-LSL-0302A	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Hopper Low Level Switch	Main Plant PCS	Discrete Input	4C (24VDC)	Vega	VB63.XXFOARKMX		Complies	
2111-CV-002	2111-ZSH-0302A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Side Travel Warning	Main Plant PCS	Discrete Input	3C (24VDC)	Telemecanique	XCRT115		Supplier Standard	
2111-CV-002	2111-ZSHH-0302A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Side Travel Alarm	Main Plant PCS	Discrete Input		Covered by cables listed for 2111-ZSH-0302A	Telemecanique	XCRT115	Supplier Standard	
2111-CV-002	2111-HSS-0302B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Safety Pull Cord	Main Plant PCS	Discrete Input	2C (24VDC)	Conveyor Components	RS-2		Supplier Standard	
2111-HP-001	2111-LSL-0302B	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Hopper Low Level Switch	Main Plant PCS	Discrete Input	4C (24VDC)	Vega	VB63.XXFOARKMX		Complies	
2111-CV-002	2111-ZSH-0302B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Side Travel Warning	Main Plant PCS	Discrete Input	3C (24VDC)	Telemecanique	XCRT115		Supplier Standard	
2111-CV-002	2111-ZSHH-0302B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Conveyor Side Travel Alarm	Main Plant PCS	Discrete Input		Covered by cables listed for 2111-ZSH-0302B	Telemecanique	XCRT115	Supplier Standard	
2111-XM-002	2111-LSH-0303	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Diverter Gate Plugged Chute Switch	Main Plant PCS	Discrete Input	4C (24VDC)	Vega	VB63.XXFOARKMX		Complies	
2111-XM-002	2111-PCV-0304	10262849-06	14	E&I Contractor Installed	Buyer	Alpha Spodumene Feed Diverter Gate Air Supply Regulator							Supplier Standard	
2111-XM-002	2111-XV-0304	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Diverter Gate Solenoid Valve	Main Plant PCS	Discrete Output	2C (24VDC)	Salina Vortex	4B500-24ES1-24VDC		Supplier Standard	
2111-XM-002	2111-ZSC-0304	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Diverter Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Salina Vortex	4ES9P-M18-SPDT		Supplier Standard	
2111-XM-002	2111-ZSO-0304	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Diverter Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Salina Vortex	4ES9P-M18-SPDT		Supplier Standard	
2111-BE-001A	2111-LSH-0307	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Bucket Elevator Plugged Chute Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Mollet	MFB-EA		Supplier Standard	
2111-BE-001A	2111-SE-0307	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Zero Speed Sensor							Supplier Standard	
2111-BE-001A	2111-SSL-0307	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC), 2C+E (220VAC)	Siemens	MSP-3/RMA		Supplier Standard	
2111-BE-001A	2111-TE-0307	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Reducer Temperature Element	Wired to 2121-TSH-0307	8V NAMUR	1P Shielded (24VDC)	Turck	BIM-G18-Y1/S926		Supplier Standard	
2111-BE-001A	2111-TSH-0307	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Reducer Temperature Switch	Main Plant PCS	Discrete Input	4C (24VDC)	Flender	EWD/20-250VUC		Supplier Standard	
2111-BE-001A	2111-ZSH-0307A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001A	2111-ZSHH-0307A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001A	2111-ZSH-0307B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001A	2111-ZSHH-0307B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001B	2111-LSH-0308	10262849-06	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Bucket Elevator Plugged Chute Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Mollet	MFB-EA		Supplier Standard	
2111-BE-001B	2111-SE-0308	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Zero Speed Sensor							Supplier Standard	
2111-BE-001B	2111-SSL-0308	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC), 2C+E (220VAC)	Siemens	MSP-3/RMA		Supplier Standard	
2111-BE-001B	2111-TE-0308	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Reducer Temperature Element	Wired to 2121-TSH-0308	8V NAMUR	1P Shielded (24VDC)	Turck	BIM-G18-Y1/S926		Supplier Standard	
2111-BE-001B	2111-TSH-0308	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Reducer Temperature Switch	Main Plant PCS	Discrete Input	4C (24VDC)	Flender	EWD/20-250VUC		Supplier Standard	
2111-BE-001B	2111-ZSH-0308A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001B	2111-ZSHH-0308A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001B	2111-ZSH-0308B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-BE-001B	2111-ZSHH-0308B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Bucket Elevator Bucket Alignment Switch	Main Plant PCS	Discrete Input	2C (24VDC)	Turck	BI15U-CP40-FDZ30X2		Supplier Standard	
2111-CV-001	2111-SSL-0310	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Zero Speed Alarm	Main Plant PCS	Discrete Input	3C (24VDC)	IFM Efector	DD2503		Supplier Standard	
2111-CV-001	2111-YS-0310	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Belt Tear Alarm	Main Plant PCS	Discrete Input	2C (24VDC)	KBT	NSR66-BD3		Supplier Standard	
2111-CV-001	2111-ZSH-0310A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Side Travel Warning	Main Plant PCS	Discrete Input	3C (24VDC)	Telemecanique	XCRT115		Supplier Standard	
2111-CV-001	2111-ZSHH-0310A	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Side Travel Alarm	Main Plant PCS	Discrete Input		Covered by cables listed for 2111-ZSH-0302A	Telemecanique	XCRT115	Supplier Standard	
2111-CV-001	2111-ZSH-0310B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Side Travel Warning	Main Plant PCS	Discrete Input	3C (24VDC)	Telemecanique	XCRT115		Supplier Standard	
2111-CV-001	2111-ZSHH-0310B	10262849-06	14	Factory Installed	Metso	Alpha Spodumene Feed Hopper Pull-Out Conveyor Side Travel Alarm	Main Plant PCS	Discrete Input		Covered by cables listed for 2111-ZSH-0302B	Telemecanique	XCRT115	Supplier Standard	
2111-DC-001	2111-KC-0315	10262849-07	14	E&I Contractor Installed	Metso	Alpha Spodumene Storage Bin Dust Collector Pulse Cleaning Timer				2P Shielded (24VDC)	Turbo Controls	Series E2T		Supplier Standard
2111-DC-001	2111-PCV-0315	10262849-07	14	E&I Contractor Installed	Buyer	Alpha Spodumene Storage Bin Dust Collector Cleaning Air Pressure Regulator							Supplier Standard	

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2111-WF-001	2111-WQS-0318	10262849-07	14	E&I Contractor Installed	Metso	Alpha Spodumene Feed Weigh Feeder Totalizer	Main Plant PCS	Discrete Input	2C (24VDC)		Thayer	Series 5200	Supplier Standard
2121-HD-001	2121-TE-0320	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Thermocouple					Rosemount	214CTKAKT1SGM0685SLE1WXWA	Complies
2121-HD-001	2121-TIT-0320	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-HD-001	2121-PCV-0321	10262849-07	14	E&I Contractor Installed	Buyer	Calciner Feed Hood Pressure Transmitter Air Supply Regulator							Supplier Standard
2121-HD-001	2121-PIT-0321	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-50-50 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-HD-001	2121-XV-0321	10262849-07	14	E&I Contractor Installed	Buyer	Calciner Feed Hood Pressure Transmitter Purge Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-DM-001	2121-TE-0322	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Outlet Thermocouple					Rosemount	214CTKAKT1SGM0685SLE1WXWA	Complies
2121-DM-001	2121-TIT-0322	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Outlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-DM-001	2121-TZ-0322	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	3P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-015 / DHC-100A OTR	Supplier Standard
2121-DM-001	2121-ZSC-0322	10262849-07	14	Factory Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Closed Switch	Main Plant PCS	Discrete Input		Covered by cables listed for 2121-TZ-0322	ABZ	ABZ-015 / DHC-100A OTR	Supplier Standard
2121-DM-001	2121-ZT-0322	10262849-07	14	Factory Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-TZ-0322	ABZ	ABZ-015 / DHC-100A OTR	Supplier Standard
2121-DM-001	2121-TE-0322A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Outlet Thermocouple					Rosemount	214CTKAKT1SGM0685SLE1WXWA	Complies
2121-DM-001	2121-TIT-0322A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Feed Hood Outlet Tempering Damper Outlet Temperature Transmitter	Calciner BMS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-PP-003	2121-AE-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Element					Mettler Toledo	GPRO500ATA0ECKS001EMXXX_AA	Complies
2121-PP-003	2121-AT-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Transmitter O2 Concentration					Mettler Toledo	GPRO500ATA0ECKS001EMXXX_AA	Complies
2121-PP-003	2121-FISL-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Days Until Serviced	Calciner BMS	Analog Input 4-20mA	0-100% Concentration	2P Shielded (24VDC), 2C+E (24VDC)			
2121-PP-003	2121-FISL-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Low Flow Switch	Calciner BMS	Discrete Input		2C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K005N1 SS KFD2-SR2-Ex1.W 24VDC	Complies
2121-PP-003	2121-PIT-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Pressure Compensation Transmitter	Wired to 2121-AT-0323	Analog Input 4-20mA	-6.0-6.0kPa	1P Shielded (24VDC)	Rosemount	3051CG1A22A1BM5Q4QTC4CN	Complies
2121-PP-003	2121-TE-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Temperature Compensation Element					Rosemount	214CRTSMB1S4M0135SLAR1C1TBXW	Complies
2121-PP-003	2121-TIT-0323	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Temperature Compensation Transmitter	Wired to 2121-AT-0323	Analog Input 4-20mA	0-600°C	1P Shielded (24VDC)	Rosemount	644SANAQ4QT	Complies
2121-PP-003	2121-FISL-0324	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Nitrogen Supply Low Flow Switch	Calciner BMS	Discrete Input	0.5 L/min	4C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K005N1 SS KFD2-SR2-Ex1.W 24VDC	Complies
2121-PP-003	2121-PCV-0324A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Nitrogen Pressure Control Valve							Supplier Standard
2121-PP-003	2121-PCV-0324B	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Nitrogen Pressure Control Valve							Supplier Standard
2121-PP-003	2121-PCV-0325A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2121-PP-003	2121-XV-0325A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 1 Outlet Isolation Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-PCV-0325B	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2121-PP-003	2121-XV-0325B	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 1 Inlet Isolation Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0325C	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Pre-Filter 1 Bypass Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0325D	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 2 Outlet Isolation Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0325E	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 2 Inlet Isolation Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0325F	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Pre-Filter 2 Bypass Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0325G	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 1 & 2 Selection Pilot Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0326A	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 1 Blowback Air Solenoid Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0326B	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Pre-Filter 1 Blowback Air Solenoid Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0326C	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Filter 2 Blowback Air Solenoid Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-PP-003	2121-XV-0326D	10262849-07	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas O2 Analyzer Pre-Filter 2 Blowback Air Solenoid Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Complies
2121-DC-001	2121-YE-0330	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Broken Bag Detector Element	Wired to 2121-YS-0330			Pre-fab cable supplied with sensor (50' length)	FilterSense	PS 10-A1-L15-T450P-P10-M02-1R5-W2	Complies
2121-DC-001	2121-YS-0330	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Broken Bag Detector Switch	Main Plant PCS	Discrete Input		4C (24VDC)	FilterSense	PM 1 PRO-A-R5-G-R	Complies
2121-DC-001	2121-PIT-0330A	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Inlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5.0-0.0kPa	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-DC-001	2121-PIT-0330B	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Outlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5.0-0.0kPa	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-DC-001	2121-PCV-0331	10262849-08	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Outlet Dampers Air Supply Regulator							Supplier Standard
2121-DC-001	2121-ZSC-0331	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Outlet Damper Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A	Supplier Standard
2121-DC-001	2121-ZSO-0331	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Outlet Damper Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A	Supplier Standard
2121-DC-001	2121-XV-0331A	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Outlet Open Direction Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC	Supplier Standard
2121-DC-001	2121-XV-0331B	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Outlet Close Direction Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC	Supplier Standard
2121-DC-001	2121-KC-0332	10262											

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2121-DC-001	2121-PI-0332A	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Pulse Air Tank Pressure Gauge							Supplier Standard
2121-DC-001	2121-PI-0332B	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Pulse Air Tank Pressure Gauge							vibrant
2121-DC-001	2121-ZSC-0334	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Outlet Damper Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Honeywell	LSA1A	Supplier Standard
2121-DC-001	2121-ZSO-0334	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Outlet Damper Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Honeywell	LSA1A	Supplier Standard
2121-DC-001	2121-XV-0334A	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Outlet Damper Open Contol Solenoid	Main Plant PCS	Discrete Output	2C (24VDC)		ASCO	8344G082, 24VDC	Supplier Standard
2121-DC-001	2121-XV-0334B	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Outlet Damper Close Contol Solenoid	Main Plant PCS	Discrete Output	2C (24VDC)		ASCO	8344G082, 24VDC	Supplier Standard
2121-DC-001	2121-KC-0335	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Cleaning Timer				4C (24VDC), 2C+E (220VAC)	Turbo Controls	Series E1T	Supplier Standard
2121-DC-001	2121-KS-0335	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Cleaning Timer Cycle Complete	Main Plant PCS	Discrete Input		Covered by cables listed for 2121-KC-0335	Turbo Controls	Series E1T	Supplier Standard
2121-DC-001	2121-LSH-0335	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Module 2 Hopper High Level Switch	Main Plant PCS	Discrete Input	4C (24VDC)		Vega	VB63.XXFOARKMX	Complies
2121-DC-001	2121-PDI-0335	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Local Differential Pressure Gauge							Supplier Standard
2121-DC-001	2121-XY-0335	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Cleaning Timer Enable	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-KC-0335	Turbo Controls	Series E1T	Supplier Standard
2121-DM-005	2121-ZSC-0335	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Inlet Damper Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Honeywell	LSA1A	Supplier Standard
2121-DM-005	2121-ZSO-0335	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Inlet Damper Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Honeywell	LSA1A	Supplier Standard
2121-DC-001	2121-XV-0335(A-Q)	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Cleaning Pilot Solenoids	Wired to 2121-KC-0335	Discrete Output		Integral to 2121-KC-0335	Turbo Controls	Series E1T	Supplier Standard
2121-DC-001	2121-PI-0335A	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Air Tank Pressure Gauge							Supplier Standard
2121-DC-001	2121-PI-0335B	10262849-08	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Pulse Air Tank Pressure Gauge							Supplier Standard
2121-DC-001	2121-TE-0338	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Outlet Thermocouple					Rosemount	214CTKAKT1SGM0685SLE1WXWA	Complies
2121-DC-001	2121-TIT-0338	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Outlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-DC-001	2121-AA-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Transmitter Days Until Service	Calciner BMS	Analog Input 4-20mA	0-365 days	Covered by cables listed for 2121-AT-0485	Mettler Toledo	GPRO500ATC0BQGS080LA1DH_//AA	Complies
2121-DC-001	2121-AE-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Element					Mettler Toledo	GPRO500ATC0BQGS080LA1DH_//AA	Complies
2121-DC-001	2121-ASI-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Transmitter CO Concentration	Calciner BMS	Analog Input 4-20mA	0-2% Concentration	Covered by cables listed for 2121-AT-0485	Mettler Toledo	GPRO500ATC0BQGS080LA1DH_//AA	Complies
2121-DC-001	2121-AT-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Transmitter	Calciner BMS			2P (24VDC), 2C+E (24VDC)	Mettler Toledo	GPRO500ATC0BQGS080LA1DH_//AA	Complies
2121-DC-001	2121-PIT-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Pressure Compensation Transmitter	Wired to 2121-AT-0485	Analog Input 4-20mA	-6.0-6.0kPa	1P Shielded (24VDC)	Rosemount	3051CG1A22A1BM5Q4QTC4CN	Complies
2121-DC-001	2121-TE-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Temperature Compensation Element					Rosemount	214CRHSMB1S4M0485SLAR1C2TBXW	Complies
2121-DC-001	2121-TT-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Temperature Compensation Transmitter	Wired to 2121-AT-0485	Analog Input 4-20mA	0-400°C	1P Shielded (24VDC)	Rosemount	644SANAQ4QT	Complies
2121-DC-001	2121-XV-0485	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Blowback Air Solenoid Valve	Calciner BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24DC	Supplier Standard
2121-DC-001	2121-FISL-0485A	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Air Supply Low Flow Switch	Calciner BMS	Discrete Input	0.5 L/min	4C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K005N1 SS KFD2-SR2-Ex2.W 24VDC	Complies
2121-DC-001	2121-PCV-0485A	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Air Pressure Control Valve							Supplier Standard
2121-DC-001	2121-FISL-0485B	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Blowback Air Supply Low Flow Switch	Calciner BMS	Discrete Input	8 L/min	4C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K040N1 SS KFD2-SR2-Ex2.W 24VDC	Complies
2121-DC-001	2121-PCV-0485B	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Air Pressure Control Valve							Supplier Standard
2121-DC-001	2121-PCV-0485C	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2121-DC-001	2121-PCV-0485D	10262849-08	14	E&I Contractor Installed	Metso	Calciner Kiln Exhaust Gas CO Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2121-VV-001	2121-SSL-0340A	10262849-09	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 1 Rotary Valve Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M3001V10F	Supplier Standard
2121-VV-002	2121-SSL-0340B	10262849-09	14	Factory Installed	Metso	Calciner Kiln Baghouse Module 2 Rotary Valve Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M3001V10F	Supplier Standard
2121-CV-001	2121-SSL-0341	10262849-09	14	Factory Installed	Metso	Calciner Kiln Baghouse Dust Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2121-CV-002	2121-FCV-0345	10262849-09	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Screw Conveyor Water Spray Flow Control Valve							Supplier Standard
2121-CV-002	2121-PI-0345	10262849-09	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Screw Conveyor Water Spray Pressure Gauge							Supplier Standard
2121-CV-002	2121-SSL-0345	10262849-09	14	Factory Installed	Metso	Calciner Kiln Baghouse Dust Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2121-CH-004	2121-TE-0345	10262849-09	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Screw Conveyor Discharge Thermocouple					Rosemount	214CTKAKT1SGM0480SLE1WXWA	Supplier Standard
2121-CH-004	2121-TIT-0345	10262849-09	14	E&I Contractor Installed	Metso	Calciner Kiln Baghouse Screw Conveyor Discharge Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-CV-002	2121-TZ-0345	10262849-09	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Screw Conveyor Water Spray Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%				Supplier Standard
2121-CV-002	2121-XV-0345	10262849-09	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Screw Conveyor Water Spray Shutoff Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-CV-002	2121-ZT-0345	10262849-09	14	E&I Contractor Installed	Buyer	Calciner Kiln Baghouse Screw Conveyor Water Spray Flow Control Valve Position	Main Plant PCS	Analog Input 4-20mA	0-100%				Supplier Standard
2121-KN-001	2121-SE-0350	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Speed Element	Wired to 2121-ST-0350			2C (24VDC)	Westec Instruments	7MH7146-0EA (MSP-12)	Westec Instruments - 7MH7146-0EA
2121-KN-001	2121-ST-0350	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Speed Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2 RPM	1P Shielded (24VDC), 2C+E (220VAC)	Westec Instruments	90322000 (NCT-2 5211)	Complies
2121-XM-003	2121-TSH-0350	10262849-10	14	Factory Installed	Metso	Calciner Kiln Motor High Temperature Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	355M/L_132kW	Supplier Standard
2121-XM-003	2121-ZSC-0350	10262849-10	14	Factory Installed	Metso	Calciner Kiln Motor Brake Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	SBM400	Supplier Standard
2121-XM-004	2121-XS-0351	10262849-10	14	Factory Installed	Metso	Calciner Kiln Auxiliary Drive Brake Released Command	Main Plant						

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2121-HD-002	2121-PIT-0354	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Firing Hood Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	-25-25 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-HD-002	2121-XV-0354	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Firing Hood Pressure Transmitter Purge Valve	Calciner BMS	Discrete Output					Supplier Standard
2121-HD-002	2121-PCV-0355A	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Firing Hood Pressure Purge Air Supply Regulator							Supplier Standard
2121-HD-002	2121-PIT-0355A	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Firing Hood Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	-25-25 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-HD-002	2121-XV-0355A	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Firing Hood Pressure Transmitter Purge Valve	Calciner BMS	Discrete Output					Supplier Standard
2121-HD-002	2121-PCV-0355B	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Firing Hood Pressure Purge Air Supply Regulator							Supplier Standard
2121-HD-002	2121-PIT-0355B	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Firing Hood Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	-25-25 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-HD-002	2121-XV-0355B	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Firing Hood Pressure Transmitter Purge Valve	Calciner BMS	Discrete Output					Supplier Standard
2121-HD-002	2121-TE-0356	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Firing Hood Thermocouple					Rosemount	214CTAKT1SGM0835SLE1XWXA	Complies
2121-HD-002	2121-TIT-0356	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Firing Hood Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-1200°C	1P Shielded (24VDC)	Rosemount	644HAK1J5MF5Q4XA	Supplier Standard
2121-HD-002	2121-PCV-0363	10262849-10	14	E&I Contractor Installed	Buyer	Calciner Kiln Product Discharge Pyrometer Cooling Air Supply Regulator							Supplier Standard
2121-HD-002	2121-TIT-0363	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Product Discharge Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	250-1600°C	2P Shielded (24VDC)	IFM Efector	TW2001	Complies
2121-HD-002	2121-GT-0365	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Product Discharge Camera					Process Sensors Corp.	PSC-PV-6XEO	Supplier Standard
2121-CPL-004	2121-PSL-0365	10262849-10	14	Factory Installed	Metso	Calciner Kiln Product Discharge Camera Cooling Air Low Pressure Switch	Camera RCC	Discrete Input			Omega	PSW-190	Supplier Standard
2121-CPL-004	2121-XV-0365	10262849-10	14	Factory Installed	Metso	Calciner Kiln Product Discharge Camera Retract Solenoid Valve	Camera RCC	Discrete Output		2C (12VDC)	SMC	VQ4100-67-03T	Supplier Standard
2121-CPL-004	2121-TT-0365A	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Product Discharge Camera Temperature A Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2000°C	2P Shielded (24VDC)	Process Sensors Corp.	PSC-PV-6XEO	Supplier Standard
2121-CPL-004	2121-TT-0365B	10262849-10	14	E&I Contractor Installed	Metso	Calciner Kiln Product Discharge Camera Temperature B Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2000°C	Covered by cables listed for 2121-TT-0365A	Process Sensors Corp.	PSC-PV-6XEO	Supplier Standard
2121-KN-001	2121-FIT-0369	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Uphill Bearing Cooling Water Flow Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-PCV-0369	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Uphill Bearing Cooling Water Pressure Regulator							Supplier Standard
2121-KN-001	2121-TI-0369	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Uphill Bearing Cooling Water Temperature Gauge							Supplier Standard
2121-KN-001	2121-PI-0369A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Uphill Bearing Cooling Water Inlet Pressure Gauge							Supplier Standard
2121-KN-001	2121-PI-0369B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Uphill Bearing Cooling Water Outlet Pressure Gauge							Supplier Standard
2121-KN-001	2121-FIT-0370	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Downhill Bearing Cooling Water Low Flow Switch	Main Plant PCS	Discrete Input					Supplier Standard
2121-KN-001	2121-PCV-0370	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Downhill Bearing Cooling Water Pressure Regulator							Supplier Standard
2121-KN-001	2121-TI-0370	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Downhill Bearing Cooling Water Temperature Gauge							Supplier Standard
2121-KN-001	2121-PI-0370A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Downhill Bearing Cooling Water Inlet Pressure Gauge							Supplier Standard
2121-KN-001	2121-PI-0370B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Downhill Bearing Cooling Water Outlet Pressure Gauge							Supplier Standard
2121-KN-001	2121-TE-0371	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 1 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0371	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 1 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0371A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 1A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0371B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 1B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0372	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 2 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0372	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 2 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0372A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 2A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0372B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 2B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0373	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 3 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0373	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 3 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0373A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 3A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0373B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 3B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0374	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 4 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0374	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 4 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0374A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 4A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0374B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 4B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0375	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 5 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0375	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 5 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0375A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 5A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0375B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 5B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0376	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 6 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0376	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 6 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0376A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 6A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0376B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 6B Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-TE-0377	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 7 Cooling Water Return Thermocouple							Supplier Standard
2121-KN-001	2121-TIT-0377	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 7 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121												

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2121-KN-001	2121-TIT-0378	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing Station 8 Cooling Water Return Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-KN-001	2121-FI-0378A	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 8A Cooling Water Flow Gauge							Supplier Standard
2121-KN-001	2121-FI-0378B	10262849-11	14	E&I Contractor Installed	Buyer	Calciner Kiln Bearing 8B Cooling Water Flow Gauge							Supplier Standard
2121-HD-003	2121-PIT-0390	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Feed Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-25-25 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-DM-002	2121-PZ-0390	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Feed Hood Exhaust Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-015-B-ALS / DHC-100A OTR	Supplier Standard
2121-DM-002	2121-ZT-0390	10262849-12	14	Factory Installed	Metso	Calciner Cooler Feed Hood Exhaust Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-PZ-0390	ABZ	ABZ-015-B-ALS / DHC-100A OTR	Supplier Standard
2121-HD-004	2121-PT-0391	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Discharge Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-25-25 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-HD-004	2121-TE-0391	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Discharge Hood Thermocouple					Rosemount	214CTKAKT1SGM0630SLE1XWXA	Complies
2121-HD-004	2121-TIT-0391	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Discharge Hood Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-RC-001	2121-SE-0395	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Speed Element		Wired to 2121-ST-0395		2C (24VDC)	Westec Instruments	7MH7146-0EA (MSP-12)	Westec Instruments - 7MH7146-0EA
2121-RC-001	2121-ST-0395	10262849-12	14	E&I Contractor Installed	Metso	Calciner Cooler Speed Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2 RPM	1P Shielded (24VDC), 2C+E (220VAC)	Westec Instruments	90322000 (NCT-2 5211)	Complies
2121-XM-005	2121-TSH-0395	10262849-12	14	Factory Installed	Metso	Calciner Cooler Drive Motor High Temperature Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	280S_M_LEFT_55KW	Supplier Standard
2121-XM-005	2121-ZSC-0395	10262849-12	14	Factory Installed	Metso	Calciner Cooler Drive Motor Brake Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	SBM315	Supplier Standard
2121-XM-006	2121-XS-0396	10262849-12	14	Factory Installed	Metso	Calciner Cooler Auxiliary Drive Brake Released Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	FC20 1650 / 2700G	Supplier Standard
2121-XM-011	2121-TE-0412	10262849-13	14	E&I Contractor Installed	Metso	Calciner Cooler Cooling Sump Thermocouple					Rosemount	214CTKAKT1SGM0405SLE1XWXA	Complies
2121-XM-011	2121-TIT-0412	10262849-13	14	E&I Contractor Installed	Metso	Calciner Cooler Cooling Sump Temperature Transmitter	Main Plant PCS	Analog Output 4-20mA	0-100°C	1P Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard
2121-TK-001	2121-LSL-0414	10262849-13	14	E&I Contractor Installed	Metso	Calciner Cooler Water Collection Tank Low Level Switch	Main Plant PCS	Discrete Input		2C (24VDC)	IFM Efector	KI0206	Complies
2121-TK-001	2121-LIT-0415	10262849-13	14	E&I Contractor Installed	Metso	Calciner Cooler Water Collection Tank Level Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	2P Shielded (24VDC)	Vega	PS64.IXFGMJHXAMAXM	Supplier Standard
2121-PP-001A	2121-PI-0416A	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Water Pump Outlet Pressure Gauge							Supplier Standard
2121-PP-001B	2121-PI-0416B	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Water Pump Outlet Pressure Gauge							Supplier Standard
2121-XM-011	2121-TCV-0552	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Cooling Water Zone 5 Control Valve							Supplier Standard
2121-XM-011	2121-TZ-0552	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Cooling Water Zone 5 Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%				Supplier Standard
2121-XM-011	2121-ZT-0552	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Cooling Water Zone 5 Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%				Supplier Standard
2121-XM-011	2121-FE-1105	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Emergency Water Spray Flow Element							Supplier Standard
2121-XM-011	2121-FT-1105	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Emergency Water Spray Flow Transmitter	Main Plant PCS	Analog Input 4-20mA					Supplier Standard
2121-XM-011	2121-XV-1110	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Emergency Water Spray Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-PP-001(A-B)	2121-XV-1111	10262849-13	14	E&I Contractor Installed	Buyer	Calciner Cooler Cooling Water Recycle Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-PP-001(A-B)	2121-XV-1112	10262849-13	14	E&I Contractor Installed	Buyer	Calcine Cooler Water Cooling Loop Bypass Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-PP-001(A-B)	2121-XV-1113	10262849-13	14	E&I Contractor Installed	Buyer	Acid Roast Scrubber Emergency Cooling Water Supply Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-PP-001(A-B)	2121-XV-1114	10262849-13	14	E&I Contractor Installed	Buyer	Calcine Scrubber Emergency Cooling Water Supply Valve	Main Plant PCS	Discrete Output					Supplier Standard
2121-LU-002	2121-XA-0500A	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Fault Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-002	2121-YS-0500A	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-002	2121-XA-0500B	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Reservoir Low Level Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-002	2121-YS-0500B	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Reset	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-002	2121-XI-0500C	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Running	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-002	2121-LSL-0502	10262849-14	14	E&I Contractor Installed	Metso	Calcine Kiln Gear Spray Lube Tank Low Level Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)	SKF	PVP-2012-950	Supplier Standard
2121-LU-002	2121-TSL-0502A	10262849-14	14	E&I Contractor Installed	Metso	Calcine Kiln Gear Spray Lube Tank Low Temperature Switch							Supplier Standard
2121-LU-002	2121-TSL-0502B	10262849-14	14	E&I Contractor Installed	Metso	Calcine Kiln Gear Spray Lube Supply to Nozzles Low Temperature Switch							Supplier Standard
2121-LU-002	2121-PI-0503	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Supply to Nozzles Pressure Gauge							Supplier Standard
2121-LU-002	2121-PRV-0503	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Supply to Nozzles Pressure Relief Valve							Supplier Standard
2121-LU-002	2121-PCV-0504	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Pump Air Supply Pressure Control Valve							Supplier Standard
2121-LU-002	2121-XV-0504	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Pump Air Supply Solenoid Valve	Kiln Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2121-LU-002	2121-PCV-0505	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Air Supply to Nozzles Pressure Control Valve							Supplier Standard
2121-LU-002	2121-PSL-0505	10262849-14	14	E&I Contractor Installed	Metso	Calcine Kiln Gear Spray Air Supply to Nozzles Low Pressure Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)	SKF	AC-4261-3, 5B	Supplier Standard
2121-LU-002	2121-XV-0505	10262849-14	14	E&I Contractor Installed	Metso	Calcine Kiln Gear Spray Air Supply to Nozzles Solenoid Valve	Kiln Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2121-LU-002	2121-ZS-0505	10262849-14	14	Factory Installed	Metso	Calcine Kiln Gear Spray Lube Spray Feeders Cycle Switch	Kiln Gear Spray	Discrete Input		3C (24VDC)	SKF	24-0159-6028	Supplier Standard
2121-LU-003	2121-XA-0510A	10262849-14	14	Factory Installed	Metso	Calcine Cooler Gear Spray Fault Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-003	2121-YS-0510A	10262849-14	14	Factory Installed	Metso	Calcine Cooler Gear Spray Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-003	2121-XA-0510B	10262849-14	14	Factory Installed	Metso	Calcine Cooler Gear Spray Lube Reservoir Low Level Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-003	2121-YS-0510B	10262849-14	14	Factory Installed	Metso	Calcine Cooler Gear Spray Reset	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2121-LU-003	2121-XI-0510C	10262849-14</											

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2121-LU-003	2121-PCV-0514	10262849-14	14	E&I Contractor Installed	Metso	Calciner Kiln Gear Spray Lube Pump Air Supply Pressure Control Valve							Supplier Standard
2121-LU-003	2121-XV-0514	10262849-14	14	Factory Installed	Metso	Calciner Kiln Gear Spray Lube Pump Air Supply Solenoid Valve	Cooler Gear Spray	Discrete Output	2C (24VDC)				Supplier Standard
2121-LU-003	2121-PCV-0515	10262849-14	14	E&I Contractor Installed	Metso	Calciner Kiln Gear Spray Air Supply to Nozzles Pressure Control Valve							Supplier Standard
2121-LU-003	2121-PSL-0515	10262849-14	14	E&I Contractor Installed	Metso	Calciner Kiln Gear Spray Air Supply to Nozzles Low Pressure Switch	Cooler Gear Spray	Discrete Input	2C (24VDC)		SKF	AC-4261-3, 5B	Supplier Standard
2121-LU-003	2121-XV-0515	10262849-14	14	Factory Installed	Metso	Calciner Kiln Gear Spray Air Supply to Nozzles Solenoid Valve	Cooler Gear Spray	Discrete Output	2C (24VDC)				Supplier Standard
2121-LU-003	2121-ZS-0515	10262849-14	14	Factory Installed	Metso	Calciner Kiln Gear Spray Lube Spray Feeders Cycle Switch	Cooler Gear Spray	Discrete Input	3C (24VDC)		SKF	24-0159-6028	Supplier Standard
2121-FA-003	2121-FE-0420	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Primary Air Flow Element							Supplier Standard
2121-FA-003	2121-FIT-0420A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Primary Air Flow Transmitter	Calciner BMS	Analog Input 4-20mA	0-1500 Nm³/h	1P Shielded (24VDC)	Rosemount	3051SMV3M12G3R2E12A1BC12C2M5Q4QT	Supplier Standard
2121-FA-003	2121-TE-0420A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Primary Air Flow Temperature Compensation RTD		Wired to 2121-FT-0420A	4-Wire RTD	4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0345SLAR1C2TBXW	Supplier Standard
2121-FA-003	2121-FIT-0420B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Primary Air Flow Transmitter	Calciner BMS	Analog Input 4-20mA	0-1500 Nm³/h	1P Shielded (24VDC)	Rosemount	3051SMV3M12G3R2E12A1BC12C2M5Q4QT	Supplier Standard
2121-FA-003	2121-TE-0420B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Primary Air Flow Temperature Compensation RTD		Wired to 2121-FT-0420B	4-Wire RTD	4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0345SLAR1C2TBXW	Supplier Standard
2121-FA-003	2121-PI-0422	10262849-15	14	E&I Contractor Installed	Buyer	Calciner Kiln Combustion Air Fan Local Pressure Gauge							Supplier Standard
2121-FA-003	2121-PIT-0423	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Combustion Air Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	0.0-10.0kPa	1P Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2121-BU-001	2121-BEC-0424	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Main Flame Scanner Relay	Calciner BMS	Discrete Input		2C (24VDC), 2C+E (220VAC)	Durag	D-UG 660 024D-420	Supplier Standard
2121-BU-001	2121-BE-0424A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Pilot Flame Scanner	Calciner BMS	Discrete Input		2C (24VDC), 2C+E (220VAC)	Hegwein	ZDAP	Supplier Standard
2121-BU-001	2121-TE-0424A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Temperature Element					One Temp	30 k 310 3500 d 200 MP	Supplier Standard
2121-BU-001	2121-TT-0424A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Temperature Transmitter	Calciner BMS	Analog Input 4-20mA	0-2000°C	1P Shielded (24VDC)	Rosemount	644SANAQ4QT	Supplier Standard
2121-BU-001	2121-BE-0424B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Main Flame Scanner		Wired to 2121-BEC-0424			Durag	D-LE 603 UI	Supplier Standard
2121-BU-001	2121-PCV-0424B	10262849-15	14	E&I Contractor Installed	Buyer	Calciner Kiln Burner Main Flame Scanner Cooling Air Supply Regulator							Supplier Standard
2121-BU-001	2121-TE-0424B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Spare Temperature Element					One Temp	30 k 310 3500 d 200 MP	Supplier Standard
2121-HD-002	2121-BE-0424C	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Main Flame Scanner		Wired to 2121-BEC-0424			Durag	D-LE 603 UI	Supplier Standard
2121-BU-001	2121-PCV-0424C	10262849-15	14	E&I Contractor Installed	Buyer	Calciner Kiln Burner Main Flame Scanner Cooling Air Supply Regulator							Supplier Standard
2121-BU-001	2121-TE-0424C	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Spare Temperature Element					One Temp	30 k 310 3500 d 200 MP	Supplier Standard
2121-FA-002	2121-FE-0428	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Flow Element							Supplier Standard
2121-FA-002	2121-FIT-0428A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Flow Transmitter	Calciner BMS	Analog Input 4-20mA	0.0-3.6kPa	1P Shielded (24VDC)	Rosemount	3051SMV3M12G3R2E12A1BC12C2M5Q4QT	Supplier Standard
2121-FA-002	2121-TE-0428A	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Flow Temperature Compensation RTD		Wired to 2121-FT-0428A	4-Wire RTD	4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0345SLAR1C2TBXW	Supplier Standard
2121-FA-002	2121-FIT-0428B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Flow Transmitter	Calciner BMS	Analog Input 4-20mA	0.0-3.6kPa	1P Shielded (24VDC)	Rosemount	3051SMV3M12G3R2E12A1BC12C2M5Q4QT	Supplier Standard
2121-FA-002	2121-TE-0428B	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Flow Temperature Compensation RTD		Wired to 2121-FT-0428B	4-Wire RTD	4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0345SLAR1C2TBXW	Supplier Standard
2121-FA-002	2121-PI-0429	10262849-15	14	E&I Contractor Installed	Buyer	Calciner Kiln Secondary Air Pressure Gauge							Supplier Standard
2121-FA-002	2121-PIT-0429	10262849-15	14	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	0.0-4.0kPa	1P Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies
2121-XM-016	2121-PCV-0430	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Pressure Regulator							Supplier Standard
2121-XM-016	2121-PI-0430	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Pressure Gauge							Supplier Standard
2121-XM-016	2121-PIT-0431	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	0.0-60.0kPa	1P Shielded (24VDC)	Rosemount	3051CG2A22A1BM5Q4TC4CN	Supplier Standard
2121-XM-016	2121-BSV-0432	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Shutoff Valve	Calciner BMS	Discrete Output		2C+E (220VAC)	Honeywell-Krom Schroeder	VAS115R/NW	Supplier Standard
2121-XM-016	2121-BSV-0434	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Shutoff Valve	Calciner BMS	Discrete Output		2C+E (220VAC)	Honeywell-Krom Schroeder	VAS115R/NW	Supplier Standard
2121-XM-016	2121-PI-0435	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Gas Pressure Gauge							Supplier Standard
2121-BU-001	2121-BSV-0436	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Pilot Gas Shutoff Valve	Calciner BMS	Discrete Output		2C+E (220VAC)	Honeywell-Krom Schroeder	VAS115R/NW	Supplier Standard
2121-BU-001	2121-BX-0437	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Ignition Transformer	Calciner BMS	Discrete Output		2C+E (220VAC)	Hegwein	ZDAP	Supplier Standard
2121-XM-016	2121-FE-0438	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Air Flow Element							Supplier Standard
2121-XM-016	2121-PDT-0438	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Air Flow Transmitter							Supplier Standard
2121-XM-016	2121-PCV-0439	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Pilot Air Pressure Regulator							Supplier Standard
2121-XM-016	2121-FCV-0440	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Flow Control Valve							Supplier Standard
2121-XM-016	2121-FE-0440	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Fuel Flow Orifice							Supplier Standard
2121-XM-016	2121-FZ-0440	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Flow Control Valve	Calciner BMS	Analog Output 4-20mA	0-100%	3P Shielded (24VDC), 2C+E (220VAC)	Maxon	0300 S DSCV AA11-CA001-I00	Supplier Standard
2121-XM-016	2121-ZSC-0440	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Flow Control Valve Low-Fire Position Switch	Calciner BMS	Discrete Input		Covered by cables listed for 2121-FZ-0440	Maxon	0300 S DSCV AA11-CA001-I00	Supplier Standard
2121-XM-016	2121-ZT-0440	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Flow Control Valve Position Feedback	Calciner BMS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-FZ-0440	Maxon	0300 S DSCV AA11-CA001-I00	Supplier Standard
2121-XM-016	2121-FIT-0440A	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Fuel Flow Transmitter	Calciner BMS	Analog Input 4-20mA	0-1600 Nm³/h	1P Shielded (24VDC)	Rosemount	3051SMV	Supplier Standard
2121-XM-016	2121-TE-0440A	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Fuel Flow Temperature Compensation RTD		Wired					

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ALPHA SPODUMENE CALCINING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2121-XM-016	2121-ZSC-0443	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Shutoff Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	400SMA11	Supplier Standard
2121-XM-016	2121-ZSO-0443	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Shutoff Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	400SMA11	Supplier Standard
2121-XM-016	2121-BSV-0444	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Vent Valve	Calciner BMS	Discrete Output	2C (24VDC)		Maxon	200SMA21	Supplier Standard
2121-XM-016	2121-ZSC-0444	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Vent Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	200SMA21	Supplier Standard
2121-XM-016	2121-ZSO-0444	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Vent Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	200SMA21	Supplier Standard
2121-XM-016	2121-BSV-0445	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Shutoff Valve	Calciner BMS	Discrete Output	2C (24VDC)		Maxon	400SMA11	Supplier Standard
2121-XM-016	2121-ZSC-0445	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Shutoff Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	400SMA11	Supplier Standard
2121-XM-016	2121-ZSO-0445	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Main Gas Shutoff Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)		Maxon	400SMA11	Supplier Standard
2121-XM-016	2121-PIT-0446	10262849-16	14	Factory Installed	Metso	Calciner Kiln Main Burner Gas Pressure Transmitter	Calciner BMS	Analog Input 4-20mA	0-160 kPa	1P Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Supplier Standard
2121-XM-016	2121-PI-0447	10262849-16	14	Factory Installed	Metso	Calciner Kiln Burner Gas Pressure Gauge							Supplier Standard
2121-BU-001	2121-PI-0448	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Air Pressure Gauge							Supplier Standard
2121-BU-001	2121-PI-0449	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Pressure Gauge							Supplier Standard
2121-XM-016	2121-ZSC-0449A	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Shutoff Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-XM-016	2121-ZSO-0449A	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Shutoff Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-XM-016	2121-ZSC-0449B	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Shutoff Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-XM-016	2121-ZSO-0449B	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Shutoff Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-XM-016	2121-ZSC-0449C	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Vent Valve Closed Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-XM-016	2121-ZSO-0449C	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Rack Inlet Vent Valve Open Switch	Calciner BMS	Discrete Input	2C (24VDC)				Supplier Standard
2121-BU-001	2121-PI-0450	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Gas Pressure Gauge							Supplier Standard
2121-BU-001	2121-PI-0451	10262849-16	14	E&I Contractor Installed	Metso	Calciner Kiln Burner Air Pressure Gauge							Supplier Standard
2121-XM-037	2121-FE-0460	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Quench Water Flow Element							Supplier Standard
2121-XM-037	2121-FIT-0460	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Quench Water Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	1P Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2121-SR-001	2121-LIT-0461	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Sump Level Transmitter Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	1P Shielded (24VDC)	Rosemount	2051L2AC0FD31AAS1E1M4Q4	Supplier Standard
2121-SR-001	2121-XV-0461	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Sump Make Up Water Control Valve	Main Plant PCS	Discrete Output	2C (24VDC)		ASCO	8210G022 24VDC	Supplier Standard
2121-SR-001	2121-PDT-0462A	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Packed Tower Differential Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-127 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CD2A22A1AE1M4Q4	Supplier Standard
2121-SR-001	2121-PDT-0462B	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Packed Tower Mist Eliminator Differential Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-127 mmH <sub>2</sub> O	1P Shielded (24VDC)	Rosemount	2051CD2A22A1AE1M4Q4	Supplier Standard
2121-XM-037	2121-PI-0464	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Recirculation Pump Pressure Gauge							Supplier Standard
2121-XM-037	2121-FE-0465	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Purge Flow Element							Supplier Standard
2121-XM-037	2121-FIT-0465	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Purge Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	1P Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2121-XM-037	2121-FE-0466	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Recirculation Flow Element							Supplier Standard
2121-XM-037	2121-FIT-0466	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Recirculation Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	1P Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2121-SR-001	2121-TE-0467	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Inlet Temperature							Supplier Standard
2121-SR-001	2121-TIT-0467	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Inlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	1P Shielded (24VDC)	Rosemount	214CTKAKT1SGM0405SLE1WXA	Supplier Standard
2121-XM-037	2121-ACV-0468	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Caustic Injection Flow Control Valve							Supplier Standard
2121-XM-037	2121-AE-0468	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber pH Element							Supplier Standard
2121-XM-037	2121-AT-0468	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber pH Transmitter	Main Plant PCS	Analog Input 4-20mA	0-14 pH	1P Shielded (24VDC), 2C+E (220VAC)	Rosemount	1056-01-22-38-AN	Supplier Standard
2121-XM-037	2121-AZ-0468	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Caustic Injection Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (24VDC)	Hayward	HRSN2AD8	Supplier Standard
2121-XM-037	2121-ZT-0468	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Caustic Injection Flow Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-AZ-0468	Hayward	HRSN2AD8	Supplier Standard
2121-XM-037	2121-ACV-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Purge Flow Control Valve							Supplier Standard
2121-XM-037	2121-AE-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Conductivity Element							Supplier Standard
2121-XM-037	2121-AT-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Conductivity Transmitter	Main Plant PCS	Analog Input 4-20mA	0-14 pH	1P Shielded (24VDC), 2C+E (220VAC)	Rosemount	1056-01-22-38-AN	Supplier Standard
2121-XM-037	2121-AZ-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Purge Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (24VDC)	Hayward	HRSN2AD8	Supplier Standard
2121-SR-001	2121-XV-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Tower Spray Water Valve	Main Plant PCS	Discrete Output	2C (24VDC)		Magnatrol	E44G29SC-HDBWSS	Supplier Standard
2121-XM-037	2121-ZT-0469	10262849-17	14	E&I Contractor Installed	Metso	Calciner Scrubber Purge Flow Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-AZ-0469	Hayward	HRSN2AD8	Supplier Standard
2121-SR-001	2121-XV-0470	10262849-17	14	E&I Contractor Installed	Buyer	Calciner Scrubber Purge Valve	Main Plant PCS	Discrete Output					Supplier Standard

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - GRINDING / ACID MIXING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor	
2121-GA-002	2121-PCV-0551	10262856-06	13	E&I Contractor Installed	Buyer	Calcine Cooler Emergency Discharge Slide Gate Air Supply Regulator							Supplier Standard	
2121-GA-002	2121-ZSC-0551	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Emergency Discharge Slide Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2121-GA-002	2121-ZSO-0551	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Emergency Discharge Slide Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2121-GA-002	2121-XV-0551A	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Emergency Discharge Slide Gate Direction Control Valve Open Solenoid	Main Plant PCS	Discrete Output	4C (24VDC)		Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2121-GA-002	2121-XV-0551B	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Emergency Discharge Slide Gate Direction Control Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-XV-0551A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2121-CH-003	2121-TE-0552	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Material Discharge Thermocouple					Rosemount	214CTAKT1SGM0405SLE1XWXA	Complies	
2121-CH-003	2121-TIT-0552	10262856-06	13	E&I Contractor Installed	Metso	Calcine Cooler Material Discharge Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Supplier Standard	
2131-CH-002	2131-PIT-0550	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Exhaust Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5.0-0.0kPa	2C Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4	Complies	
2131-GA-001A	2131-PCV-0560	10262856-06	13	E&I Contractor Installed	Buyer	Ball Mill Discharge Slide Gate Air Supply Regulator							Supplier Standard	
2131-CV-001A	2131-SSL-0560	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		4B Components	M1001V10F	Supplier Standard	
2131-GA-001A	2131-ZSC-0560	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-001A	2131-ZSO-0560	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-001A	2131-XV-0560A	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Direction Control Valve Open Solenoid	Main Plant PCS	Discrete Output	4C (24VDC)		Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-001A	2131-XV-0560B	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Direction Control Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-XV-0560A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-001B	2131-PCV-0561	10262856-06	13	E&I Contractor Installed	Buyer	Ball Mill Discharge Slide Gate Air Supply Regulator							Supplier Standard	
2131-CV-001B	2131-SSL-0561	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		4B Components	M1001V10F	Supplier Standard	
2131-GA-001B	2131-ZSC-0561	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-001B	2131-ZSO-0561	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-001A	2131-XV-0561A	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Direction Control Valve Open Solenoid	Main Plant PCS	Discrete Output	4C (24VDC)		Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-001A	2131-XV-0561B	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Slide Gate Direction Control Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-XV-0561A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-CV-004	2131-SSL-0572	10262856-06	13	Factory Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		4B Components	M1001V10F	Supplier Standard	
2131-GA-002A	2131-PCV-0573	10262856-06	13	E&I Contractor Installed	Buyer	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Air Supply Regulator							Supplier Standard	
2131-GA-002A	2131-ZSC-0573	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-002A	2131-ZSO-0573	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-002A	2131-XV-0573A	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Direction Control Valve Open Solenoid	Main Plant PCS	Discrete Output	4C (24VDC)		Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-002A	2131-XV-0573B	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Direction Control Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-XV-0573A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-002B	2131-PCV-0574	10262856-06	13	E&I Contractor Installed	Buyer	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Air Supply Regulator							Supplier Standard	
2131-GA-002B	2131-ZSC-0574	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Closed Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-002B	2131-ZSO-0574	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Open Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Salina Vortex	4ES9P-M18-SPDT	Supplier Standard	
2131-GA-002B	2131-XV-0574A	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Direction Control Valve Open Solenoid	Main Plant PCS	Discrete Output	4C (24VDC)		Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2131-GA-002B	2131-XV-0574B	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Dust Screw Conveyor Slide Gate Direction Control Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2121-XV-0574A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard	
2141-BE-001A	2141-LSH-0562	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Bucket Elevator Plugged Chute Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Mollet	MFB-EA	Supplier Standard	
2141-BE-001A	2141-SE-0562	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Zero Speed Sensing Element							Supplier Standard	
2141-BE-001A	2141-SSL-0562	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Zero Speed Switch	Main Plant PCS	Discrete Input	4C (24VDC)		Turck	MS24-112R20-250UC	Supplier Standard	
2141-BE-001A	2141-TE-0562	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Reducer Temperature Element		Wired to 2141-TSH-0562	8V NAMUR	1P Shielded (24VDC)	Turck	BIM-G18-Y1/S926	Supplier Standard	
2141-BE-001A	2141-TSH-0562	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Reducer Temperature Switch	Main Plant PCS	Discrete Input		2C Shielded (24VDC)	Fleender	EWD/20-250VUC	Supplier Standard	
2141-BE-001B	2141-LSH-0563	10262856-06	13	E&I Contractor Installed	Metso	Ball Mill Discharge Bucket Elevator Plugged Chute Switch	Main Plant PCS	Discrete Input	2C (24VDC)		Mollet	MFB-EA	Supplier Standard	
2141-BE-001B	2141-SE-0563	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Speed Sensing Element							Supplier Standard	
2141-BE-001B	2141-SSL-0563	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Zero Speed Switch	Main Plant PCS	Discrete Input	4C (24VDC)		Turck	MS24-112R20-250UC	Supplier Standard	
2141-BE-001B	2141-TE-0563	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Reducer Temperature Element		Wired to 2141-TSH-0563	8V NAMUR	1P Shielded (24VDC)	Turck	BIM-G18-Y1/S926	Supplier Standard	
2141-BE-001B	2141-TSH-0563	10262856-06	13	Factory Installed	Metso	Ball Mill Discharge Bucket Elevator Reducer Temperature Switch	Main Plant PCS	Discrete Input		2C Shielded (24VDC)	Fleender	EWD/20-250VUC	Supplier Standard	
2141-BN-001	2141-LT-0670	10262856-06	13	E&I Contractor Installed	Metso	Acid Mixer Feed Bin Level Transmitter	Main Plant PCS	Analog Input 4-20mA	4.20m-0.75m	2C Shielded (24VDC)	Vega	PS69.IXCSDBHXAMAXM	Complies	
2141-DC-001	2141-KC-0671	10262856-06	13	Factory Installed	Metso	Acid Mixer Feed Bin Dust Collector Pulse Cleaning Timer				2P Shielded (24VDC)	Turbo Controls	Series E2T	Supplier Standard	
2141-DC-001	2141-PCV-0671	10262856-06	13	E&I Contractor Installed	Buyer	Acid Mixer Feed Bin Dust Collector Cleaning Air Pressure Regulator							Supplier Standard	
2141-DC-001	2141-PDT-0671	10262856-06	13	Factory Installed	Metso	Acid Mixer Feed Bin Dust Collector Differential Pressure Transmitter		Wired to 2141-KC-0671	Analog Input 4-20mA		Covered by cables listed for 2141-KC-0671	Turbo Controls	Series E2T	Supplier Standard
2141-DC-001	2141-XV-0671(A-C)	10262856-06	13	Factory Installed	Metso	Acid Mixer Feed Bin Dust Collector Pulse Cleaning Solenoid		Wired to 2141-KC-0671	Discrete Output		Integral to 2141-KC-0671	Turbo Controls	Series E2T	Supplier Standard
2141-WF-001	2141-LSH-0680	10262856-07	13	E&I Contractor Installed	Metso	Acid Mixer 1 Weigh Feeder Plugged Chute Switch	Main Plant PCS	Discrete Input		4C (24VDC)	Vega	VB63.XXFOARKMX	Complies	
2141-WF-001</														

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Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-FE-002	2141-SSL-0683A	10262856-07	13	Factory Installed	Metso	Acid Mixer 1 Discharge Screw Conveyor Screw A Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	4B Components	M1001V10F		Supplier Standard
2141-FE-002	2141-SSL-0683B	10262856-07	13	Factory Installed	Metso	Acid Mixer 1 Discharge Screw Conveyor Screw B Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	4B Components	M1001V10F		Supplier Standard
2141-WF-002	2141-LSH-0685	10262856-07	13	E&I Contractor Installed	Metso	Acid Mixer 2 Weigh Feeder Plugged Chute Switch	Main Plant PCS	Discrete Input	3C (24VDC)	Vega	VB63.XXFOARKMX		Complies
2141-WF-002	2141-SE-0685	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Weigh Feeder Speed Sensor	Wired to 2141-WIT-0685						Supplier Standard
2141-WF-002	2141-WE-0685	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Weigh Feeder Load Cell	Wired to 2141-WIT-0685						Supplier Standard
2141-WF-002	2141-WIT-0685	10262856-07	13	E&I Contractor Installed	Metso	Acid Mixer 2 Weigh Feeder Weight Integrator	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Thayer	Series 5200	Supplier Standard
2141-WF-002	2141-WQS-0685	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Weigh Feeder Totalizer	Main Plant PCS	Discrete Input		2C (24VDC)	Thayer	Series 5200	Supplier Standard
2141-MX-002	2141-WE-0687	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Load Cells							Supplier Standard
2141-MX-002	2141-WT-0687	10262856-07	13	E&I Contractor Installed	Metso	Acid Mixer 2 Load Cell Weight Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC)	TBA	TBA	Supplier Standard
2141-MX-002	2141-PI-0687A	10262856-07	13	E&I Contractor Installed	Buyer	Acid Mixer 2 Vent Air Pressure Gauge							Supplier Standard
2141-MX-002	2141-SSL-0687A	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Paddle A Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2141-MX-002	2141-SSL-0687B	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Paddle B Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2141-FE-003	2141-SSL-0688A	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Discharge Screw Conveyor Screw A Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2141-FE-003	2141-SSL-0688B	10262856-07	13	Factory Installed	Metso	Acid Mixer 2 Discharge Screw Conveyor Screw B Zero Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2131-ML-001	2131-TE-0600A	10262856-08	13	Factory Installed	Metso	Ball Mill Pinion Bearing Drive End RTD					Rosemount	0068N21A30N010X8Q4XA	Supplier Standard
2131-ML-001	2131-TIT-0600A	10262856-08	13	Factory Installed	Metso	Ball Mill Pinion Bearing Drive End Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	644HANAXAM5J6Q4	Supplier Standard
2131-ML-001	2131-TE-0600B	10262856-08	13	Factory Installed	Metso	Ball Mill Pinion Bearing Non-Drive End RTD					Rosemount	0068N21A30N010X8Q4XA	Supplier Standard
2131-ML-001	2131-TIT-0600B	10262856-08	13	Factory Installed	Metso	Ball Mill Pinion Bearing Non-Drive End Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	644HANAXAM5J6Q4	Supplier Standard
2131-ML-001	2131-FSL-0603	10262856-08	13	E&I Contractor Installed	Metso	Ball Mill Feed End Bearing Cooling Water Low Flow Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Universal	MN-BIF-90LM-10-32V1.0-A1XL-Z86-66D	Supplier Standard
2131-ML-001	2131-LSL-0603	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing Sump Low Oil Level Switch	Main Plant PCS	Analog Input 4-20mA	≤8mA = Low Level	2C Shielded (24VDC)	Drexelbrook	PLTO-3000-A1BZ01777.8-088.9	Supplier Standard
2131-ML-001	2131-TI-0603	10262856-08	13	E&I Contractor Installed	Metso	Ball Mill Feed End Bearing Oil Return Temperature Gauge							Supplier Standard
2131-ML-001	2131-TE-0603A	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0603A	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-TE-0603B	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0603B	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-TE-0603C	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0603C	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-FSL-0604	10262856-08	13	E&I Contractor Installed	Metso	Ball Mill Discharge End Bearing Cooling Water Low Flow Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Universal	MN-BIF-90LM-10-32V1.0-A1XL-Z86-66D	Supplier Standard
2131-ML-001	2131-LSL-0604	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing Sump Low Oil Level Switch	Main Plant PCS	Analog Input 4-20mA	≤8mA = Low Level	2C Shielded (24VDC)	Drexelbrook	PLTO-3000-A1BZ01777.8-088.9	Supplier Standard
2131-ML-001	2131-TI-0604	10262856-08	13	E&I Contractor Installed	Metso	Ball Mill Discharge End Bearing Oil Return Temperature Gauge							Supplier Standard
2131-ML-001	2131-TE-0604A	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0604A	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-TE-0604B	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0604B	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-TE-0604C	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD							Supplier Standard
2131-ML-001	2131-TT-0604C	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing RTD Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	248RANAQ4	Supplier Standard
2131-ML-001	2131-PI-0621B	10262856-08	13	Factory Installed	Metso	Ball Mill Feed End Bearing High Pressure Lube Hand Pump Pressure Gauge							Supplier Standard
2131-ML-001	2131-PI-0622B	10262856-08	13	Factory Installed	Metso	Ball Mill Discharge End Bearing High Pressure Lube Hand Pump Pressure Gauge							Supplier Standard
2131-CPL-001	2131-XL-0603	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Feed End Trunnion Bearing Oil Low Level Light	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-CPL-001	2131-XL-0604	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Discharge End Trunnion Bearing Oil Low Level Light	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-CPL-001	2131-HSS-0610	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Emergency Stop Button	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2131-LU-001	2131-PDSH-0610	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Low Pressure Lube Pump Filter Differential Pressure Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Barksdale	DPD2T-A80SSFX-L6	Supplier Standard
2131-LU-001	2131-PI-0610	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Low Pressure Lube Pump Pressure Gauge							Supplier Standard
2131-LU-001	2131-TCV-0610	10262856-09	13	Factory Installed	Metso	Ball Mill Lube Pump Heat Exchanger Cooling Water Control Valve							Supplier Standard
2131-LU-001	2131-PDI-0610A	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Low Pressure Lube Pump Filter Differential Pressure Gauge							Supplier Standard
2131-CPL-001	2131-SS-0610A	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel LP Pump Selector Switch	Main Plant PCS	Discrete Input		3C (24VDC)			Supplier Standard
2131-LU-001	2131-PDI-0610B	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Low Pressure Lube Pump Filter Differential Pressure Gauge							Supplier Standard
2131-CPL-001	2131-SS-0610B	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Remote Control Switch	Main Plant PCS	Discrete Input		3C (24VDC)			Supplier Standard
2131-LU-001	2131-PRV-0611	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Low Pressure Lube Pump Pressure Relief Valve							Supplier Standard
2131-CPL-001	2131-XL-0611	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel LP Pump 1 Running Light	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-CPL-001	2131-HS-0611A	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel LP Pump 1 Start Button	Main Plant PCS	Discrete Input		2C (24VDC)			

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INSTRUMENT LIST AND PCS I/O LISTING - GRINDING / ACID MIXING  
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Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2131-TK-002	2131-LI-0614	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Lube Oil Tank Oil Level Gauge							Supplier Standard
2131-TK-002	2131-LSL-0614	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Lube Oil Tank Low Level Switch	Main Plant PCS	Analog Input 4-20mA	≤8mA = Low Level	2C Shielded (24VDC)	Drexelbrook	PLTO-3000-A1BZ01777.8-088.9	Supplier Standard
2131-TK-002	2131-TE-0614	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Lube Oil Tank Oil RTD							Supplier Standard
2131-TK-002	2131-TI-0614	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Lube Oil Tank Oil Temperature Gauge							Supplier Standard
2131-TK-002	2131-TT-0614	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing Lube Oil Tank Oil Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Endress Hauser	TH13-8A23E1A3S1BK	Supplier Standard
2131-CPL-001	2131-XL-0614A	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Lube Oil Low Level Light	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-CPL-001	2131-XL-0614B	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel Lube Heater On Light	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-LU-001	2131-PCV-0615	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing High Pressure Lube Pump Supply Pressure Control Valve							Supplier Standard
2131-LU-001	2131-PI-0615	10262856-09	13	Factory Installed	Metso	Ball Mill Trunnion Bearing High Pressure Lube Pump Supply Pressure Gauge							Supplier Standard
2131-CPL-001	2131-XL-0620	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel HP Pump Running Light	Main Plant PCS	Discrete Output					Supplier Standard
2131-CPL-001	2131-HS-0620A	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel HP Pump Start Button	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2131-CPL-001	2131-HS-0620B	10262856-09	13	Factory Installed	Metso	Ball Mill Lube System Control Panel HP Pump Stop Button	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2131-LU-001	2131-PIT-0621	10262856-09	13	Factory Installed	Metso	Ball Mill Feed End Bearing High Pressure Lube Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-41370 kPa	2C Shielded (24VDC)	Rosemount	3051TG5A2B21AQ4	Supplier Standard
2131-LU-001	2131-PRV-0621	10262856-09	13	Factory Installed	Metso	Ball Mill Feed End Bearing High Pressure Lube Pressure Relief Valve							Supplier Standard
2131-LU-001	2131-PI-0621A	10262856-09	13	Factory Installed	Metso	Ball Mill Feed End Bearing High Pressure Lube Pressure Gauge							Supplier Standard
2131-LU-001	2131-PIT-0622	10262856-09	13	Factory Installed	Metso	Ball Mill Discharge End Bearing High Pressure Lube Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-41370 kPa	2C Shielded (24VDC)	Rosemount	3051TG5A2B21AQ4	Supplier Standard
2131-LU-001	2131-PRV-0622	10262856-09	13	Factory Installed	Metso	Ball Mill Discharge End Bearing High Pressure Lube Pressure Relief Valve							Supplier Standard
2131-LU-001	2131-PI-0622A	10262856-09	13	Factory Installed	Metso	Ball Mill Discharge End Bearing High Pressure Lube Pressure Gauge							Supplier Standard
2131-CPL-002	2131-XA-0630	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray Control Panel System Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2131-CPL-002	2131-YS-0630	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray Control Panel Remote Run Command	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2131-LU-003	2131-PCV-0631	10262856-10	13	E&I Contractor Installed	Buyer	Ball Mill Gear Spray System Air Supply Regulator							Supplier Standard
2131-LU-003	2131-PSL-0631	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Air Supply Low Pressure Switch	Ball Mill Gear Spray	Discrete Input		2C (24VDC)	Ashcroft	LPD-N4-GG-B-25-XK3-CD27	Supplier Standard
2131-LU-003	2131-XV-0631	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Air Supply Solenoid	Ball Mill Gear Spray	Discrete Output		2C (24VDC)	ASCO	JKH8210G2-24 VDC	Supplier Standard
2131-LU-003	2131-PCV-0632	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Spray Bar Air Supply Regulator							Supplier Standard
2131-LU-003	2131-PI-0632	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Spray Bar Air Pressure Gauge							Supplier Standard
2131-LU-003	2131-PCV-0633	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Pump Air Supply Regulator							Supplier Standard
2131-LU-003	2131-PI-0633	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Pump Air Pressure Gauge							Supplier Standard
2131-LU-003	2131-XV-0633	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Pump Air Supply Solenoid	Ball Mill Gear Spray	Discrete Output		2C (24VDC)	ASCO	JKH8320G184-24 VDC	Supplier Standard
2131-LU-003	2131-PI-0634	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray System Pump Outlet Lube Pressure Gauge							Supplier Standard
2131-LU-003	2131-LSL-0637	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray Grease Drum Low Level Switch	Ball Mill Gear Spray	Discrete Input		2C (24VDC)	Farval	LC13689C	Supplier Standard
2131-LU-003	2131-TSL-0637	10262856-10	13	E&I Contractor Installed	Metso	Ball Mill Gear Spray Grease Drum Heater Temperature Switch							Supplier Standard
2131-CPL-002	2131-XA-0637	10262856-10	13	Factory Installed	Metso	Ball Mill Gear Spray Grease Drum Low Level Alarm	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2131-LU-003	2131-ZS-0644	10262856-10	13	E&I Contractor Installed	Metso	Ball Mill Gear Spray System Spray Bar Port Cycle Switch	Ball Mill Gear Spray	Discrete Input		2C (24VDC)	Honeywell	LS2A4L-1B	Supplier Standard
2131-CPL-003	2131-YE-0640	10262856-11	13	E&I Contractor Installed	Metso	Ball Mill Inchng Drive Control Panel Warning Horn	Main Plant PCS	Discrete Output		2C (24VDC)	Federal Signal	4.50E-22	Supplier Standard
2131-XM-005	2131-TE-0640A	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Drive End Bearing RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640B	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Non-Drive End Bearing RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640C	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase A Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640D	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase A Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640E	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase B Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640F	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase B Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640G	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase C Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-XM-005	2131-TE-0640H	10262856-11	13	Factory Installed	Metso	Ball Mill Motor Phase C Windings RTD	Main Plant PCS	Analog Input RTD		3C Shielded (24VDC)	WEG	(3-wire, Pt-100)	Supplier Standard
2131-CPL-003	2131-HSS-0650	10262856-11	13	Factory Installed	Metso	Ball Mill Inchng Drive Local Control Panel Emergency Stop	MCC	Discrete Input		2C (24VDC)			Supplier Standard
2131-CPL-003	2131-SS-0650	10262856-11	13	Factory Installed	Metso	Ball Mill Inchng Drive Local FWD/OFF/REV Selector Switch	MCC	Discrete Input		3C (24VDC)			Supplier Standard
2131-CPL-003	2131-XL-0650	10262856-11	13	Factory Installed	Metso	Ball Mill Inchng Drive Local Ready Light	MCC	Discrete Output		2C (24VDC)			Supplier Standard
2131-TK-001	2131-TE-0651	10262856-11	13	Factory Installed	Metso	Ball Mill Reducer Oil Thermocouple					Rosemount	006520Z035Y0145G38A2XA	Supplier Standard
2131-TK-001	2131-TIT-0651	10262856-11	13	Factory Installed	Metso	Ball Mill Reducer Oil Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	644SA16XAM5C4Q4	Supplier Standard
2131-LU-002	2131-PDSH-0652	10262856-12	13	Factory Installed	Metso	Ball Mill Reducer Lube Oil Filter Differential Pressure Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Mahle	77536550 & 7766948	Supplier Standard
2131-LU-002	2131-PI-0652	10262856-12	13	Factory Installed	Metso	Ball Mill Reducer Lube Oil Pressure Gauge							Supplier Standard
2131-LU-002	2131-PRV-0652	10262856-12	13	Factory Installed	Metso	Ball Mill Reducer Oil Lube Pump Pressure Relief Valve							Supplier Standard
2131-LU-002	2131-PSL-0652	10262856-12	13	Factory Installed	Metso	Ball Mill Reducer Lube Oil Low Pressure Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SUCO	0184, 0.5bar	Supplier Standard
2131-LU-002	2131-TI-0652	10262856-12	13	Factory Installed	Metso	Ball Mill Reducer Lube Oil Temperature Gauge							Supplier Standard
2131-LU-002	2131-PDI-0652A</												

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - GRINDING / ACID MIXING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor		
2131-VV-002	2131-SSL-0570B	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Rotary Valve Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	4B Components	M3001V10F		Supplier Standard		
2131-CV-002	2131-SSL-0571A	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	4B Components	M1001V10F		Supplier Standard		
2131-CV-003	2131-SSL-0571B	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Screw Conveyor Zero Speed Switch	Main Plant PCS	Discrete Input	2C (24VDC)	4B Components	M1001V10F		Supplier Standard		
2131-DC-001	2131-TE-0580	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Inlet Thermocouple				Rosemount	214CTKAKT1SGM0630SLE1XWXA		Complies		
2131-DC-001	2131-TIT-0580	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Inlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-300°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA		Supplier Standard	
2131-DM-001	2131-TZ-0580	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Tempering Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR		Supplier Standard	
2131-DC-001	2131-YE-0580	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Outlet Broken Bag Detector Element				Pre-fab cable supplied with sensor (50' length)	FilterSense	PS 10-A1-L10-T450-P10-M02-1R5-D3-6-W2			
2131-DC-001	2131-YS-0580	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Outlet Broken Bag Detector Switch	Main Plant PCS	Discrete Input		4C Shielded (24VDC)	FilterSense	PM 1 PRO-A-R5-G-R		Complies	
2131-DM-001	2131-ZT-0580	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Temperating Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2131-TZ-0580	ABZ	ABZ-009 / DHC-100A OTR		Supplier Standard	
2131-DC-001	2131-PIT-0580A	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Inlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5.0-0.0kPa	2C Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4		Complies	
2131-DC-001	2131-PIT-0580B	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Outlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5.0-0.0kPa	2C Shielded (24VDC)	Rosemount	2051CG1A22A1BB4K1M5Q4		Complies	
2131-DC-001	2131-PCV-0581	10262856-13	13	E&I Contractor Installed	Buyer	Ball Mill Baghouse Outlet Dampers Air Supply Regulator							Supplier Standard		
2131-DC-001	2131-ZSC-0581	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Outlet Damper Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-ZSO-0581	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Outlet Damper Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-XV-0581A	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Outlet Damper Open Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC		Supplier Standard	
2131-DC-001	2131-XV-0581B	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Outlet Damper Close Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC		Supplier Standard	
2131-DC-001	2131-KC-0582	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Module 1 Pulse Cleaning Timer				6C (24VDC)	Turbo Controls	Series E1T		Supplier Standard	
2131-DC-001	2131-KS-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Pulse Cleaning Timer Cycle Complete Switch	Main Plant PCS	Discrete Input		Covered by cables listed for 2131-KC-0582	Turbo Controls	Series E1T		Supplier Standard	
2131-DC-001	2131-LSH-0582	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Module 1 Hopper High Level Switch	Main Plant PCS	Discrete Input		4C (24VDC)	Vega	VB63.XXFOARKMX		Complies	
2131-DC-001	2131-PCV-0582	10262856-13	13	E&I Contractor Installed	Buyer	Ball Mill Baghouse Pulse Air Supply Regulator							Supplier Standard		
2131-DC-001	2131-PDI-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Local Differential Pressure Gauge							Supplier Standard		
2131-DC-001	2131-PI-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Pulse Air Tank Pressure Gauge							Supplier Standard		
2131-DC-001	2131-XY-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Pulse Cleaning Timer Enable	Main Plant PCS	Discrete Output		Covered by cables listed for 2131-KC-0582	Turbo Controls	Series E1T		Supplier Standard	
2131-DM-002	2131-ZSC-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Inlet Damper Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DM-002	2131-ZSO-0582	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Inlet Damper Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-XV-0582(A-J)	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 1 Pulse Cleaning Solenoid				Wired to 2131-KC-0582	Discrete Output	Integral to 2141-KC-0582	Turbo Controls	Series E1T	Supplier Standard
2131-DC-001	2131-ZSC-0584	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Outlet Damper Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-ZSO-0584	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Outlet Damper Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-XV-0584A	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Outlet Damper Open Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC		Supplier Standard	
2131-DC-001	2131-XV-0584B	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Outlet Damper Close Contol Solenoid	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8344G082, 24VDC		Supplier Standard	
2131-DC-001	2131-KC-0585	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Module 2 Pulse Cleaning Timer				6C (24VDC)	Turbo Controls	Series E1T		Supplier Standard	
2131-DC-001	2131-KS-0585	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Pulse Cleaning Timer Cycle Complete Switch	Main Plant PCS	Discrete Input		Covered by cables listed for 2131-KC-0585	Turbo Controls	Series E1T		Supplier Standard	
2131-DC-001	2131-LSH-0585	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Module 2 Hopper High Level Switch	Main Plant PCS	Discrete Input		4C (24VDC)	Vega	VB63.XXFOARKMX		Complies	
2131-DC-001	2131-PDI-0585	10262856-13	13	E&I Contractor Installed	Metso	Ball Mill Baghouse Module 2 Local Differential Pressure Gauge							Supplier Standard		
2131-DC-001	2131-PI-0585	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Pulse Air Tank Pressure Gauge							Supplier Standard		
2131-DC-001	2131-XY-0585	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Pulse Cleaning Timer Enable	Main Plant PCS	Discrete Output		Covered by cables listed for 2131-KC-0585	Turbo Controls	Series E1T		Supplier Standard	
2131-DM-003	2131-ZSC-0585	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Inlet Damper Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DM-003	2131-ZSO-0585	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Inlet Damper Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Honeywell	LSA1A		Supplier Standard	
2131-DC-001	2131-XV-0585(A-J)	10262856-13	13	Factory Installed	Metso	Ball Mill Baghouse Module 2 Pulse Cleaning Solenoid				Wired to 2131-KC-0585	Discrete Output	Integral to 2141-KC-0585	Turbo Controls	Series E1T	Supplier Standard

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-FU-001, 002	2141-ZSC-0695A	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Primary Shutoff Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0695A	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Primary Shutoff Valve Open	Main Plant PCS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSC-0695B	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Secondary Shutoff Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0695B	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Secondary Shutoff Valve Open	Main Plant PCS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSC-0695C	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Vent Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0695C	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Vent Valve Open	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-SV-0696	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Primary Shutoff Solenoid Valve	Main Plant PCS	Discrete Output					Supplier Standard
2141-FU-001, 002	2141-ZSC-0696	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Primary Shutoff Solenoid Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0696	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Primary Shutoff Solenoid Valve Open	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-SV-0697	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Vent Solenoid Valve	Main Plant PCS	Discrete Output					Supplier Standard
2141-FU-001, 002	2141-ZSC-0697	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Vent Solenoid Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0697	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Vent Solenoid Valve Open	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-SV-0698	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Secondary Shutoff Solenoid Valve	Main Plant PCS	Discrete Output					Supplier Standard
2141-FU-001, 002	2141-ZSC-0698	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Secondary Shutoff Solenoid Valve Closed	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-ZSO-0698	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Secondary Shutoff Solenoid Valve Open	Acid Roaster BMS	Discrete Input					Supplier Standard
2141-FU-001, 002	2141-PT-0699	10262912-05	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Natural Gas Supply Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA					Complies
2141-HD-001	2141-PIT-0701	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Feed Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-100-100 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-FA-003	2141-FE-0703	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Recirculation Air Flow Orifice							Supplier Standard
2141-FA-003	2141-FIT-0703	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Recirculation Air Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	0-1500 NM <sup>3</sup> /HR	2P Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-003	2141-TE-0703	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Recirculation Air Thermocouple							Complies
2141-FA-003	2141-TIT-0703	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Recirculation Air Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FA-003	2141-TE-0703A	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Recirculation Air Flow Transmitter Compensation RTD	Wired to 2141-FT-0703	4-Wire RTD		4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0305SLE1AR1C2B1UAE080TBXW	Complies
2141-FU-001	2141-PCV-0704A	10262912-06	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Zone 1 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-FU-001	2141-TIT-0704A	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Zone 1 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-FU-001	2141-PCV-0704B	10262912-06	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Zone 2 Shell Pyrometer Cooling Air Flow Pressure Regulator	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Supplier Standard
2141-FU-001	2141-TIT-0704B	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Zone 2 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-FU-001	2141-PCV-0704C	10262912-06	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Zone 3 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-FU-001	2141-TIT-0704C	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Zone 3 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-FU-001	2141-TE-0705A	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack A Thermocouple							Complies
2141-FU-001	2141-TIT-0705A	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack A Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-001	2141-TE-0705B	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack B Thermocouple							Complies
2141-FU-001	2141-TIT-0705B	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack B Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-001	2141-TE-0705C	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack C Thermocouple							Complies
2141-FU-001	2141-TIT-0705C	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack C Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-001	2141-TE-0705D	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack D Thermocouple							Complies
2141-FU-001	2141-TIT-0705D	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack D Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-001	2141-TE-0705E	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack E Thermocouple							Complies
2141-FU-001	2141-TIT-0705E	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Stack E Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-001	2141-PIT-0706	10262912-06	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Furnace Exhaust Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-FA-004	2141-FE-0713	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Recirculation Air Flow Orifice							Supplier Standard
2141-FA-004	2141-FIT-0713	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Recirculation Air Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	0-1500 NM <sup>3</sup> /HR	2P Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-004	2141-TE-0713	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Recirculation Air Thermocouple							Complies
2141-FA-004	2141-TIT-0713	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Recirculation Air Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FA-004	2141-TE-0713A	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Recirculation Air Flow Transmitter Compensation RTD	Wired to 2141-FT-0713	4-Wire RTD		4C Shielded (24VDC)	Rosemount	214CRTSMB1S4M0305SLE1AR1C2B1UAE080TBXW	Complies
2141-FU-002	2141-PCV-0714A	10262912-07	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 2 Zone 1 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-FU-002	2141-TIT-0714A	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Zone 1 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-FU-002	2141-PCV-0714B	10262912-07	13	E&I Contractor Installed	Buyer	Acid							

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-FU-002	2141-TIT-0715D	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Stack D Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-002	2141-TE-0715E	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Stack E Thermocouple					Rosemount	214CTKAKT1SGM0630SLE1XWXA	Complies
2141-FU-002	2141-TIT-0715E	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Stack E Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-FU-002	2141-PIT-0716	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Furnace Exhaust Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-FU-002	2141-PIT-0717	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Furnace Manifold Draft Pressure	Acid Roaster BMS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-FU-002	2141-TE-0717	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Furnace Exhaust Thermocouple					Rosemount	214CTKAKT1SGM0835SLE1XWXA	Complies
2141-FU-002	2141-TIT-0717	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Furnace Exhaust Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-1000°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-DM-002	2141-TZ-0718	10262912-07	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace Recirculation Air Tempering Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	4P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-050 / DHC-100A OTR	Supplier Standard
2141-DM-002	2141-ZSC-0718	10262912-07	13	Factory Installed	Metso	Acid Roast Kiln Furnace Recirculation Air Tempering Damper Actuator Closed Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-TZ-0718	ABZ	ABZ-050 / DHC-100A OTR	Supplier Standard
2141-DM-002	2141-ZSO-0718	10262912-07	13	Factory Installed	Metso	Acid Roast Kiln Furnace Recirculation Air Tempering Damper Actuator Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-TZ-0718	ABZ	ABZ-050 / DHC-100A OTR	Supplier Standard
2141-DM-002	2141-ZT-0718	10262912-07	13	Factory Installed	Metso	Acid Roast Kiln Furnace Recirculation Air Tempering Damper Actuator Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0718	ABZ	ABZ-050 / DHC-100A OTR	Supplier Standard
2121-HX-001	2121-PIT-0360	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Outlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-4.0 kPa	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2121-HX-001	2121-TE-0360	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Outlet Thermocouple					Rosemount	214CTKAKT1SGM0630SLE1XWXA	Complies
2121-HX-001	2121-TIT-0360	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Ambient Air Outlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2121-HX-001	2121-TE-0721	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Recirculation Air Outlet Temperature Thermocouple					Rosemount	214CTKAKT1SGM0630SLE1XWXA	Complies
2121-HX-001	2141-TT-0721	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Recirculation Air Outlet Temperature Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2121-DM-008	2121-TZ-0721B	10262912-08	13	E&I Contractor Installed	Metso	Calcine Kiln Secondary Air Heat Exchanger Bypass Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-028 / DHC-100A OTR	Supplier Standard
2121-DM-008	2121-ZT-0721B	10262912-08	13	E&I Contractor Installed	Metso	Calcine Kiln Secondary Air Heat Exchanger Bypass Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2121-TZ-0721B	ABZ	ABZ-028 / DHC-100A OTR	Supplier Standard
2141-HX-001	2141-PIT-0721	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Outlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-DM-008	2141-TZ-0721A	10262912-08	13	E&I Contractor Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Outlet Tempering Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-008	2141-ZT-0721A	10262912-08	13	Factory Installed	Metso	Calciner Kiln Secondary Air Heat Exchanger Outlet Tempering Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0721A	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-XM-010	2141-PIT-0722	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Combustion Air Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-XM-010	2141-PCV-0724A	10262912-08	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Jacket 1 Zone 1 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-XM-010	2141-TIT-0724A	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Zone 1 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-DM-003A	2141-TZ-0724A	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket Zone 1 Exhaust Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003A	2141-ZSO-0724A	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 1 Exhaust Damper Open Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003A	2141-ZT-0724A	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 1 Exhaust Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0724A	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-XM-010	2141-PCV-0724B	10262912-08	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Jacket 1 Zone 2 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-XM-010	2141-TIT-0724B	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Zone 2 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-DM-003B	2141-TZ-0724B	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket Zone 2 Exhaust Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003B	2141-ZSO-0724B	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 2 Exhaust Damper Open Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003B	2141-ZT-0724B	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 2 Exhaust Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0724B	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-XM-010	2141-PCV-0724C	10262912-08	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Jacket 1 Zone 3 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-XM-010	2141-TIT-0724C	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Zone 3 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-DM-003C	2141-TZ-0724C	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket Zone 3 Exhaust Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003C	2141-ZSO-0724C	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 3 Exhaust Damper Open Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-003C	2141-ZT-0724C	10262912-08	13	Factory Installed	Metso	Acid Roast Kiln Jacket Zone 3 Exhaust Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0724C	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-XM-010	2141-TE-0725A	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Stack A Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-XM-010	2141-TIT-0725A	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Stack A Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-XM-010	2141-TE-0725B	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Stack B Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-XM-010	2141-TIT-0725B	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Stack B Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-XM-010	2141-TE-0725C	10262912-08	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 1 Stack C Thermocouple							

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-XM-011	2141-PCV-0734C	10262912-09	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Jacket 2 Zone 3 Shell Pyrometer Cooling Air Flow Pressure Regulator							Supplier Standard
2141-XM-011	2141-TIT-0734C	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Zone 3 Shell Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-XM-011	2141-TE-0735A	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack A Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-XM-011	2141-TIT-0735A	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack A Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-XM-011	2141-TE-0735B	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack B Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-XM-011	2141-TIT-0735B	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack B Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-XM-011	2141-TE-0735C	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack C Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-XM-011	2141-TIT-0735C	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Stack C Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-XM-011	2141-PIT-0736	10262912-09	13	E&I Contractor Installed	Metso	Acid Roast Kiln Jacket 2 Exhaust Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	-250-250 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-FA-001	2141-TE-0744	10262912-10	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace I.D. Fan Exhaust Thermocouple					Rosemount	214CTKAKT1SGM0480SLE1XWXA	Complies
2141-FA-001	2141-TIT-0744	10262912-10	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace I.D. Fan Exhaust Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-DM-001	2141-TZ-0744	10262912-10	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace I.D. Fan Tempering Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-001	2141-ZSC-0744	10262912-10	13	Factory Installed	Metso	Acid Roast Kiln Furnace I.D. Fan Tempering Damper Closed Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-001	2141-ZT-0744	10262912-10	13	Factory Installed	Metso	Acid Roast Kiln Furnace I.D. Fan Tempering Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0744	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-HD-002	2141-PCV-0750	10262912-11	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Discharge Hood Pyrometer Cooling Air Pressure Regulator							Supplier Standard
2141-HD-002	2141-TIT-0750	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Discharge Hood Product Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-HD-002	2141-PIT-0751	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Discharge Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-100-100 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-HD-002	2141-TE-0752	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Discharge Hood Thermocouple					Rosemount	214CTKAKT1SGM0430SLE1XWXA	Complies
2141-HD-002	2141-TIT-0752	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Discharge Hood Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-CH-001	2141-LSH-0756	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Discharge Chute Plugged Chute Switch	Main Plant PCS	Discrete Input		4C (24VDC)	Vega	VB63.XXFOARKMX	Complies
2141-GA-005	2141-PCV-0758	10262912-11	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Emergency Discharge Slide Gate Pressure Regulator							Supplier Standard
2141-GA-005	2141-ZSC-0758	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Emergency Discharge Slide Gate Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Salina Vortex	4ES9P-M18-SPDT	Supplier Standard
2141-GA-005	2141-ZSO-0758	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Emergency Discharge Slide Gate Open Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Salina Vortex	4ES9P-M18-SPDT	Supplier Standard
2141-GA-005	2141-XV-0758A	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Emergency Discharge Slide Gate Solenoid Valve Open Solenoid	Main Plant PCS	Discrete Output		4C (24VDC)	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard
2141-GA-005	2141-XV-0758B	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Kiln Emergency Discharge Slide Gate Solenoid Valve Close Solenoid	Main Plant PCS	Discrete Output		Covered by cables listed for 2141-XV-0758A	Salina Vortex	4B500-24ES1-24VDC	Supplier Standard
2141-RC-001	2141-SE-0760	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Speed Sensor							Westec Instruments - 7MH7146-0EA
2141-RC-001	2141-ST-0760	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Speed Transmitter	Main Plant PCS	Analog Input 4-20mA	0-3 RPM	2C Shielded (24VDC), 2C+E (220VAC)	Westec Instruments	90322000	Complies
2141-XM-004	2141-TSH-0760A	10262912-11	13	Factory Installed	Metso	Acid Roast Cooler Main Drive High Temperature Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	TBA	Supplier Standard
2141-XM-004	2141-ZSC-0760A	10262912-11	13	Factory Installed	Metso	Acid Roast Cooler Main Brake Closed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	SEW	TBA	Supplier Standard
2141-XM-005	2141-XS-0760B	10262912-11	13	Factory Installed	Metso	Acid Roast Cooler Emergency Motor Brake Release Command	Main Plant PCS	Discrete Output		2C (24VDC)	SEW	FC20 1650 / 2700G	Supplier Standard
2141-HD-003	2141-PIT-0761	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Feed Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-100-100 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-DM-007	2141-PZ-0761	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Exhaust Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-DM-007	2141-ZT-0761	10262912-11	13	Factory Installed	Metso	Acid Roast Cooler Exhaust Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-PZ-0761	ABZ	ABZ-009 / DHC-100A OTR	Supplier Standard
2141-HD-003	2141-TE-0762	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Exhaust Thermocouple					Rosemount	214CTKAKT1SGM0405SLE1XWXA	Complies
2141-HD-003	2141-TIT-0762	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Exhaust Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5Q4XA	Complies
2141-HD-004	2141-PCV-0764	10262912-11	13	E&I Contractor Installed	Buyer	Acid Roast Cooler Discharge Hood Product Pyrometer Cooling Air Regulator							Supplier Standard
2141-HD-004	2141-TIT-0764	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Discharge Hood Product Pyrometer Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2P Shielded (24VDC)	IFM Efector	TW2000	Complies
2141-HD-004	2141-LSH-0765	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Discharge Chute Plugged Chute Switch	Main Plant PCS	Discrete Input		4C (24VDC)	Vega	VB63.XXFOARKMX	Complies
2141-HD-004	2141-PIT-0765	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Discharge Hood Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-100-100 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2141-VV-002	2141-SSL-0766	10262912-11	13	E&I Contractor Installed	Metso	Acid Roast Cooler Discharge Hood Rotary Airlock Low Speed Switch	Main Plant PCS	Discrete Input		2C (24VDC)	4B Components	M1001V10F	Supplier Standard
2141-FA-005	2141-FE-0770	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Combustion Air Flow Orifice							Supplier Standard
2141-FA-005	2141-FIT-0770	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Combustion Air Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2750 NM <sup>3</sup> /HR	2P Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-005	2141-PDT-0770	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Combustion Air Fan Orifice Plate Differential Pressure Transmitter	Acid Roaster BMS	Discrete Input		2C Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-005	2141-TE-0770	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Combustion Air Flow Transmitter Compensation RTD	Wired to 2141-FT-0770	4-Wire RTD		4C Shielded (24VDC)	Rosemount	214CRTSMB1S1M4030SLE1AR1C2B1UAE080TBXW	Complies
2141-BU-001, 002	2141-PIT-0771	1026											

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-XM-013	2141-PCV-0812	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Main Gas Pressure Regulator							Supplier Standard
2141-XM-013	2141-PSH-0812	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-013	2141-PSL-0812	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-013	2141-BSV-0812A	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-013	2141-PI-0812A	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-013	2141-BSV-0812B	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-013	2141-PI-0812B	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-013	2141-PI-0812C	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Gas Pressure Gauge							Supplier Standard
2141-XM-013	2141-BSV-0813	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-013	2141-PIT-0813	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 1 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-BU-002	2141-BE-0816	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-002	2141-BX-0816	10262912-12	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZI7.5-20/33W	Supplier Standard
2141-BU-002	2141-PCV-0816	10262912-12	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Burner 2 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-014	2141-FCV-0817	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Main Flow Control Valve							Supplier Standard
2141-XM-014	2141-PCV-0817	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Main Gas Pressure Regulator							Supplier Standard
2141-XM-014	2141-PSH-0817	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-014	2141-PSL-0817	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-014	2141-BSV-0817A	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-014	2141-PI-0817A	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-014	2141-BSV-0817B	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-014	2141-PI-0817B	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-014	2141-PI-0817C	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Gas Pressure Gauge							Supplier Standard
2141-XM-014	2141-BSV-0818	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-014	2141-PIT-0818	10262912-12	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 2 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-DM-005C	2141-TZ-0772A	10262912-13	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005C	2141-ZSC-0772A	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005C	2141-ZSO-0772A	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0772A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005C	2141-ZT-0772A	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-ZT-0772A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005D	2141-TZ-0772B	10262912-13	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005D	2141-ZSC-0772B	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005D	2141-ZSO-0772B	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0772B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005D	2141-ZT-0772B	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-ZT-0772B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-BU-003	2141-BE-0821	10262912-13	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-003	2141-BX-0821	10262912-13	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZI7.5-20/33W	Supplier Standard
2141-BU-003	2141-PCV-0821	10262912-13	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Burner 3 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-015	2141-FCV-0822	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Main Flow Control Valve							Supplier Standard
2141-XM-015	2141-PCV-0822	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Main Gas Pressure Regulator							Supplier Standard
2141-XM-015	2141-PSH-0822	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-015	2141-PSL-0822	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input	2C (24VDC)		Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-015	2141-BSV-0822A	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-015	2141-PI-0822A	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-015	2141-BSV-0822B	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-015	2141-PI-0822B	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-015	2141-PI-0822C	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Gas Pressure Gauge							Supplier Standard
2141-XM-015	2141-BSV-0823	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-015	2141-PIT-0823	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 3 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT</td	

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-XM-016	2141-PI-0827C	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Gas Pressure Gauge							Supplier Standard
2141-XM-016	2141-BSV-0828	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-016	2141-PIT-0828	10262912-13	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 4 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-DM-005E	2141-TZ-0773A	10262912-14	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Combustion Air Supply Damper	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005E	2141-ZSC-0773A	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005E	2141-ZSO-0773A	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0773A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-005E	2141-ZT-0773A	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0773A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-BU-005	2141-BE-0831	10262912-14	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-005	2141-BX-0831	10262912-14	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZ17.5-20/33W	Supplier Standard
2141-BU-005	2141-PCV-0831	10262912-14	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 1 Burner 5 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-017	2141-FCV-0832	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Main Flow Control Valve							Supplier Standard
2141-XM-017	2141-PCV-0832	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Main Gas Pressure Regulator							Supplier Standard
2141-XM-017	2141-PSH-0832	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-017	2141-PSL-0832	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-017	2141-BSV-0832A	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-017	2141-PI-0832A	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-017	2141-BSV-0832B	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-017	2141-PI-0832B	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-017	2141-PI-0832C	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Gas Pressure Gauge							Supplier Standard
2141-XM-017	2141-BSV-0833	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-017	2141-PIT-0833	10262912-14	13	Factory Installed	Metso	Acid Roast Kiln Furnace 1 Burner 5 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-FA-006	2141-FE-0780	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Combustion Air Flow Orifice							Supplier Standard
2141-FA-006	2141-FT-0780	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Combustion Air Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	0-2750 NM <sup>3</sup> /HR	2P Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-006	2141-PDT-0780	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Combustion Air Fan Orifice Plate Differential Pressure Transmitter	Acid Roaster BMS	Discrete Input		2C Shielded (24VDC)	Rosemount	3051SMV5M11G3R2A11A1AC13C2K1M5Q4	Complies
2141-FA-006	2141-TE-0780	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Combustion Air Flow Transmitter Compensation RTD	Wired to 2141-FT-0780	4-Wire RTD		4C Shielded (24VDC)	Rosemount	214CRTSMB1S1M0305SLE1AR1C2B1UAE080TBXW	Complies
2141-BU-006, 007	2141-PIT-0781	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Zone 1-3 Combustion Air Supply Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-DM-006A	2141-TZ-0781A	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Complies
2141-DM-006A	2141-ZSC-0781A	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006A	2141-ZSO-0781A	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0781A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006A	2141-ZT-0781A	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0781A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006B	2141-TZ-0781B	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006B	2141-ZSC-0781B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006B	2141-ZSO-0781B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0781B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006B	2141-ZT-0781B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0781B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-BU-006	2141-BE-0841	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-006	2141-BX-0841	10262912-15	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZ17.5-20/33W	Supplier Standard
2141-BU-006	2141-PCV-0841	10262912-15	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 2 Burner 6 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-018	2141-FCV-0842	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Main Flow Control Valve							Supplier Standard
2141-XM-018	2141-PCV-0842	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Main Gas Pressure Regulator							Supplier Standard
2141-XM-018	2141-PSH-0842	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-018	2141-PSL-0842	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-018	2141-BSV-0842A	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-018	2141-PI-0842A	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-018	2141-BSV-0842B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 6 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125	

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Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-XM-019	2141-BSV-0847B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-019	2141-PI-0847B	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-019	2141-PI-0847C	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Gas Pressure Gauge							Supplier Standard
2141-XM-019	2141-BSV-0848	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-019	2141-PIT-0848	10262912-15	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 7 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-DM-006C	2141-TZ-0782A	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Complies
2141-DM-006C	2141-ZSC-0782A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006C	2141-ZSO-0782A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0782A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006C	2141-ZT-0782A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0782A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006D	2141-TZ-0782B	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006D	2141-ZSC-0782B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006D	2141-ZSO-0782B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0782B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006D	2141-ZT-0782B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0782B	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-BU-008	2141-BE-0851	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-008	2141-BX-0851	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZ17.5-20/33W	Supplier Standard
2141-BU-008	2141-PCV-0851	10262912-16	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 2 Burner 8 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-020	2141-FCV-0852	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Main Flow Control Valve							Supplier Standard
2141-XM-020	2141-PCV-0852	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Main Gas Pressure Regulator							Supplier Standard
2141-XM-020	2141-PSH-0852	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-020	2141-PSL-0852	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-020	2141-BSV-0852A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-020	2141-PI-0852A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-020	2141-BSV-0852B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-020	2141-PI-0852B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-020	2141-PI-0852C	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Gas Pressure Gauge							Supplier Standard
2141-XM-020	2141-BSV-0853	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-020	2141-PIT-0853	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 8 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-BU-009	2141-BE-0856	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Flame Scanner	Acid Roaster BMS	Discrete Input		2P Shielded (24VDC)	Durag	D-LX 201 UA	Supplier Standard
2141-BU-009	2141-BX-0856	10262912-16	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Ignition Spark Rod	Acid Roaster BMS	Discrete Output		2C+E (220VAC)	Honeywell-Kromschroder	TZ17.5-20/33W	Supplier Standard
2141-BU-009	2141-PCV-0856	10262912-16	13	E&I Contractor Installed	Buyer	Acid Roast Kiln Furnace 2 Burner 9 Flame Scanner Cooling Air Pressure Regulator							Supplier Standard
2141-XM-021	2141-FCV-0857	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Main Flow Control Valve							Supplier Standard
2141-XM-021	2141-PCV-0857	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Main Gas Pressure Regulator							Supplier Standard
2141-XM-021	2141-PSH-0857	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Gas High Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG50U-4G	Supplier Standard
2141-XM-021	2141-PSL-0857	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Gas Low Pressure Switch	Acid Roaster BMS	Discrete Input		2C (24VDC)	Honeywell-Kromschroder	DG150U-4G	Supplier Standard
2141-XM-021	2141-BSV-0857A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Main Gas Primary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-021	2141-PI-0857A	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Gas Supply Pressure Gauge							Supplier Standard
2141-XM-021	2141-BSV-0857B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Main Gas Secondary Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VCS 125RNK	Supplier Standard
2141-XM-021	2141-PI-0857B	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Regulated Main Gas Pressure Gauge							Supplier Standard
2141-XM-021	2141-PI-0857C	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Gas Pressure Gauge							Supplier Standard
2141-XM-021	2141-BSV-0858	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-021	2141-PIT-0858	10262912-16	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 9 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-DM-006E	2141-TZ-0783A	10262912-17	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Combustion Air Supply Damper Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006E	2141-ZSC-0783A	10262912-17	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Combustion Air Supply Damper Closed Switch	Acid Roaster BMS	Discrete Input		3C (24VDC)	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006E	2141-ZSO-0783A	10262912-17	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Combustion Air Supply Damper Open Switch	Acid Roaster BMS	Discrete Input		Covered by cables listed for 2141-ZSC-0783A	Honeywell-Kromschroder	IC20-50H20E	Supplier Standard
2141-DM-006E	2141-ZT-0783A	10262912-17	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Combustion Air Supply Damper Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2141-TZ-0783A	Honeywell-Kromschroder	IC20-50H20E	

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Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2141-XM-022	2141-BSV-0863	10262912-17	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Pilot Gas Shutoff Valve	Acid Roaster BMS	Discrete Output	2C (24VDC)		Honeywell-Kromschroder	VAS 125NK	Supplier Standard
2141-XM-022	2141-PIT-0863	10262912-17	13	Factory Installed	Metso	Acid Roast Kiln Furnace 2 Burner 10 Leak Detection Gas Pressure Transmitter	Acid Roaster BMS	Analog Input 4-20mA	0-200kPa	2C Shielded (24VDC)	Rosemount	3051TG1A2B21BM5Q4S5QT	Complies
2141-FU-001,002	2141-AE-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Element					Mettler Toledo	GPRO500ATC0BQGS080LA1DH_AA	Supplier Standard
2141-FU-001,002	2141-AT-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Transmitter O2 Concentration Acid Roast Kiln Furnace 1&2 O2 Analyzer Transmitter Days Until Service	Acid Roaster BMS	Analog Input 4-20mA Analog Input 4-20mA	0-100% Concentration 0-365 days	2P Shielded (24VDC), 2C+E (24VDC)	Mettler Toledo	GPRO500ATC0BQGS080LA1DH_AA	Supplier Standard
2141-FU-001,002	2141-PIT-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Pressure Compensation Transmitter	Wired to 2141-AE-0715	Analog Input 4-20mA	-6-6kPa	2C Shielded (24VDC)	Rosemount	3051CG1A22A1BM5Q4QTC4CN	Supplier Standard
2141-FU-001,002	2141-TE-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Temperature Compensation Element					Rosemount	214CRHSMB1S4M0485SLAR1C2TBXW	Supplier Standard
2141-FU-001,002	2141-TT-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Temperature Compensation Transmitter	Wired to 2141-AE-0715	Analog Input 4-20mA	0-600°C	2C Shielded (24VDC)	Rosemount	644SANAQ4QT	Supplier Standard
2141-FU-001,002	2141-XV-0715	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Blowback Air Solenoid Valve	Acid Roaster BMS	Discrete Output		2C (24VDC)	ASCO	SC8327B002 24VDC	Supplier Standard
2141-FU-001,002	2141-FISL-0715A	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Nitrogen Supply Low Flow Switch	Acid Roaster BMS	Discrete Input	0.5 L/min	4C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K005N1 SS KFD2-SR2-Ex2,W 24VDC	Supplier Standard
2141-FU-001,002	2141-PCV-0715A	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Nitrogen Pressure Control Valve							Supplier Standard
2141-FU-001,002	2141-FISL-0715B	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Air Supply Low Flow Switch	Acid Roaster BMS	Discrete Input	8 L/min	4C (24VDC)	Switch: Krohne Relay: Pepperl + Fuchs	DK32VG46K040N1 SS KFD2-SR2-Ex2,W 24VDC	Supplier Standard
2141-FU-001,002	2141-PCV-0715B	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Nitrogen Pressure Control Valve							Supplier Standard
2141-FU-001,002	2141-PCV-0715C	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2141-FU-001,002	2141-PCV-0715D	10262912-18	13	E&I Contractor Installed	Metso	Acid Roast Kiln Furnace 1&2 O2 Analyzer Blowback Air Pressure Control Valve							Supplier Standard
2141-CPL-002A	2141-XA-0900A	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Fault Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-002A	2141-YS-0900A	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-002A	2141-XA-0900B	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Reservoir Low Level Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-002A	2141-YS-0900B	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Reset	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-002A	2141-XI-0900C	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Running	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-LU-001	2141-LSL-0902	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Lube Tank Low Level Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)	SKF	PVP-2012-950	Supplier Standard
2141-LU-001	2141-TSL-0902A	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Lube Tank Low Temp Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)			Supplier Standard
2141-LU-001	2141-TSL-0902B	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Lube Supply to Nozzles Low Temp Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)			Supplier Standard
2141-LU-001	2141-PI-0903	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Supply to Nozzles Pressure Gauge							Supplier Standard
2141-LU-001	2141-PRV-0903	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Supply to Nozzles Pressure Relief Valve							Supplier Standard
2141-LU-001	2141-PCV-0904	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Pump Air Supply Pressure Control Valve							Supplier Standard
2141-LU-001	2141-XV-0904	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Pump Air Supply Solenoid Valve	Kiln Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2141-LU-001	2141-PCV-0905	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Spray Feeders Air Supply Pressure Control Valve							Supplier Standard
2141-LU-001	2141-PSL-0905	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Air Supply to Nozzles Low Pressure Switch	Kiln Gear Spray	Discrete Input		2C (24VDC)	SKF	AC-4261-3, 5B	Supplier Standard
2141-LU-001	2141-XV-0905	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Lube Spray Feeders Solenoid Valve	Kiln Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2141-LU-001	2141-ZS-0905	10262912-19	13	Factory Installed	Metso	Acid Roast Kiln Gear Spray Lube Spray Feeders Cycle Switch	Kiln Gear Spray	Discrete Input		3C (24VDC)	SKF	24-0159-6028	Supplier Standard
2141-CPL-003A	2141-XA-0910A	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Fault Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-003A	2141-YS-0910A	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-003A	2141-XA-0910B	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Reservoir Low Level Alarm	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-003A	2141-YS-0910B	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Reset	Main Plant PCS	Discrete Output		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-CPL-003A	2141-XI-0910C	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Running	Main Plant PCS	Discrete Input		2C (24VDC)	SKF	AEP2-OG	Supplier Standard
2141-LU-002	2141-LSL-0912	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Cooler Gear Spray Lube Tank Low Level Switch	Cooler Gear Spray	Discrete Input		2C (24VDC)	SKF	PVP-2012-950	Supplier Standard
2141-LU-002	2141-TSL-0912A	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Cooler Gear Spray Lube Tank Low Temp Switch	Cooler Gear Spray	Discrete Input		2C (24VDC)			Supplier Standard
2141-LU-002	2141-TSL-0912B	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Kiln Gear Spray Lube Supply to Nozzles Low Temp Switch	Cooler Gear Spray	Discrete Input		2C (24VDC)			Supplier Standard
2141-LU-002	2141-PI-0913	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Supply to Nozzles Pressure Gauge							Supplier Standard
2141-LU-002	2141-PRV-0913	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Supply to Nozzles Pressure Relief Valve							Supplier Standard
2141-LU-002	2141-PCV-0914	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Cooler Gear Spray Lube Pump Air Supply Pressure Control Valve							Supplier Standard
2141-LU-002	2141-XV-0914	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Pump Air Supply Solenoid Valve	Cooler Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2141-LU-002	2141-PCV-0915	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Cooler Gear Spray Lube Spray Feeders Air Supply Pressure Control Valve							Supplier Standard
2141-LU-002	2141-PSL-0915	10262912-19	13	E&I Contractor Installed	Metso	Acid Roast Cooler Gear Spray Air Supply to Nozzles Low Pressure Switch	Cooler Gear Spray	Discrete Input		2C (24VDC)	SKF	AC-4261-3, 5B	Supplier Standard
2141-LU-002	2141-XV-0915	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Spray Feeders Solenoid Valve	Cooler Gear Spray	Discrete Output		2C (24VDC)			Supplier Standard
2141-LU-002	2141-ZS-0915	10262912-19	13	Factory Installed	Metso	Acid Roast Cooler Gear Spray Lube Spray Feeders Cycle Switch	Cooler Gear Spray	Discrete Input		3C (24VDC)	SKF	24-0159-6028	Supplier Standard
2141-TK-001	2141-LSL-0919	10262912-20	13	E&I Contractor Installed	Metso	Acid Roast Cooler Water Collection Tank Level Switch	Main Plant PCS	Discrete Input		2C (24VDC)	IFM Efector	KI0206	Complies
2141-XM-012	2141-TE-0919	10262912-20											

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2151-SR-001	2151-FIT-0930	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Venturi Water Supply Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	2C Shielded (24VDC)	Rosemount	8800DW005SA1N1D1E1M5Q4	Complies
2151-SR-001	2151-LIT-0931	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Sump Level Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	2C Shielded (24VDC)	Rosemount	2051L2AC0FD31AS1E1M4Q4	Supplier Standard
2151-SR-001	2151-XV-0931	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Sump Make-Up Water Supply Valve	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8210G022 24VDC	Supplier Standard
2151-SR-001	2151-AE-0932	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Water Conductivity Element							Supplier Standard
2151-SR-001	2151-AT-0932	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Water Conductivity Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	1056-01-22-38-AN	Supplier Standard
2151-SR-001	2151-FE-0932	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Flow Element							Supplier Standard
2151-SR-001	2151-FIT-0932	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2151-SR-001	2151-PI-0932	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Pressure Gauge							Supplier Standard
2151-PP-001A	2151-XV-0932A	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Inlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	3 BYV BFLY VALVE CPVC/CPVC	Supplier Standard
2151-PP-001A	2151-XV-0932B	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Outlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	TBH2150ASTE0000	Supplier Standard
2151-PP-001B	2151-XV-0933A	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Inlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	3 BYV BFLY VALVE CPVC/CPVC	Supplier Standard
2151-PP-001B	2151-XV-0933B	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Recirculation Pump Outlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	TBH2150ASTE0000	Supplier Standard
2151-SR-001	2151-AZ-0935	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Purge Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	TBA	2P Shielded (24VDC), 2C+E (24VDC)	Hayward	HRSN2AD8	Supplier Standard
2151-SR-001	2151-FCV-0935	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Purge Flow Control Valve							Supplier Standard
2151-SR-001	2151-FE-0935	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Purge Flow Element							Supplier Standard
2151-SR-001	2151-FIT-0935	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Purge Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2151-SR-001	2151-ZT-0935	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Purge Flow Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	TBA	Covered by cables listed for 2151-AZ-0935	Hayward	HRSN2AD8	Supplier Standard
2151-SR-001	2151-PIT-0990	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Gas Inlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5-0 kPa	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2151-SR-001	2151-TE-0990	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Gas Inlet Thermocouple							Complies
2151-SR-001	2151-TIT-0990	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Gas Inlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-500°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5QXA	Complies
2151-SR-001	2151-PDT-0991	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Differential Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CD2A33A1AE1M4Q4	Supplier Standard
2151-SR-001	2151-TE-0991	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Gas Inlet Post Cooling Water Thermocouple							Supplier Standard
2151-SR-001	2151-TIT-0991	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Venturi Scrubber Gas Inlet Post Cooling Water Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100°C	2C Shielded (24VDC)	Rosemount	644HAK1J5M5F5QXA	Supplier Standard
2151-SR-001	2151-PIT-0992	10262912-21	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Separator Gas Outlet Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	-5-0 kPa	2C Shielded (24VDC)	Rosemount	2051CG2A22A1BB4K1M5Q4	Complies
2151-CPL-001A	2151-SC-0941	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Blower VSD Setpoint	Main Plant PCS	Analog Output 4-20mA	0-100%	2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-XY-0941	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Blower Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-CPL-001A	2151-XI-0941A	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Blower Running	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-CPL-001A	2151-XI-0941B	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Blower Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-CPL-001A	2151-JC-0942	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Power Controller Setpoint	Main Plant PCS	Analog Output 4-20mA	0-100%	2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-XY-0942	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-HE-001	2151-TE-0942A	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Inlet Thermocouple							Supplier Standard
2151-HE-001	2151-TT-0942A	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Inlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC)	Rosemount	644RANA	Supplier Standard
2151-CPL-001A	2151-XI-0942A	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Running	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-HE-001	2151-TE-0942B	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Outlet Thermocouple							Supplier Standard
2151-HE-001	2151-TT-0942B	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Outlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC)	Rosemount	644RANA	Supplier Standard
2151-CPL-001A	2151-XI-0942B	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-FA-002	2151-FSL-0943	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Heater Low Air Flow Switch	Main Plant PCS	Discrete Input		2C (24VDC)	TBA	TBA	Supplier Standard
2151-CPL-001A	2151-SI-0943	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Sparks Per Minute	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-XY-0943	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-CPL-001A	2151-EI-0943A	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Primary Voltage	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-II-0943A	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Primary Current	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-XI-0943A	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Running	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-CPL-001A	2151-EI-0943B	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Secondary Voltage	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-II-0943B	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Secondary Current	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-001A	2151-XI-0943B	10262912-22	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 1 Transformer/Rectifier Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-EP-001	2151-FE-0945	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Water Flow Element							Supplier Standard
2151-EP-001	2151-FIT-0945	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Water Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2151-EP-001	2151-PCV-0945	10262912-22	13	E&I Contractor Installed	Buyer</td								

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2151-TK-001	2151-LIT-0966	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Discharge Water Collection Tank Level Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	2C Shielded (24VDC)	Rosemount	L068CAA2E02400XD2AA24XF8AZB8AZF02400C0ZZ	Supplier Standard
2151-TK-001	2151-LSL-0966	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Discharge Water Collection Tank Level Switch	Main Plant PCS	Discrete Input		2C (24VDC)	Rosemount	2130DA2MF2AARE01801E1	Supplier Standard
2151-PP-003	2151-PI-0966	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Discharge Water Pump Outlet Pressure Gauge							Supplier Standard
2151-EP-001	2151-PIT-0993A	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Outlet Chamber Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A33A1AB4E1M5Q4	Supplier Standard
2151-EP-001	2151-PIT-0993B	10262912-22	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 1 Inlet Chamber Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A33A1AB4E1M5Q4	Supplier Standard
2151-SR-002	2151-LIT-0951	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Sump Level Transmitter	Main Plant PCS	Analog Input 4-20mA	0-100%	2C Shielded (24VDC)	Rosemount	2051L2AC0FD31AAS1E1M4Q4	Supplier Standard
2151-SR-002	2151-XV-0951	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Make-up Water Supply Shutoff Valve	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8210G009 24VDC	Supplier Standard
2151-SR-002	2151-XV-0952	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Packed Tower Mist Eliminator Wash Water Shutoff Solenoid Valve	Main Plant PCS	Discrete Output		2C (24VDC)	ASCO	8210G009 24VDC	Supplier Standard
2151-SR-002	2151-PI-0953	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Water Pressure Gauge							Supplier Standard
2151-PP-002A	2151-XV-0953A	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Pump Inlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	3 BYV BFY VALVE CPVC/CPVC	Supplier Standard
2151-PP-002A	2151-XV-0953B	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Pump Outlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	TBH2200ASTE0000	Supplier Standard
2151-PP-002B	2151-XV-0954A	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Pump Inlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	3 BYV BFY VALVE CPVC/CPVC	Supplier Standard
2151-PP-002B	2151-XV-0954B	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Pump Outlet Isolation Valve	Main Plant PCS	Discrete Output		2C (24VDC)	Hayward	TBH2200ASTE0000	Supplier Standard
2151-SR-002	2151-FE-0955	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Purge Flow Sensor					Rosemount	8711SHE010U1NHQ4	Supplier Standard
2151-SR-002	2151-FT-0955	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Purge Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2151-SR-002	2151-FE-0956	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Flow Sensor					Rosemount	8711SHE020M1NDQ4	Supplier Standard
2151-SR-002	2151-FT-0956	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirculation Flow Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	8732EMT1A1NDM4C1Q4	Supplier Standard
2151-SR-002	2151-AE-0958	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirc Water pH Sensor					Rosemount	389-01-10-55	Supplier Standard
2151-SR-002	2151-AT-0958	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirc Water pH Analyzer	Main Plant PCS	Analog Input 4-20mA	0-14 pH	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	1056-01-22-38-AN	Supplier Standard
2151-SR-002	2151-AZ-0958	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Caustic Supply Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (220VAC)	Hayward	HRS310LB 24DC 4-20 I/O	Supplier Standard
2151-SR-002	2151-FCV-0958	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Caustic Supply Flow Control Valve							Supplier Standard
2151-SR-002	2151-ZT-0958	10262912-23	13	Factory Installed	Metso	Acid Roast Scrubber Packed Tower Caustic Supply Flow Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2151-AZ-0958	Hayward	HRS310LB 24DC 4-20 I/O	Supplier Standard
2151-SR-002	2151-AE-0959	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirc Water Conductivity Sensor					Rosemount	228-02-21-56-61	Supplier Standard
2151-SR-002	2151-AT-0959	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Recirc Water Conductivity Analyzer	Main Plant PCS	Analog Input 4-20mA	0-14 pH	2C Shielded (24VDC), 2C+E (220VAC)	Rosemount	1056-01-22-38-AN	Supplier Standard
2151-SR-002	2151-AZ-0959	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Purge Flow Control Valve Actuator	Main Plant PCS	Analog Output 4-20mA	0-100%	2P Shielded (24VDC), 2C+E (24VDC)	Hayward	HRSN2AD8	Supplier Standard
2151-SR-002	2151-FCV-0959	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Purge Flow Control Valve							Supplier Standard
2151-SR-002	2151-XV-0959	10262912-23	13	E&I Contractor Installed	Buyer	Acid Roast Packed Tower Purge Valve	Main Plant PCS	Discrete Output					Supplier Standard
2151-SR-002	2151-ZT-0959	10262912-23	13	Factory Installed	Metso	Acid Roast Scrubber Packed Tower Purge Flow Control Valve Position Feedback	Main Plant PCS	Analog Input 4-20mA	0-100%	Covered by cables listed for 2151-AZ-0959	Hayward	HRSN2AD8	Supplier Standard
2151-SR-002	2151-PDT-0994A	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Packed Section Differential Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CD1A22A1AE1M4Q4	Supplier Standard
2151-SR-002	2151-PDT-0994B	10262912-23	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Packed Tower Mist Eliminator Differential Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CD1A22A1AE1M4Q4	Supplier Standard
2151-CPL-002A	2151-SC-0961	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Blower VSD Setpoint	Main Plant PCS	Analog Output 4-20mA	0-100%	2C Shielded (24VDC)			Supplier Standard
2151-CPL-002A	2151-XY-0961	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Blower Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-CPL-002A	2151-XI-0961A	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Blower Running	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-CPL-002A	2151-XI-0961B	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Blower Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-CPL-002A	2151-JC-0962	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Power Controller Setpoint	Main Plant PCS	Analog Output 4-20mA	0-100%	2C Shielded (24VDC)			Supplier Standard
2151-CPL-002A	2151-XY-0962	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-HE-002	2151-TE-0962A	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Inlet Thermocouple							Supplier Standard
2151-HE-002	2151-TT-0962A	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Inlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC)	Rosemount	644RANA	Supplier Standard
2151-CPL-002A	2151-XI-0962A	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Running	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-HE-002	2151-TE-0962B	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Outlet Thermocouple							Supplier Standard
2151-HE-002	2151-TT-0962B	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Outlet Temperature Transmitter	Main Plant PCS	Analog Input 4-20mA	TBA	2C Shielded (24VDC)	Rosemount	644RANA	Supplier Standard
2151-CPL-002A	2151-XI-0962B	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Fault	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-FA-003	2151-FSL-0963	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Heater Low Air Flow Switch	Main Plant PCS	Discrete Input		2C (24VDC)	TBA	TBA	Supplier Standard
2151-CPL-002A	2151-SI-0963	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Transformer/Rectifier Sparks Per Minute	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			Supplier Standard
2151-CPL-002A	2151-XY-0963	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Transformer/Rectifier Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-CPL-002A	2151-EI-0963A	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Transformer/Rectifier Primary Voltage	Main Plant PCS	Analog Input 4-20mA		2C Shielded (24VDC)			

LITHIUM SPODUMENE PROCESSING  
INSTRUMENT LIST AND PCS I/O LISTING - ACID ROASTING  
ALBEMARLE KEMERTON PLANT

Equipment #	Instrument Tag #	P&ID Drawing #	P&ID Rev	Installed By	Supplier	Description	Control System	Signal Type	Range	Cable Type	Manufacturer	Part #	Preferred Vendor
2151-CPL-002A	2151-XY-0965A	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Flush Water Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-EP-002	2151-PI-0965B	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Flush Water Pressure Gauge							Supplier Standard
2151-CPL-002A	2151-XI-0965B	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Flush Water Backup Auto Switch	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-EP-002	2151-XV-0965B	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Flush Water Solenoid Valve B	WESP Control Panel	Discrete Output		2C (24VDC)	ASCO	WT8551	Supplier Standard
2151-CPL-002A	2151-XY-0965B	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Flush Water Backup Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-EP-002	2151-PI-0965C	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Mist Eliminator Wash Water Pressure Gauge							Supplier Standard
2151-CPL-002A	2151-XI-0965C	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Mist Eliminator Wash Water Auto Switch	Main Plant PCS	Discrete Input		2C (24VDC)			Supplier Standard
2151-EP-002	2151-XV-0965C	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Mist Eliminator Wash Water Solenoid Valve	WESP Control Panel	Discrete Output		2C (24VDC)	ASCO	WT8551	Supplier Standard
2151-CPL-002A	2151-XY-0965C	10262912-24	13	Factory Installed	Metso	Acid Roast Scrubber WESP Stage 2 Mist Eliminator Wash Water Start/Stop	Main Plant PCS	Discrete Output		2C (24VDC)			Supplier Standard
2151-EP-002	2151-PIT-0995A	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Outlet Chamber Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1AB4M5E1Q4	Supplier Standard
2151-EP-002	2151-PIT-0995B	10262912-24	13	E&I Contractor Installed	Metso	Acid Roast Scrubber WESP Stage 2 Inlet Chamber Pressure Transmitter	Main Plant PCS	Analog Input 4-20mA	0-889 mmH <sub>2</sub> O	2C Shielded (24VDC)	Rosemount	2051CG2A22A1AB4M5E1Q4	Supplier Standard
2151-DM-005A	2151-XV-0996A	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Inlet Shutoff Damper Open Command	Main Plant PCS	Discrete Output		3C+E (220VAC)	Chemline	VS100.12	Supplier Standard
2151-DM-005A	2151-XV-0996B	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Inlet Shutoff Damper Close Command	Main Plant PCS	Discrete Output		Covered by cables listed for 2151-XV-0991A	Chemline	VS100.12	Supplier Standard
2151-DM-006A	2151-XV-0997A	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Outlet Shutoff Damper Open Command	Main Plant PCS	Discrete Output		3C+E (220VAC)	Chemline	VS100.12	Supplier Standard
2151-DM-006A	2151-XV-0997B	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Outlet Shutoff Damper Close Command	Main Plant PCS	Discrete Output		Covered by cables listed for 2151-XV-0992A	Chemline	VS100.12	Supplier Standard
2151-DM-005B	2151-XV-0998A	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Inlet Shutoff Damper Open Command	Main Plant PCS	Discrete Output		3C+E (220VAC)	Chemline	VS100.12	Supplier Standard
2151-DM-005B	2151-XV-0998B	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Inlet Shutoff Damper Close Command	Main Plant PCS	Discrete Output		Covered by cables listed for 2151-XV-0993A	Chemline	VS100.12	Supplier Standard
2151-DM-006B	2151-XV-0999A	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Outlet Shutoff Damper Open Command	Main Plant PCS	Discrete Output		3C+E (220VAC)	Chemline	VS100.12	Supplier Standard
2151-DM-006B	2151-XV-0999B	10262912-25	13	E&I Contractor Installed	Metso	Acid Roast Scrubber Exhaust Fan Outlet Shutoff Damper Close Command	Main Plant PCS	Discrete Output		Covered by cables listed for 2151-XV-0994A	Chemline	VS100.12	Supplier Standard