PHOENIXCEMENT

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January 4, 2023

Mr. Balaji Vaidyanathan
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

RE: ***Phoenix Cement Company – Clarkdale, AZ***
Class I Permit 69780
Permit Renewal Application

Dear Mr. Vaidyanathan:

The Phoenix Cement Company (PCC), a division of the Salt River Pima-Maricopa Indian Community, operates a Portland cement manufacturing facility in Clarkdale, Yavapai County, Arizona (the Clarkdale Facility). The Clarkdale Facility is regulated by the Arizona Department of Environmental Quality (ADEQ) and currently operates under ADEQ Class I Air Quality Permit 69780.

Pursuant to Attachment "A", Condition I.B of ADEQ Class I Permit 69780 and Arizona Administrative Code (A.A.C.) R18-2-304.C.2, a "timely" renewal application for the permit must be submitted to ADEQ before January 17, 2023. As a result, to meet this requirement, PCC is submitting this renewal application.

If you have any questions regarding this application or require additional information, please feel free to contact Brett Lindsay at (928) 639-8062.

Sincerely,

Gregg St. Clair
Vice President of Cement Operations

Enclosures

cc: Mr. Brett Lindsay, Phoenix Cement Company

ADEQ PERMIT RENEWAL APPLICATION
ADEQ CLASS I PERMIT 69780

Phoenix Cement Company – Clarkdale, Arizona

Prepared By:

TRINITY CONSULTANTS
1661 E. Camelback Rd.
Suite 290
Phoenix, AZ 85016
(602) 274-2900

January 2023

Project 220301.0127

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1. EXECUTIVE SUMMARY

The Phoenix Cement Company (PCC), which is a division of the Salt River Pima-Maricopa Indian Community, operates a Portland cement manufacturing facility in Clarkdale, Yavapai County, Arizona (Clarkdale Facility). The Clarkdale Facility is regulated by the Arizona Department of Environmental Quality (ADEQ) and currently operates pursuant to the requirements of ADEQ Class I Air Quality Permit 69780.

ADEQ Class I Permit 69780 was issued on July 18, 2018 and will expire on July 17, 2023. Pursuant to Attachment "A", Condition I.B of ADEQ Class I Permit 69780 and Arizona Administrative Code (A.A.C.) R18-2-304.C.2, a "timely" renewal application for the permit must be submitted to the ADEQ at least 6 months, but not more than 18 months prior to the date of permit expiration. Therefore, the permit renewal application must be submitted to ADEQ before January 17, 2023. This permit renewal application is being submitted to meet the requirement set forth by A.A.C. R-18-2-304.C.2. With this permit renewal application, PCC is proposing to incorporate historic updates/other permit actions (provided in Appendix C) at the Clarkdale Facility since the 2018 permit issuance.

The Clarkdale Facility is an existing major source under the Prevention of Significant Deterioration (PSD) and Title V programs. However, there are no physical changes or changes in method of operation being proposed as part of this permit action. Therefore, this permit action will not trigger a PSD or New Source Review (NSR) for any pollutants, and a control technology evaluation, or ambient impacts review, is not needed as part of this renewal effort. Note that the Operation and Maintenance Plan (O&MP Plan) is provided in Appendix A.

In accordance with A.A.C. R18-2-304.B [*Standard Application Form and Required Information*], the enclosed application materials provide the ADEQ standard permit application form and the information requested in the "Application Packet for a Class I Permit" prepared by the ADEQ Air Quality Division.

2. ADEQ CLASS I APPLICATION FORM

Pursuant to A.A.C R18-2-304.B, to apply for any permit required by A.A.C. Title 18, Chapter 2, applicants must complete the applicable standard application form provided by the ADEQ and supply all information required by the form's filing instructions. This section includes a completed ADEQ Standard Permit Application Form and an administrative completeness checklist identifying the location of the information required by the associated filing instructions.

SECTION 2.1

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division

1110 West Washington • Phoenix, AZ 85007 • Phone: (602) 771-2338

STANDARD CLASS I PERMIT APPLICATION FORM

(As required by A.R.S. § 49-426, and Chapter 2, Article 3, Arizona Administrative Code)

1. Permit to be issued to (Business license name of organization that is to receive permit):
   Phoenix Cement Company

2. Mailing Address: P.O. Box 428
   City: Clarkdale State: Arizona ZIP: 86324

3. Name (or names) of Owners/ Principals: Phoenix Cement Company (division of Salt River-Maricopa Indian Community)
   Phone: (480) 850-8000 Fax: (480) 850-8014 Email: None

4. Name of **Owner's** Agent: Brett Lindsay
   Phone: (928) 639-8062 Fax: (928) 634-3543 Email: BLindsay@srmaterials.com

5. Plant/Site Manager/ Contact Person and Title: Gregg St. Clair, Vice President Cement Operations
   Phone: (928) 634-2261 Fax: (928) 634-3543 Email: None

6. Plant Site Name: Phoenix Cement Company's Clarkdale Facility

7. Plant Site Location Address: 601 N Cement Plant Road
   City: Clarkdale County: Yavapai Zip Code: 86324
   Indian Reservation (if applicable, which one): N/A
   Latitude/ Longitude, Elevation: 34° 46' N, 112° W, 3,800 ft elevation
   Section/ Township/ Range: _____

8. General Nature of Business: Portland Cement Manufacturing

9. Type of Organization:
   ☐ Corporation ☐ Individual Owner ☐ Partnership ☐ Government Entity (Government Facility Code----------)
   ☒ Other A Division of Salt River Pima-Maricopa Indian Community

8. Permit Application Basis: ☐ New Source ☐ Revision ☒ Renewal of Existing Permit
   (Check all that apply.)
   For renewal or modification, include existing permit number (and exp. date): Permit 69780 (Expires July 17, 2023)
   Date of Commencement of Construction or Modification: _____
   Primary Standard Industrial Classification Code: 3241

9. I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by ADEQ as public record. I also attest that I am in compliance with the applicable requirements of the Permit and will continue to comply with such requirements and any future requirements that become effective during the life of the Permit. I will present a certification of compliance to ADEQ no less than annually and more frequently if specified by ADEQ. I further state that I will assume responsibility for the construction, modification,

or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: _____

Official Title of Signer: Vice President Cement Operations

Typed or Printed Name of Signer: Gregg St. Clair

Date: 1/3/23 Telephone Number: (928) 634-2261

SECTION 2.2 - EMISSION SOURCES

PAGE_____OF_____
DATE _____

Estimated "Potential to Emit" per A.A.C. R18-2-101.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS									
EMISSION POINT [1]		CHEMICAL COMPOSITION OF TOTAL STREAM	AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT [5]			STACK SOURCES [6]					NONPOINT	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME [2]	#/ HR. [3]	TONS/ YEAR [4]	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA			SOURCES [7]	
										DIA (ft.)	VEL. (fps)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
	No changes in emissions from previous permit renewal application with the exception of the changes contained in Appendix C.													

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL_____feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

****Submit emission calculations spreadsheet with your application****

General Instructions:

1. Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

2. Components to be listed include regulated air pollutants as defined in A.A.C. R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.

3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

7. Dimensions of nonpoint sources as defined in A.A.C. R18-2-101.

SECTION 2.3 - EQUIPMENT LIST

The following table should include all equipment utilized at the facility, and should be completed with all the requested information. Be sure to notate the units (tons/hour, horsepower, etc.) when recording the Maximum Rated Capacity information, the Serial Number and/or the Equipment ID Number. The date of manufacture must be included in order to determine if portions of the facility are NSPS applicable. Make additional copies of this form if necessary.

Submit photographs of the faceplates for all engines listed below. If an engine is certified, please also include a copy of the engine certification with the application. For any newly added equipment, include a copy of the specification sheet. These documents will be used to verify equipment information and determine applicable regulations.

Type of Equipment	Maximum Rated Capacity [1]	Make	Model	Serial Number	Date of Manufacture	Equipment ID Number
Please see Appendix B of this application						

[1] For generator sets, enter the maximum rated capacity of the engine rather than the maximum rated capacity of the generator.

SECTION 4.0 - APPLICATION ADMINISTRATIVE COMPLETENESS CHECKLIST

	REQUIREMENT	MEETS REQUIREMENTS			COMMENT
		YES	NO	N/A	
1	Has the standard application form been completed?	X			
2	Has the responsible official signed the standard application form?	X			
3	Has a process description been provided?	X			
4	Are the **facility's** emissions documented with all appropriate supporting information?	X			
5	Is the facility subject to Minor NSR requirements? **If the answer is "YES", answer** 6a, 6b and 6c as applicable. If the answer is **"NO", skip** to 7.			X	
6.a	If the facility chooses to implement RACT, is the RACT determination included for the affected pollutants for all affected emission units?			X	
6.b	If the facility chooses to demonstrate compliance with NAAQS by screen modeling, is the modeling analysis included?			X	
6.c	If refined modeling has been conducted, is a comprehensive modeling report along with all modeling files included?			X	
7	Does the application include an equipment list with the type, name, make, model, serial number, maximum rated capacity, and date of manufacture?	X			
8	Does the application include an identification and description of Pollution Controls? (if applicable)	X			
9	For any application component claimed as confidential, are the requirements of AR.S. 49-432 and A.A.C. R18-2-305 addressed?			X	
10	For any current non-compliance issue, is a compliance schedule attached?			X	
11	For minor permit revision that will make a modification upon submittal of application, has a suggested draft permit been attached?			X	
12	For major sources, have all applicable requirements been identified?			X	
13	For major sources, has a CAM applicability analysis been provided? For CAM applicable units, have CAM plans been provided?			X	
14	For major sources subject to requirements under Article 4 of the A.A.C., have all necessary New Source Review analyses identified in the application been presented?			X	

3. APPLICATION ADMINISTRATIVE COMPLETENESS

Table 3-1 provides a list of the permit application items required by Section 2.4 of ADEQ's Application Packet for a Class I Permit along with a reference to where the information is located in this application.

Table 3-1. Application Completeness Summary

Section 2.4 of Class I Application Packet[1]	Information Required	Permit Application Section
1,2	Process/Product Description including Standard Industrial Classification (SIC) code	Section 4
3,4	Description of Alternate Operating Scenarios	N/A[a]
5	Process Flow Diagram	Section 5
6	Material Balance Calculations	N/A[b]
7	Emission Calculations	Section 6
8	Applicable Requirements	Section 9
9	Proposed Exemptions from Applicable Requirements	N/A[c]
10(a)-(f), (h)	Annual and Hourly Process Rates, Fuel Usage, Raw Material Information	N/A[d]
10(g)	Operating Schedule	Section 4
11	Equipment and Control Device List	Appendix B
12	Stack Information	N/A[e]
13	Site Diagram	Section 5
14	Air Pollution Control Information	Section 8
15	Acceptable Documentation for Equipment	Appendix D
16	Compliance Plan	Section 11
17	Compliance Certification	Section 11
18	Acid Rain Information	N/A[f]
19	Major Source Requirements – BACT and Ambient Impact Analysis	N/A[g]
20	Emission Calculations	N/A[h]

a. PCC is not submitting any alternate operating scenarios with this application.
b. PCC did not base any emission calculations on a material balance.
c. PCC is not proposing to be exempt from any otherwise applicable requirements.

[1] https://static.azdeq.gov/forms/classI_app.pdf

d. There have been no changes to annual and hourly process rates, fuel usage, and raw material information in this application.
e. PCC is not proposing any changes to the facility-wide stack information.
f. Acid rain information is required only for facilities subject to federal acid rain regulations. PCC is not subject to acid rain regulations.
g. The Clarkdale Facility is not triggering any BACT and Ambient Impact Analysis with this application.
h. PCC is not proposing any emission changes with this application.

4. PROCESS DESCRIPTION

At the Clarkdale Facility (SIC code 3241), cement is produced from various types of rock, including limestone, volcanic ash, and mill scale. First, limestone and other types of rock are blasted and transported by haul trucks from the quarry to the primary crusher or to stockpiles. Crushed rock is routed to surge piles for subsequent transfer to the secondary crusher. The secondary crusher is used in conjunction with feeders and screens to further reduce the size of the rock before it is sent to the raw mill storage bays.

The crushed rock is conveyed from the storage bays and sweetener bins to the raw mill for grinding via the rock bin, elevator, and separator. Meal-size material from the raw mill is transported to the blending system which is composed of one CF (Continuous Flow) blend silo, two standard blending silos and one homogenizing silo. The in-line raw mill applies residual heat from the preheater flue whereas the existing raw ball mills each have a dryer that supplies heated air. From the blending system, the meal is pumped via the alleviator into a feed bin from which the meal is discharged into the preheat tower and kiln system.

The heart of the Portland cement manufacturing process is the pyroprocessing system, a cement kiln. The PCC Clarkdale Facility utilized a state-of-the-art rotary kiln (Kiln 4) equipped with a five-stage, suspension preheater and in-line calciner. This system transforms the raw mix into clinker, which is a gray, glass-hard, spherically shaped nodule. The chemical reactions and physical processes that constitute the transformation are complex, but they can be conceptually divided into four stages, as a function of the location and temperature in the rotary kiln, as follows:

- Evaporation of uncombined water from raw materials as material temperature increases to 212 °F;
- Dehydration, as the material temperature increases from 212 °F to approximately 800 °F to form oxides of silicon, aluminum, and iron;
- Calcination, during which carbon dioxide (CO2) is evolved, between 1,650 °F and 1,800 °F to form free lime (CaO); and
- Reaction of the oxides in the burning zone of the rotary kiln to form cement clinker at temperatures of approximately 2,750 °F.

The indirect-fired kiln burns a blend of coal and pet-coke. Coal and pet-coke are stored in separate piles from which each is conveyed into a shared crusher for crushing. The crushed coal or coke is sent to either coal bin or pet-coke bin that feeds a coal roller mill in certain blend ratio. The milled fuel blend is then sent to one of the two pulverized fuel bins for storage before being air-conveyed into the in-line calciner and the burning zone of the kiln.

Clinker discharges from the kiln into a clinker cooler. Clinker is removed from the clinker cooler by moveable crossbars onto a pan conveyor which discharges onto a belt conveyor that transports it to two clinker storage domes. During the final stage of Portland cement production, the clinker is ground with other materials in the finish mill into a fine powder. The finished Portland cement products are either bagged for transportation or sold in bulk.

4.1 Changes since 2018 Renewal

Since the July 2018 permit revision, there have been four changes that fall under A.A.C. §R18-2-317 [*Facility Changes Allowed Without Permit Revision*]. Two of the changes are related to equipment replacement that retain the same equipment numbers, namely a dust collector (DC-308) and a vibratory screen (VS-101). The other changes are the installation of a diverter gate (DG-462) between two conveyor belts (BC-462 and BC-

451) and the addition of a dust collector (PDC-502) to control particulate emissions from the recycled cement pneumatic pump (PN-502), which was previously vented to DC-504. Please refer to **Appendix C** for documentation of the updates stated above.

4.2 Administrative Changes Requested

PCC is proposing to install a 120 eKW natural-gas fired Caterpillar emergency generator (EG-800) to provide backup power for the Admin Building at the Facility. Per A.A.C. R18-2-101.68.b, this equipment qualifies as an insignificant activity, thus emissions evaluation for this equipment is not required. **Section 9** of this application expands on the regulatory applicability associated with this equipment. The equipment specification sheet is included in **Appendix D** of this application.

Additionally, PCC is requesting the removal of "Clinker Cooler Stack S-402" from Permit Condition Attachment B III.F.1.a. The permit language that included Clinker Cooler Stack S-402 in the requirement for continuous stack gas flow monitoring was based on an old version of 40 CFR 63.1350 that was later changed to clarify that a Continuous Parametric Monitoring System (CPMS) would be used to demonstrate compliance with the PM limit. The Clinker Cooler Stack S-402 is monitored by a PM CPMS and not required to be monitored by a Continuous Emissions Monitoring System (CEMS). Therefore, it is not subject to 40 CFR 63.1350(n).The redlined Page 45 of current Permit #69780 is attached as a part of **Appendix E** of this application.

5. SITE & PROCESS FLOW DIAGRAMS

The only physical changes to the Clarkdale Facility since the last renewal are equipment replacements that retain the same equipment numbers.

- Dust collector (DC-308) and;
- Vibratory screen (VS-101).

The other physical changes are the installation of the following diverter gate and dust collector:

- Diverter gate (DG-462), installed between conveyor belts (BC-462 and BC-451).
- Dust collector (PDC-502), installed to control recycled cement pneumatic pump (PN-502) particulate emissions, which was previously routed to DC-504.

The process flow diagrams (PFDs) showing the process at the Clarkdale Facility and site diagrams are contained in this section. **Figure 5-1** contains an overall site diagram for the Clarkdale Facility. **Figure 5-2** shows a close-up version of the facility. **Figure 5-3** contains multiple PFDs for the facility, including the changes noted above.

Figure 5-1. PCC - Clarkdale - Overall Site Diagram

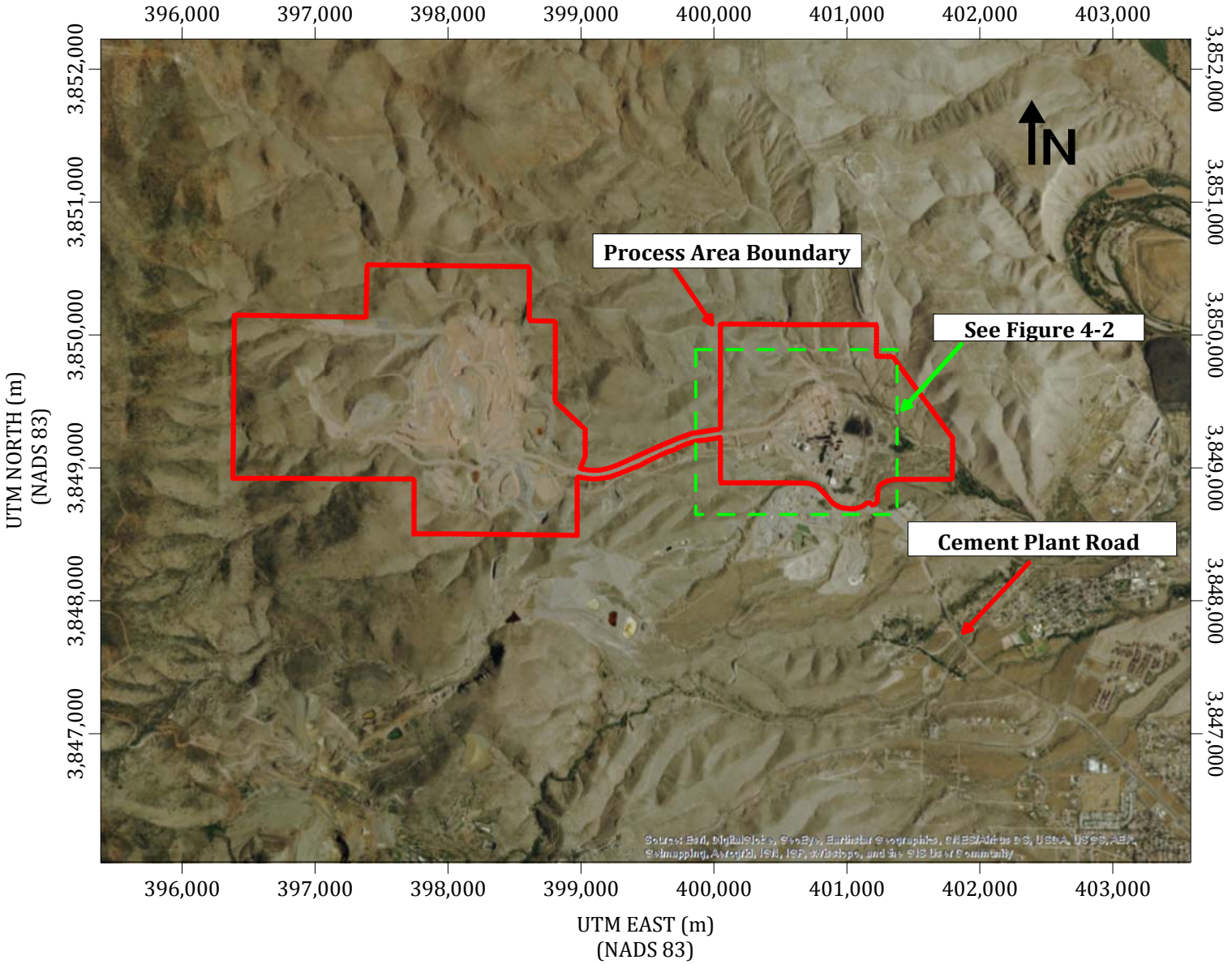


Figure 5-2. PCC - Clarkdale - Facility Zoom-In

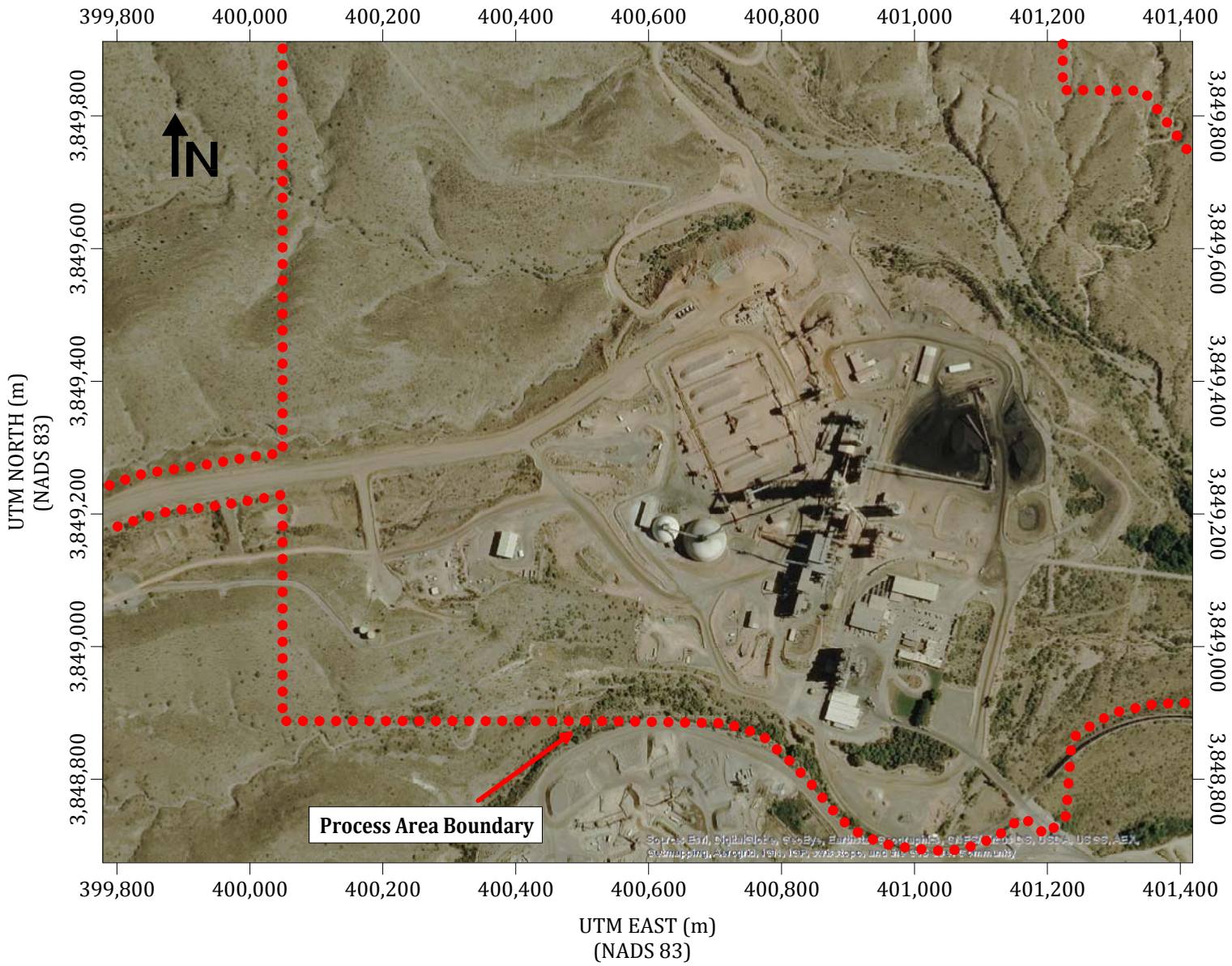
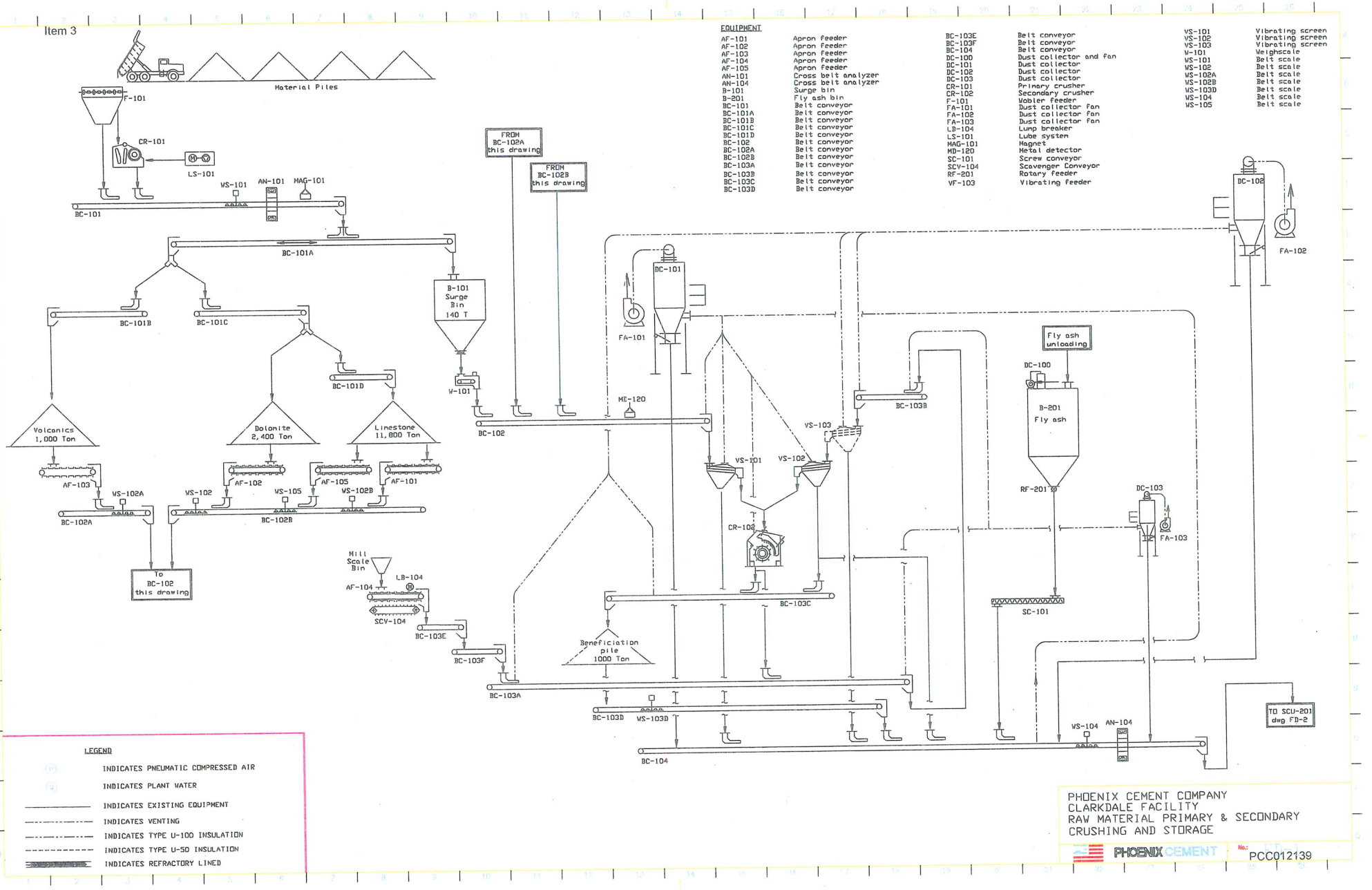


Figure 5-2. PCC - Clarkdale - Process Flow Diagram



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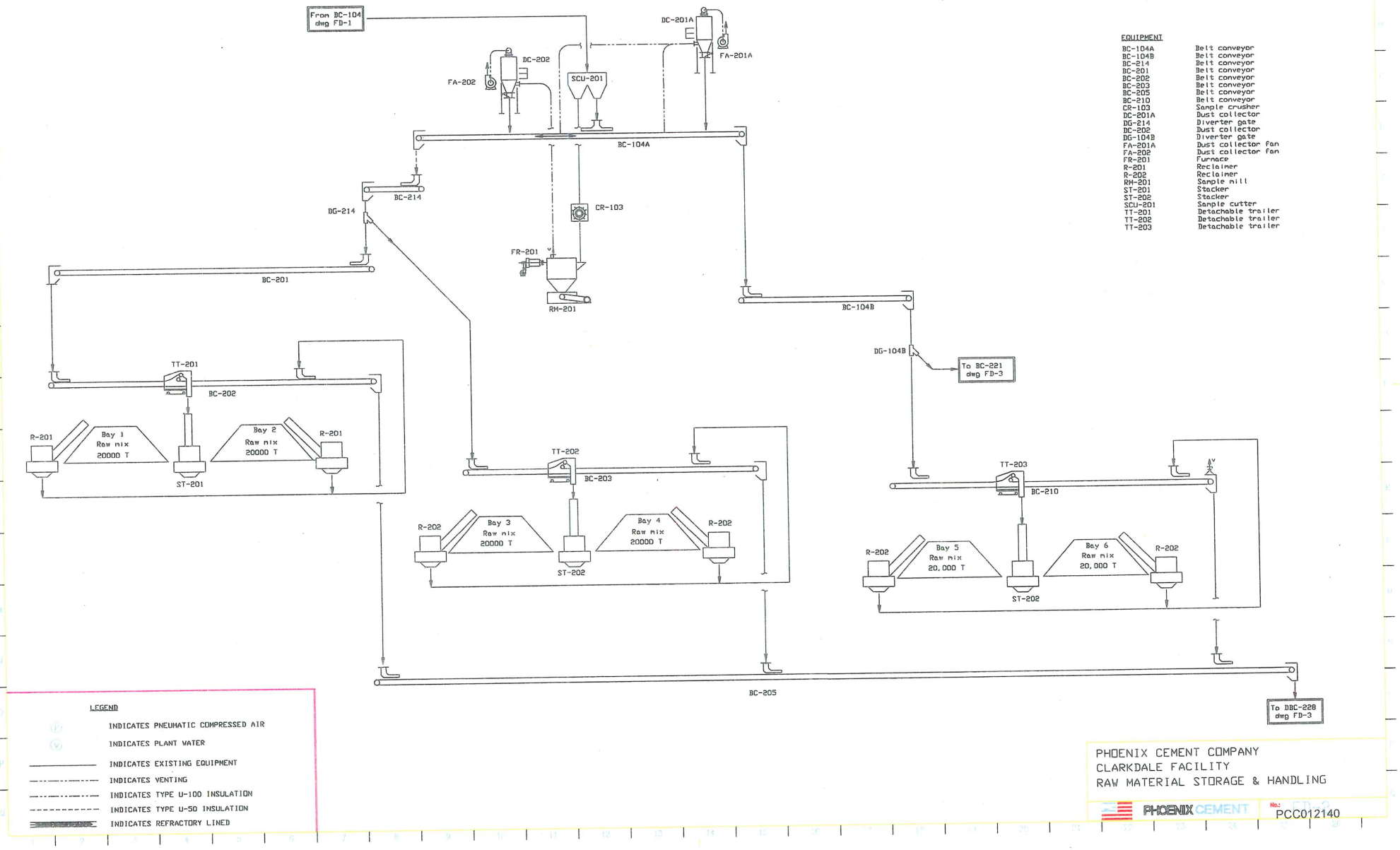
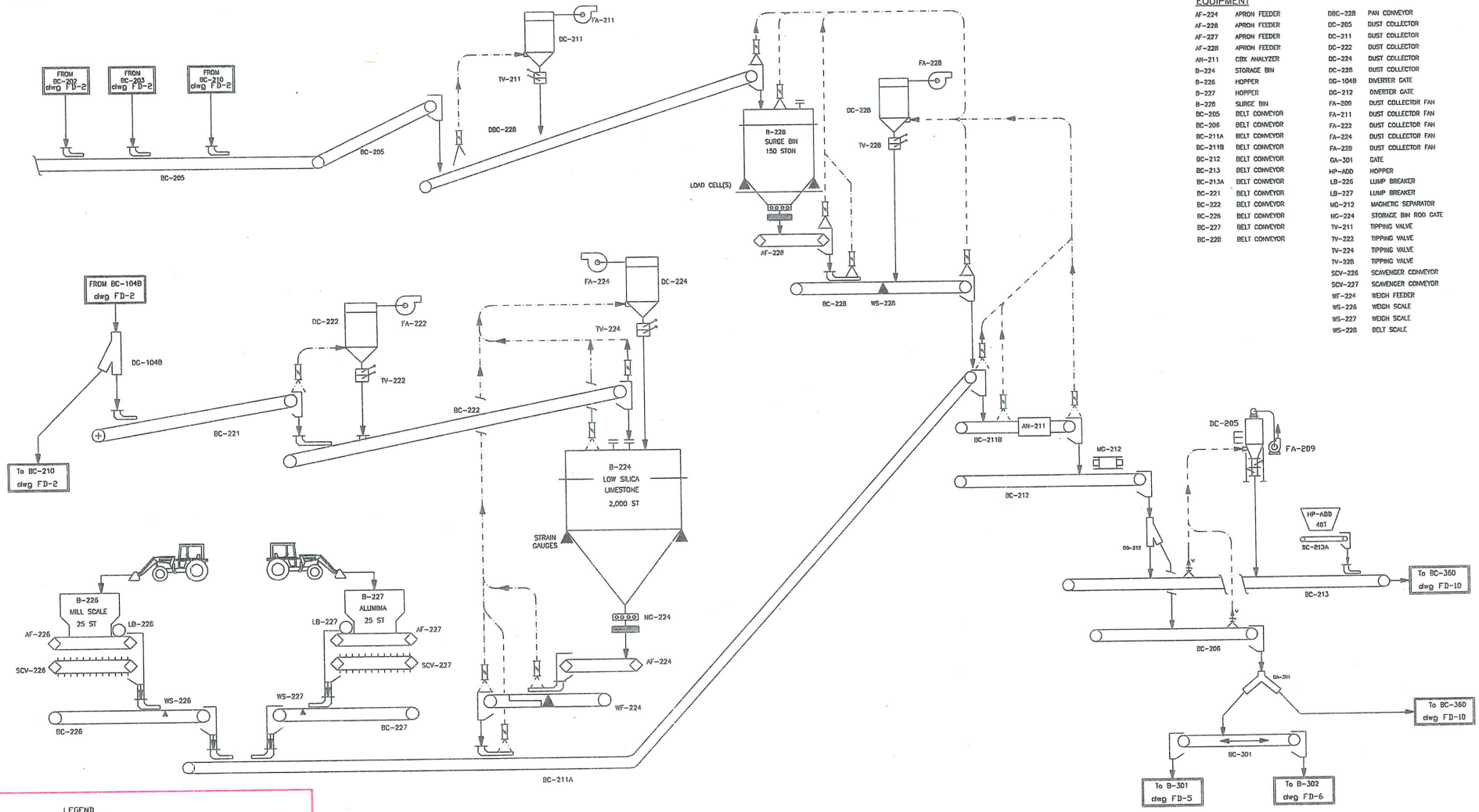
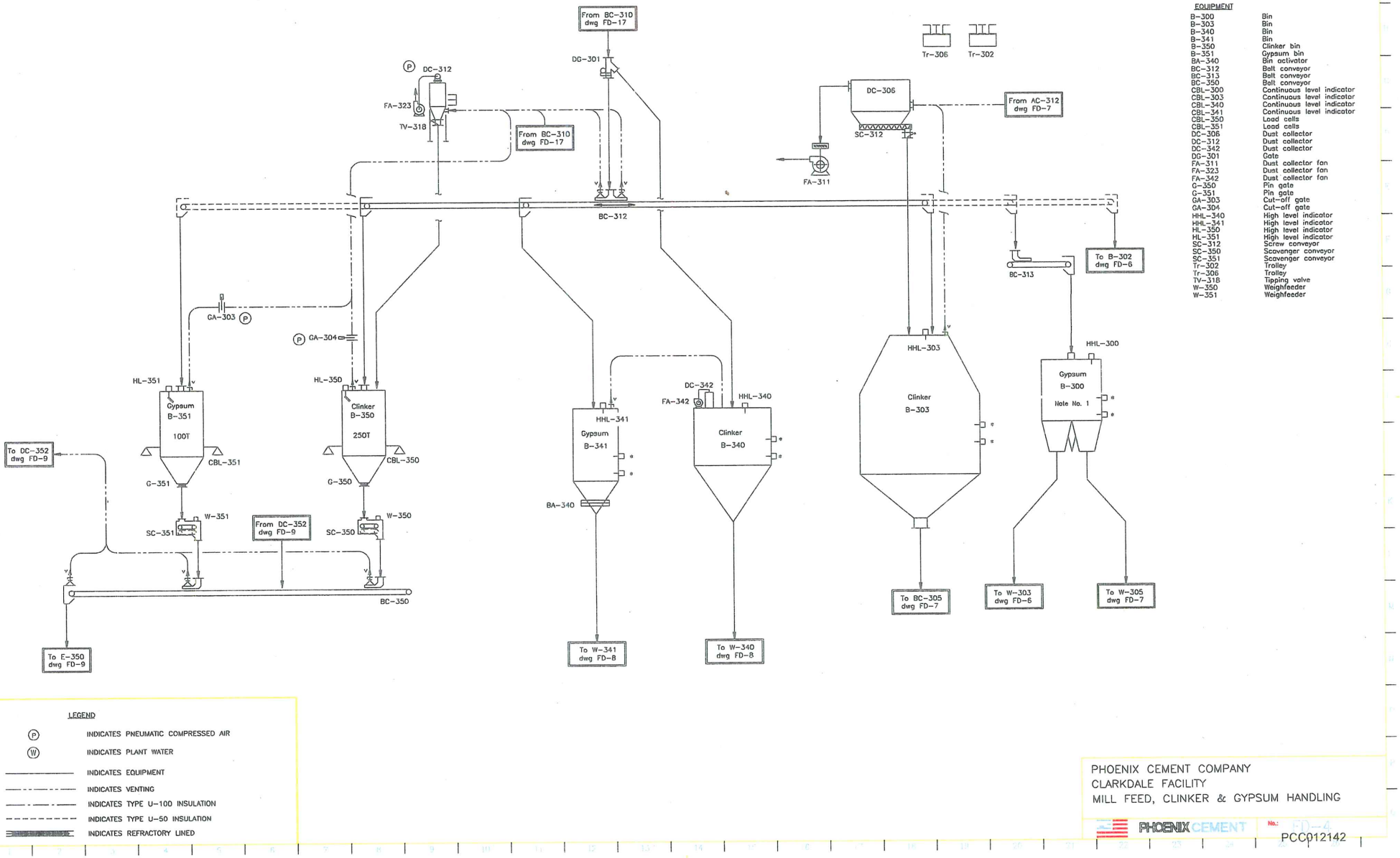
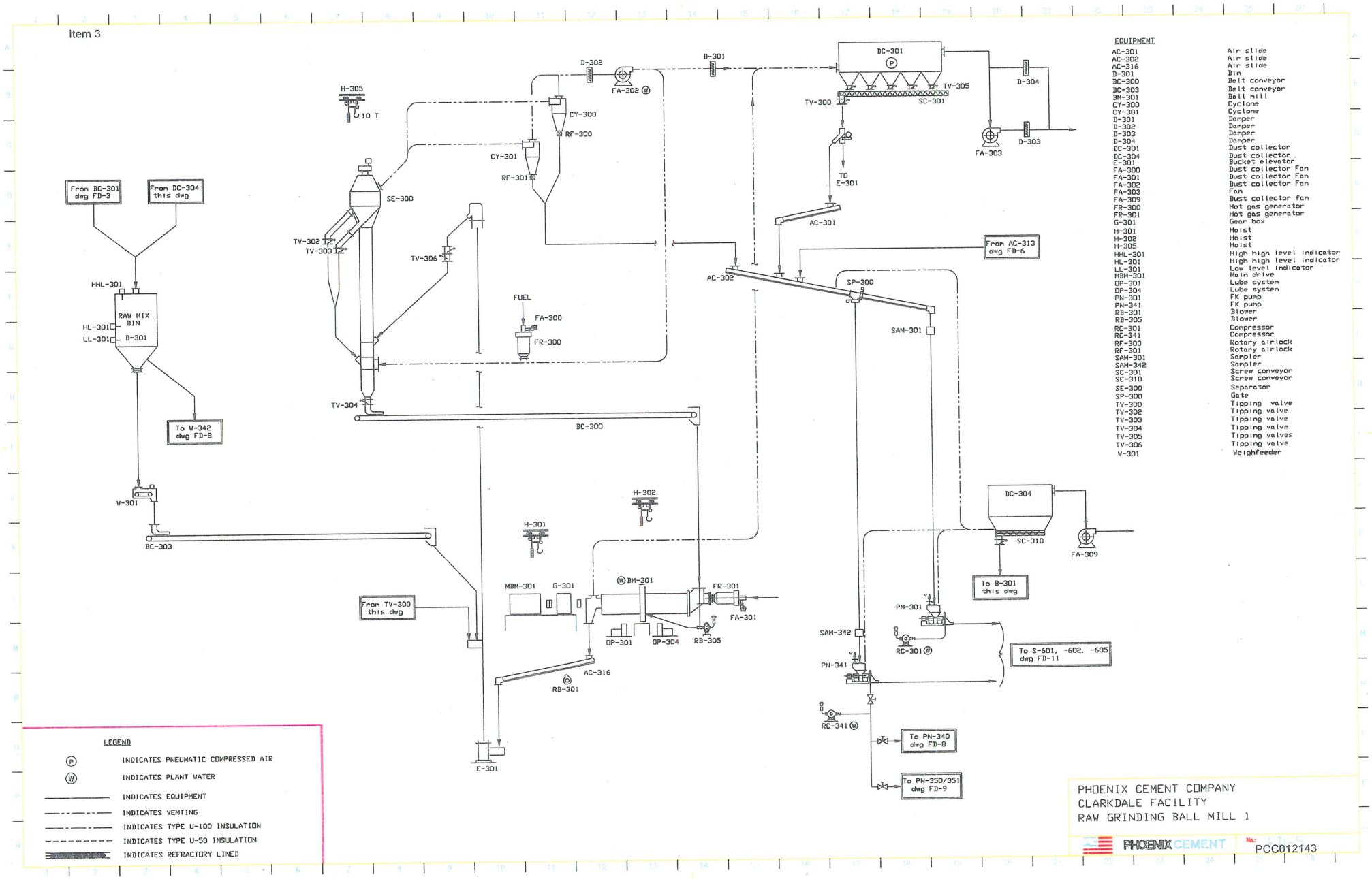

From BC-104 dwg FD-1
DC-201A
FA-201A
DC-202
FA-202
SCU-201
BC-104A
BC-214
DG-214
CR-103
FR-201
RM-201
BC-201
BC-104B
DG-104B
To BC-221 dwg FD-3
TT-201
BC-202
R-201
Bay 1 Raw mix 20000 T
Bay 2 Raw mix 20000 T
R-201
ST-201
TT-202
BC-203
R-202
Bay 3 Raw mix 20000 T
Bay 4 Raw mix 20000 T
R-202
ST-202
TT-203
BC-210
R-202
Bay 5 Raw mix 20,000 T
Bay 6 Raw mix 20,000 T
R-202
ST-202
BC-205
To DBC-228 dwg FD-3
EQUIPMENT
BC-104A Belt conveyor
BC-104B Belt conveyor
BC-214 Belt conveyor
BC-201 Belt conveyor
BC-202 Belt conveyor
BC-203 Belt conveyor
BC-205 Belt conveyor
BC-210 Belt conveyor
CR-103 Sample crusher
DC-201A Dust collector
DG-214 Diverter gate
DC-202 Dust collector
DG-104B Diverter gate
FA-201A Dust collector fan
FA-202 Dust collector fan
FR-201 Furnace
R-201 Reclaimer
R-202 Reclaimer
RM-201 Sample mill
ST-201 Stacker
ST-202 Stacker
SCU-201 Sample cutter
TT-201 Detachable trailer
TT-202 Detachable trailer
TT-203 Detachable trailer
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EXISTING EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
RAW MATERIAL STORAGE & HANDLING
PHOENIX CEMENT
No.: PCC012140

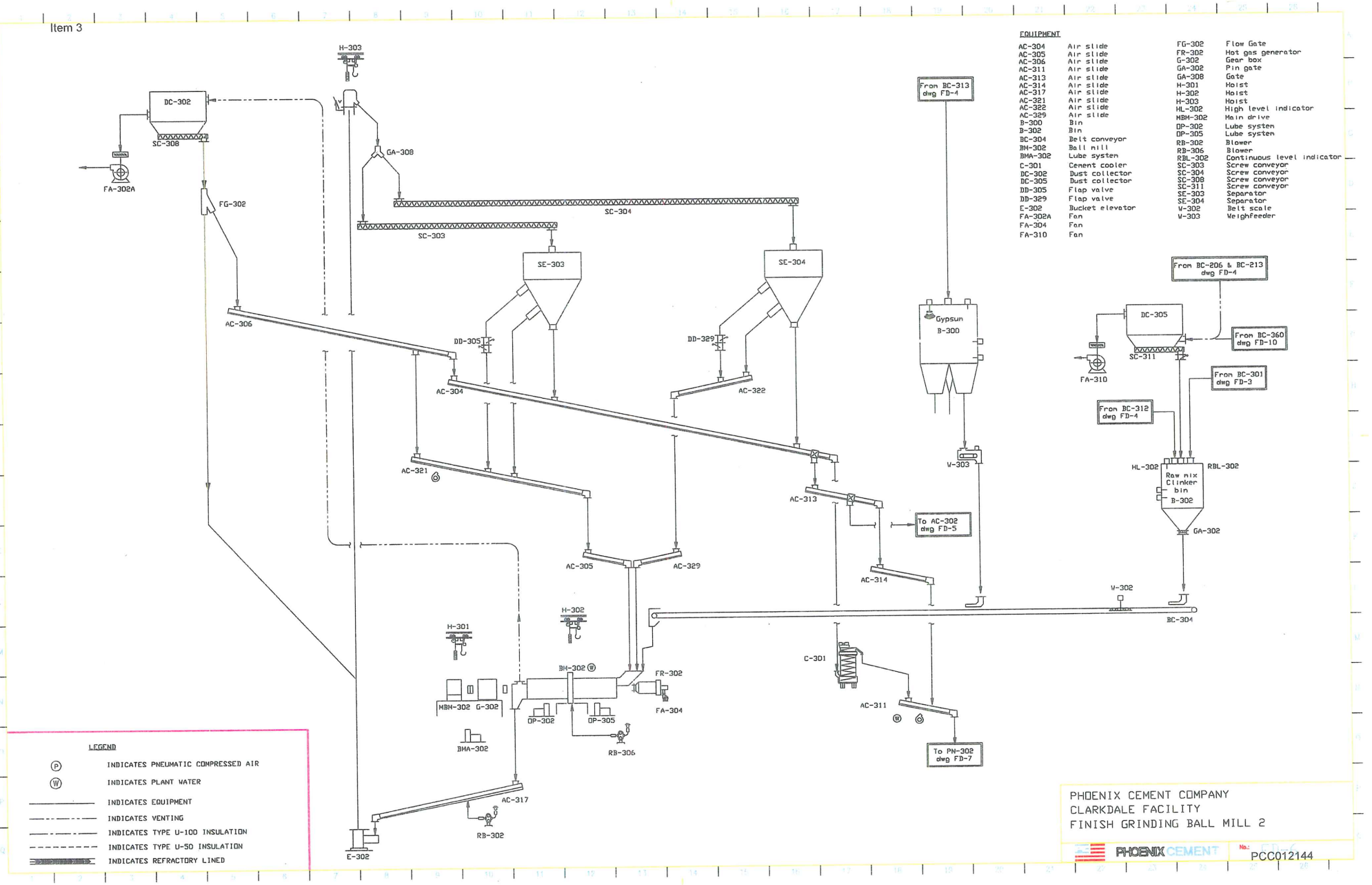
Item 3


EQUIPMENT
AF-224 APRON FEEDER
AF-226 APRON FEEDER
AF-227 APRON FEEDER
AF-228 APRON FEEDER
AN-211 CBX ANALYZER
B-224 STORAGE BIN
B-226 HOPPER
B-227 HOPPER
B-228 SURGE BIN
BC-205 BELT CONVEYOR
BC-206 BELT CONVEYOR
BC-211A BELT CONVEYOR
BC-211B BELT CONVEYOR
BC-212 BELT CONVEYOR
BC-213 BELT CONVEYOR
BC-213A BELT CONVEYOR
BC-221 BELT CONVEYOR
BC-222 BELT CONVEYOR
BC-226 BELT CONVEYOR
BC-227 BELT CONVEYOR
BC-228 BELT CONVEYOR
DBC-228 PAN CONVEYOR
DC-205 DUST COLLECTOR
DC-211 DUST COLLECTOR
DC-222 DUST COLLECTOR
DC-224 DUST COLLECTOR
DC-228 DUST COLLECTOR
DG-104B DIVERTER GATE
DG-212 DIVERTER GATE
FA-209 DUST COLLECTOR FAN
FA-211 DUST COLLECTOR FAN
FA-222 DUST COLLECTOR FAN
FA-224 DUST COLLECTOR FAN
FA-228 DUST COLLECTOR FAN
GA-301 GATE
HP-ADD HOPPER
LB-226 LUMP BREAKER
LB-227 LUMP BREAKER
MG-212 MAGNETIC SEPARATOR
NG-224 STORAGE BIN ROD GATE
TV-211 TIPPING VALVE
TV-222 TIPPING VALVE
TV-224 TIPPING VALVE
TV-228 TIPPING VALVE
SCV-226 SCAVENGER CONVEYOR
SCV-227 SCAVENGER CONVEYOR
WF-224 WEIGH FEEDER
WS-226 WEIGH SCALE
WS-227 WEIGH SCALE
WS-228 BELT SCALE
FROM BC-202 dwg FD-2
FROM BC-203 dwg FD-2
FROM BC-210 dwg FD-2
FROM BC-104B dwg FD-2
To BC-210 dwg FD-2
To BC-360 dwg FD-10
To B-301 dwg FD-5
To B-302 dwg FD-6
B-228 SURGE BIN 150 STON
B-224 LOW SILICA LIMESTONE 2,000 ST
B-226 MILL SCALE 25 ST
B-227 ALUMINA 25 ST
STRAIN GAUGES
LOAD CELL(S)
HP-ADD 40T
BC-205
BC-221
BC-222
BC-226
BC-227
BC-228
BC-211A
BC-211B
BC-212
BC-213
BC-213A
BC-206
BC-301
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
SWEETENING
PHOENIX CEMENT
No.: PCC012141

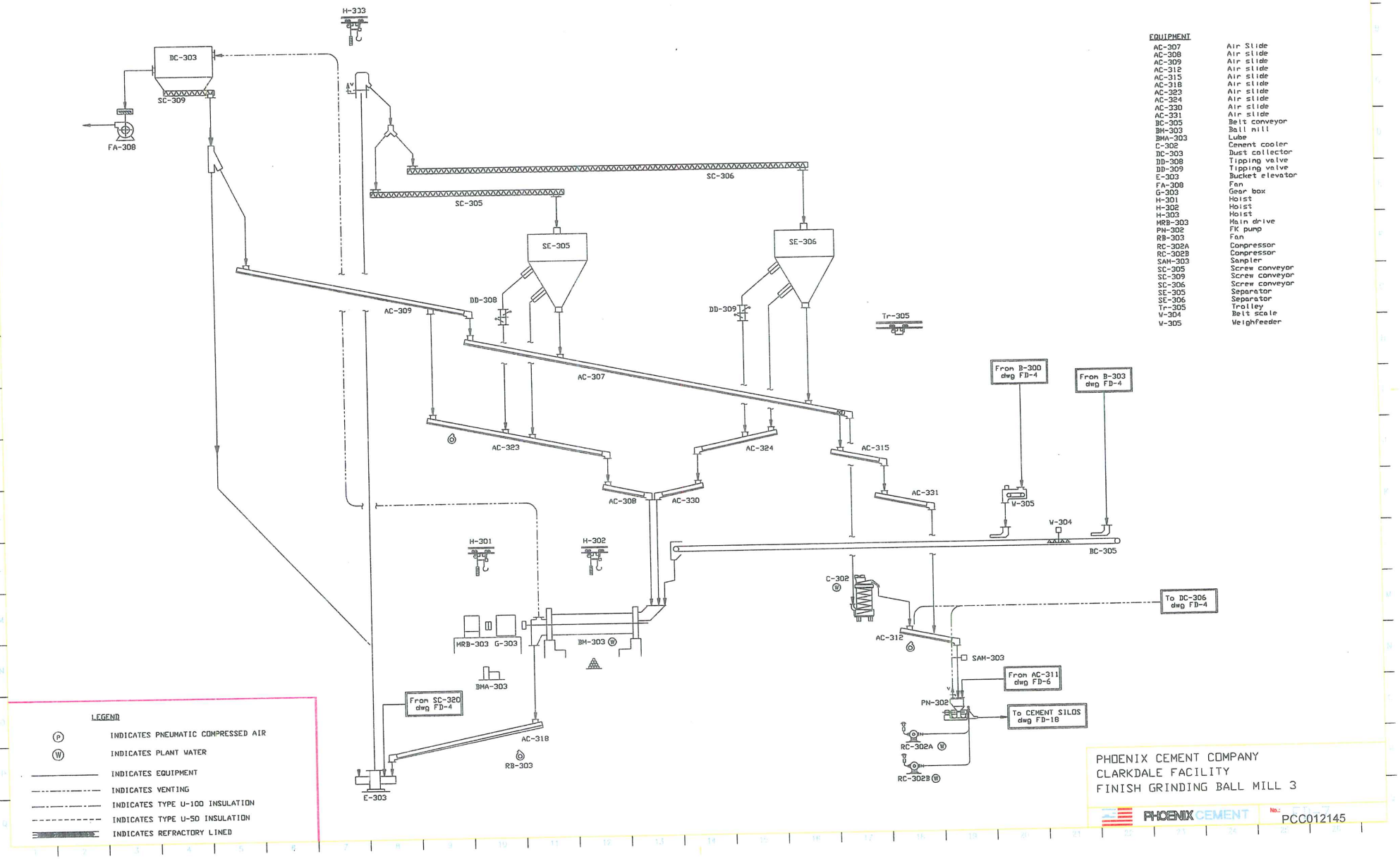
Item 3


From BC-310 dwg FD-17
DG-301
DC-312
FA-323
TV-318
From BC-310 dwg FD-17
Tr-306
Tr-302
DC-306
From AC-312 dwg FD-7
SC-312
FA-311
BC-312
BC-313
To B-302 dwg FD-6
GA-303
GA-304
HL-351
Gypsum B-351
100T
CBL-351
G-351
W-351
SC-351
HL-350
Clinker B-350
250T
CBL-350
G-350
W-350
SC-350
To DC-352 dwg FD-9
From DC-352 dwg FD-9
BC-350
To E-350 dwg FD-9
HHL-341
Gypsum B-341
BA-340
To W-341 dwg FD-8
DC-342
FA-342
HHL-340
Clinker B-340
To W-340 dwg FD-8
HHL-303
Clinker B-303
To BC-305 dwg FD-7
HHL-300
Gypsum B-300
Note No. 1
To W-303 dwg FD-6
To W-305 dwg FD-7
EQUIPMENT
B-300 Bin
B-303 Bin
B-340 Bin
B-341 Bin
B-350 Clinker bin
B-351 Gypsum bin
BA-340 Bin activator
BC-312 Belt conveyor
BC-313 Belt conveyor
BC-350 Belt conveyor
CBL-300 Continuous level indicator
CBL-303 Continuous level indicator
CBL-340 Continuous level indicator
CBL-341 Continuous level indicator
CBL-350 Load cells
CBL-351 Load cells
DC-306 Dust collector
DC-312 Dust collector
DC-342 Dust collector
DG-301 Gate
FA-311 Dust collector fan
FA-323 Dust collector fan
FA-342 Dust collector fan
G-350 Pin gate
G-351 Pin gate
GA-303 Cut-off gate
GA-304 Cut-off gate
HHL-340 High level indicator
HHL-341 High level indicator
HL-350 High level indicator
HL-351 High level indicator
SC-312 Screw conveyor
SC-350 Scavenger conveyor
SC-351 Scavenger conveyor
Tr-302 Trolley
Tr-306 Trolley
TV-318 Tipping valve
W-350 Weighfeeder
W-351 Weighfeeder
LEGEND
(P) INDICATES PNEUMATIC COMPRESSED AIR
(W) INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
MILL FEED, CLINKER & GYPSUM HANDLING
PHOENIX CEMENT
No.: FD-4
PCC012142

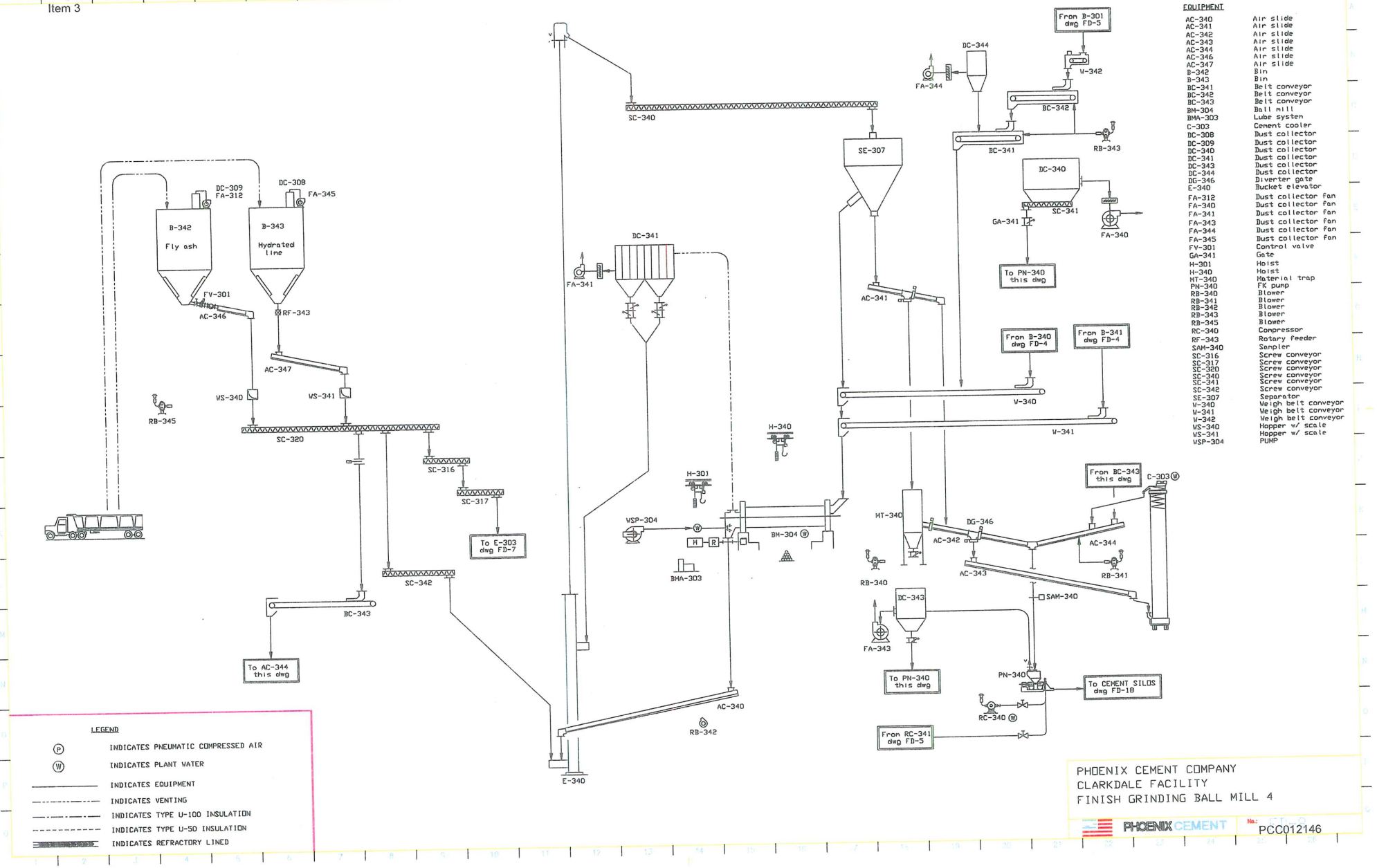

Item 3
EQUIPMENT
AC-301 Air slide
AC-302 Air slide
AC-316 Air slide
B-301 Bin
BC-300 Belt conveyor
BC-303 Belt conveyor
BM-301 Ball mill
CY-300 Cyclone
CY-301 Cyclone
D-301 Damper
D-302 Damper
D-303 Damper
D-304 Damper
DC-301 Dust collector
DC-304 Dust collector
E-301 Bucket elevator
FA-300 Dust collector Fan
FA-301 Dust collector Fan
FA-302 Dust collector Fan
FA-303 Fan
FA-309 Dust collector fan
FR-300 Hot gas generator
FR-301 Hot gas generator
G-301 Gear box
H-301 Hoist
H-302 Hoist
H-305 Hoist
HHL-301 High high level indicator
HL-301 High high level indicator
LL-301 Low level indicator
MBM-301 Main drive
OP-301 Lube system
OP-304 Lube system
PN-301 FK pump
PN-341 FK pump
RB-301 Blower
RB-305 Blower
RC-301 Compressor
RC-341 Compressor
RF-300 Rotary airlock
RF-301 Rotary airlock
SAM-301 Sampler
SAM-342 Sampler
SC-301 Screw conveyor
SC-310 Screw conveyor
SE-300 Separator
SP-300 Gate
TV-300 Tipping valve
TV-302 Tipping valve
TV-303 Tipping valve
TV-304 Tipping valve
TV-305 Tipping valves
TV-306 Tipping valve
W-301 WeighFeeder
From BC-301 dwg FD-3
From DC-304 this dwg
HHL-301
RAW MIX BIN
HL-301
LL-301
B-301
To W-342 dwg FD-8
W-301
BC-303
H-305
10 T
D-302
FA-302
CY-300
RF-300
CY-301
RF-301
SE-300
TV-302
TV-303
TV-306
FUEL
FA-300
FR-300
TV-304
BC-300
D-301
DC-301
TV-300
TV-305
SC-301
D-304
FA-303
D-303
TD
E-301
AC-301
From AC-313 dwg FD-6
AC-302
SP-300
SAM-301
H-302
H-301
MBM-301
G-301
BM-301
FR-301
FA-301
OP-301
OP-304
RB-305
From TV-300 this dwg
AC-316
RB-301
E-301
DC-304
SC-310
FA-309
To B-301 this dwg
PN-301
SAM-342
RC-301
To S-601, -602, -605 dwg FD-11
PN-341
RC-341
To PN-340 dwg FD-8
To PN-350/351 dwg FD-9
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
RAW GRINDING BALL MILL 1
PHOENIX CEMENT
No: PCC012143

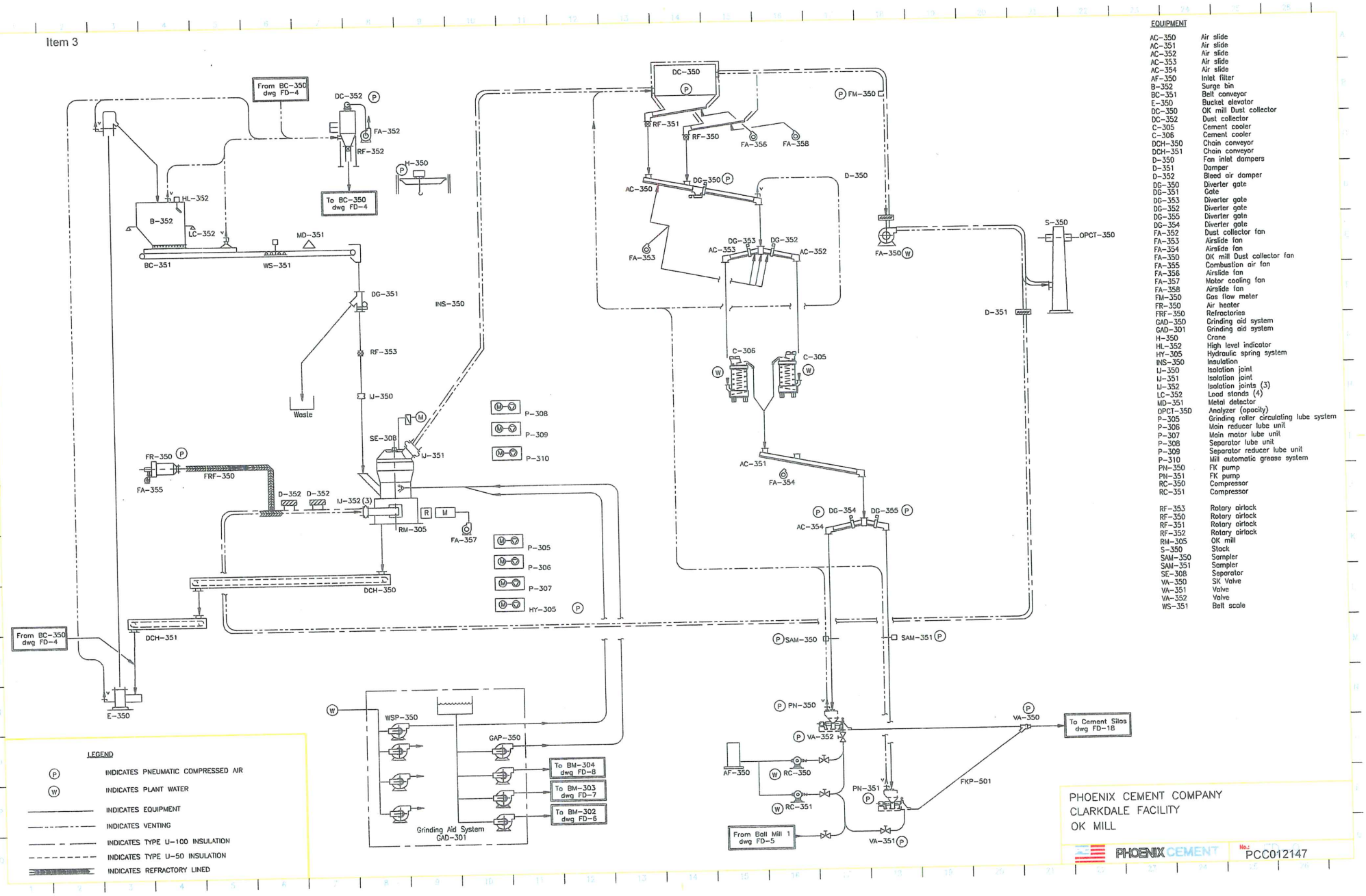

Item 3
EQUIPMENT
AC-304 Air slide
AC-305 Air slide
AC-306 Air slide
AC-311 Air slide
AC-313 Air slide
AC-314 Air slide
AC-317 Air slide
AC-321 Air slide
AC-322 Air slide
AC-329 Air slide
B-300 Bin
B-302 Bin
BC-304 Belt conveyor
BM-302 Ball mill
BMA-302 Lube system
C-301 Cement cooler
DC-302 Dust collector
DC-305 Dust collector
DD-305 Flap valve
DD-329 Flap valve
E-302 Bucket elevator
FA-302A Fan
FA-304 Fan
FA-310 Fan
FG-302 Flow Gate
FR-302 Hot gas generator
G-302 Gear box
GA-302 Pin gate
GA-308 Gate
H-301 Hoist
H-302 Hoist
H-303 Hoist
HL-302 High level indicator
MBM-302 Main drive
OP-302 Lube system
OP-305 Lube system
RB-306 Blower
RBL-302 Blower
RBL-302 Continuous level indicator
SC-303 Screw conveyor
SC-304 Screw conveyor
SC-308 Screw conveyor
SC-311 Screw conveyor
SE-303 Separator
SE-304 Separator
W-302 Belt scale
W-303 Weighfeeder
From BC-313 dwg FD-4
From BC-206 & BC-213 dwg FD-4
From BC-360 dwg FD-10
From BC-301 dwg FD-3
From BC-312 dwg FD-4
To AC-302 dwg FD-5
To PN-302 dwg FD-7
DC-302
SC-308
FA-302A
FG-302
H-303
GA-308
SC-304
SC-303
SE-303
SE-304
AC-306
DD-305
DD-329
AC-304
AC-322
AC-321
AC-313
AC-305
AC-329
AC-314
Gypsun B-300
W-303
DC-305
SC-311
FA-310
HL-302
RBL-302
Raw mix Clinker bin B-302
GA-302
W-302
BC-304
H-301
H-302
BM-302
FR-302
FA-304
MBM-302
G-302
OP-302
OP-305
RB-306
BMA-302
C-301
AC-311
AC-317
RB-302
E-302
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
FINISH GRINDING BALL MILL 2
PHOENIX CEMENT
No.: PCC012144

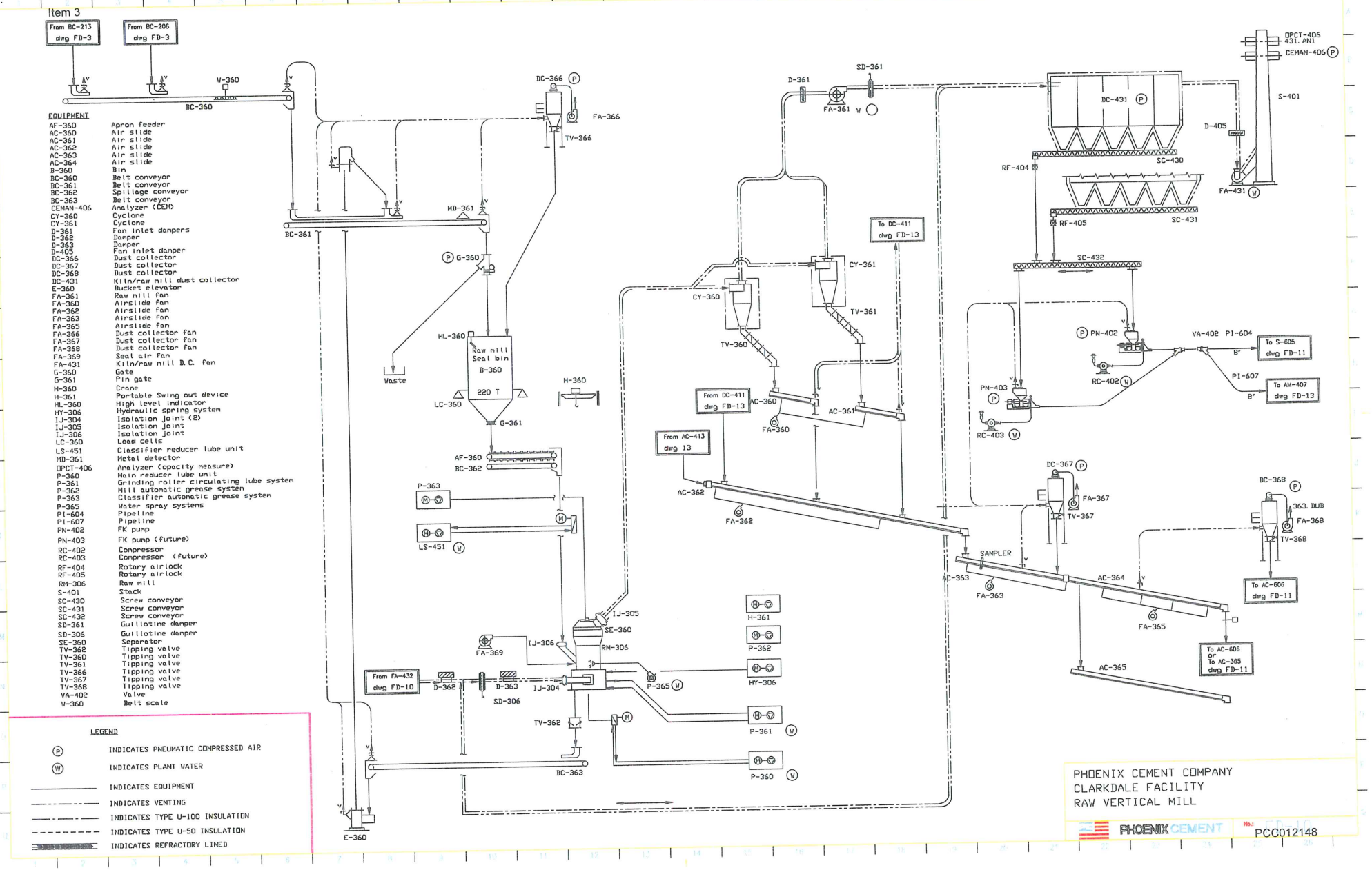
Item 3

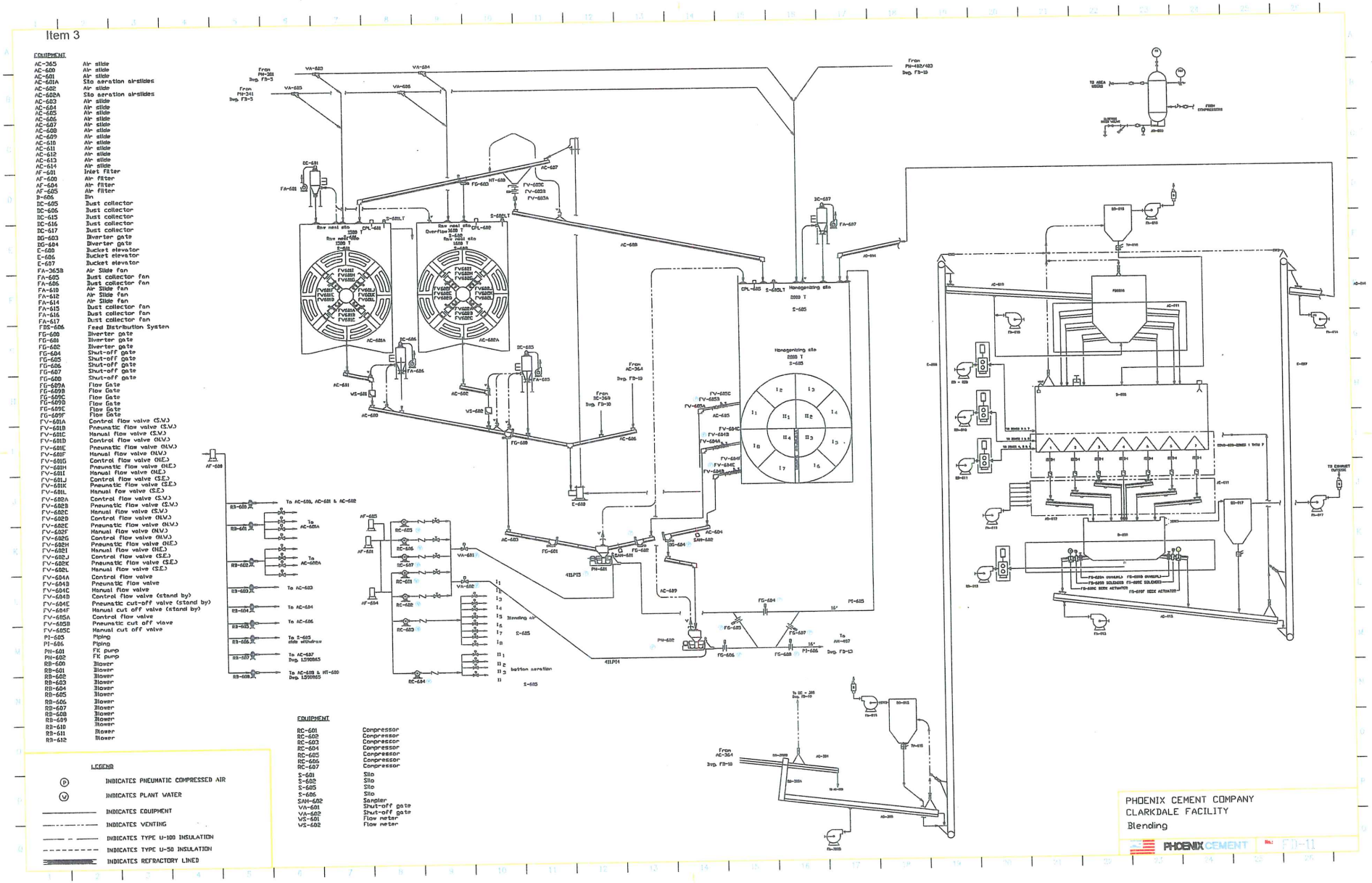

H-303
DC-303
SC-309
FA-308
SC-306
SC-305
SE-305
SE-306
AC-309
DD-308
DD-309
Tr-305
AC-307
From B-300 dwg FD-4
From B-303 dwg FD-4
AC-323
AC-324
AC-315
AC-308
AC-330
AC-331
W-305
W-304
BC-305
H-301
H-302
C-302
To DC-306 dwg FD-4
MRB-303 G-303
BM-303
AC-312
SAM-303
From AC-311 dwg FD-6
BMA-303
PN-302
To CEMENT SILOS dwg FD-18
From SC-320 dwg FD-4
AC-318
RB-303
RC-302A
RC-302B
E-303
EQUIPMENT
AC-307 Air Slide
AC-308 Air slide
AC-309 Air slide
AC-312 Air slide
AC-315 Air slide
AC-318 Air slide
AC-323 Air slide
AC-324 Air slide
AC-330 Air slide
AC-331 Air slide
BC-305 Belt conveyor
BM-303 Ball mill
BMA-303 Lube
C-302 Cement cooler
DC-303 Dust collector
DD-308 Tipping valve
DD-309 Tipping valve
E-303 Bucket elevator
FA-308 Fan
G-303 Gear box
H-301 Hoist
H-302 Hoist
H-303 Hoist
MRB-303 Main drive
PN-302 FK pump
RB-303 Fan
RC-302A Compressor
RC-302B Compressor
SAM-303 Sampler
SC-305 Screw conveyor
SC-309 Screw conveyor
SC-306 Screw conveyor
SE-305 Separator
SE-306 Separator
Tr-305 Trolley
W-304 Belt scale
W-305 Weighfeeder
LEGEND
(P) INDICATES PNEUMATIC COMPRESSED AIR
(W) INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
FINISH GRINDING BALL MILL 3
PHOENIX CEMENT
No.: PCC012145

Item 3


EQUIPMENT
AC-340 Air slide
AC-341 Air slide
AC-342 Air slide
AC-343 Air slide
AC-344 Air slide
AC-346 Air slide
AC-347 Air slide
B-342 Bin
B-343 Bin
BC-341 Belt conveyor
BC-342 Belt conveyor
BC-343 Belt conveyor
BM-304 Ball mill
BMA-303 Lube systen
C-303 Cement cooler
DC-308 Dust collector
DC-309 Dust collector
DC-340 Dust collector
DC-341 Dust collector
DC-343 Dust collector
DC-344 Dust collector
DG-346 Diverter gate
E-340 Bucket elevator
FA-312 Dust collector fan
FA-340 Dust collector fan
FA-341 Dust collector fan
FA-343 Dust collector fan
FA-344 Dust collector fan
FA-345 Dust collector fan
FV-301 Control valve
GA-341 Gate
H-301 Hoist
H-340 Hoist
MT-340 Material trap
PN-340 FK pump
RB-340 Blower
RB-341 Blower
RB-342 Blower
RB-343 Blower
RB-345 Blower
RC-340 Compressor
RF-343 Rotary feeder
SAM-340 Sampler
SC-316 Screw conveyor
SC-317 Screw conveyor
SC-320 Screw conveyor
SC-340 Screw conveyor
SC-341 Screw conveyor
SC-342 Screw conveyor
SE-307 Separator
W-340 Weigh belt conveyor
W-341 Weigh belt conveyor
W-342 Weigh belt conveyor
WS-340 Hopper w/ scale
WS-341 Hopper w/ scale
WSP-304 PUMP
From B-301 dwg FD-5
From B-340 dwg FD-4
From B-341 dwg FD-4
From BC-343 this dwg
From RC-341 dwg FD-5
To PN-340 this dwg
To E-303 dwg FD-7
To AC-344 this dwg
To CEMENT SILOS dwg FD-18
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
FINISH GRINDING BALL MILL 4
PHOENIX CEMENT
No.: PCC012146

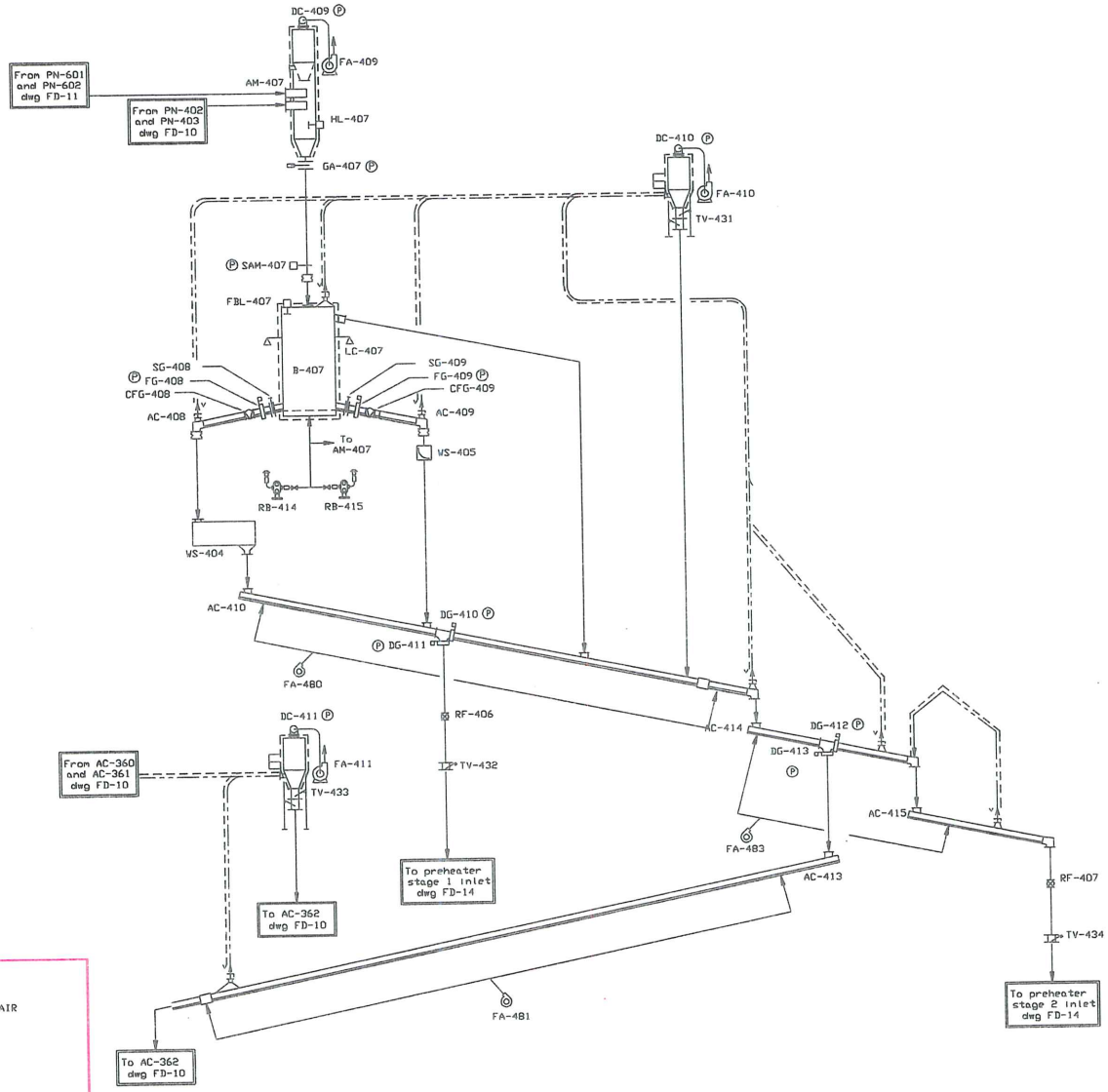

Item 3
From BC-350 dwg FD-4
DC-352
FA-352
RF-352
To BC-350 dwg FD-4
H-350
HL-352
B-352
LC-352
MD-351
BC-351
WS-351
DG-351
INS-350
RF-353
IJ-350
Waste
SE-308
IJ-351
FR-350
FRF-350
FA-355
D-352
IJ-352 (3)
RM-305
FA-357
DCH-350
DCH-351
From BC-350 dwg FD-4
E-350
P-308
P-309
P-310
P-305
P-306
P-307
HY-305
DC-350
FM-350
RF-351
RF-350
FA-356
FA-358
AC-350
DG-350
D-350
FA-353
DG-353
DG-352
AC-353
AC-352
FA-350
S-350
OPCT-350
D-351
C-306
C-305
AC-351
FA-354
DG-354
DG-355
AC-354
SAM-350
SAM-351
PN-350
VA-350
VA-352
To Cement Silos dwg FD-18
AF-350
RC-350
RC-351
PN-351
FKP-501
From Ball Mill 1 dwg FD-5
VA-351
WSP-350
GAP-350
To BM-304 dwg FD-8
To BM-303 dwg FD-7
To BM-302 dwg FD-6
Grinding Aid System GAD-301
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
EQUIPMENT
AC-350 Air slide
AC-351 Air slide
AC-352 Air slide
AC-353 Air slide
AC-354 Air slide
AF-350 Inlet filter
B-352 Surge bin
BC-351 Belt conveyor
E-350 Bucket elevator
DC-350 OK mill Dust collector
DC-352 Dust collector
C-305 Cement cooler
C-306 Cement cooler
DCH-350 Chain conveyor
DCH-351 Chain conveyor
D-350 Fan inlet dampers
D-351 Damper
D-352 Bleed air damper
DG-350 Diverter gate
DG-351 Gate
DG-353 Diverter gate
DG-352 Diverter gate
DG-355 Diverter gate
DG-354 Diverter gate
FA-352 Dust collector fan
FA-353 Airslide fan
FA-354 Airslide fan
FA-350 OK mill Dust collector fan
FA-355 Combustion air fan
FA-356 Airslide fan
FA-357 Motor cooling fan
FA-358 Airslide fan
FM-350 Gas flow meter
FR-350 Air heater
FRF-350 Refractories
GAD-350 Grinding aid system
GAD-301 Grinding aid system
H-350 Crane
HL-352 High level indicator
HY-305 Hydraulic spring system
INS-350 Insulation
IJ-350 Isolation joint
IJ-351 Isolation joint
IJ-352 Isolation joints (3)
LC-352 Load stands (4)
MD-351 Metal detector
OPCT-350 Analyzer (opacity)
P-305 Grinding roller circulating lube system
P-306 Main reducer lube unit
P-307 Main motor lube unit
P-308 Separator lube unit
P-309 Separator reducer lube unit
P-310 Mill automatic grease system
PN-350 FK pump
PN-351 FK pump
RC-350 Compressor
RC-351 Compressor
RF-353 Rotary airlock
RF-350 Rotary airlock
RF-351 Rotary airlock
RF-352 Rotary airlock
RM-305 OK mill
S-350 Stack
SAM-350 Sampler
SAM-351 Sampler
SE-308 Separator
VA-350 SK Valve
VA-351 Valve
VA-352 Valve
WS-351 Belt scale
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
OK MILL
PHOENIX CEMENT
No.: PCC012147


Item 3
From BC-213 dwg FD-3
From BC-206 dwg FD-3
W-360
BC-360
EQUIPMENT
AF-360 Apron feeder
AC-360 Air slide
AC-361 Air slide
AC-362 Air slide
AC-363 Air slide
AC-364 Air slide
B-360 Bin
BC-360 Belt conveyor
BC-361 Belt conveyor
BC-362 Spillage conveyor
BC-363 Belt conveyor
CEMAN-406 Analyzer (CEM)
CY-360 Cyclone
CY-361 Cyclone
D-361 Fan inlet dampers
D-362 Damper
D-363 Damper
D-405 Fan inlet damper
DC-366 Dust collector
DC-367 Dust collector
DC-368 Dust collector
DC-431 Kiln/raw mill dust collector
E-360 Bucket elevator
FA-361 Raw mill fan
FA-360 Airslide fan
FA-362 Airslide fan
FA-363 Airslide fan
FA-365 Airslide fan
FA-366 Dust collector fan
FA-367 Dust collector fan
FA-368 Dust collector fan
FA-369 Seal air fan
FA-431 Kiln/raw mill D.C. fan
G-360 Gate
G-361 Pin gate
H-360 Crane
H-361 Portable Swing out device
HL-360 High level indicator
HY-306 Hydraulic spring system
IJ-304 Isolation joint (2)
IJ-305 Isolation joint
IJ-306 Isolation joint
LC-360 Load cells
LS-451 Classifier reducer lube unit
MD-361 Metal detector
OPCT-406 Analyzer (capacity measure)
P-360 Main reducer lube unit
P-361 Grinding roller circulating lube system
P-362 Mill automatic grease system
P-363 Classifier automatic grease system
P-365 Water spray systems
PI-604 Pipeline
PI-607 Pipeline
PN-402 FK pump
PN-403 FK pump (future)
RC-402 Compressor
RC-403 Compressor (future)
RF-404 Rotary airlock
RF-405 Rotary airlock
RM-306 Raw mill
S-401 Stack
SC-430 Screw conveyor
SC-431 Screw conveyor
SC-432 Screw conveyor
SD-361 Guillotine damper
SD-306 Guillotine damper
SE-360 Separator
TV-362 Tipping valve
TV-360 Tipping valve
TV-361 Tipping valve
TV-366 Tipping valve
TV-367 Tipping valve
TV-368 Tipping valve
VA-402 Valve
W-360 Belt scale
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
BC-361
DC-366
FA-366
TV-366
MD-361
G-360
Waste
HL-360
Raw mill Seal bin B-360
220 T
LC-360
G-361
H-360
AF-360
BC-362
P-363
LS-451
IJ-305
SE-360
RM-306
IJ-306
FA-369
From FA-432 dwg FD-10
D-362
D-363
IJ-304
P-365
SD-306
TV-362
BC-363
E-360
H-361
P-362
HY-306
P-361
P-360
D-361
SD-361
FA-361
DC-431
SC-430
RF-404
SC-431
RF-405
SC-432
D-405
S-401
OPCT-406 431. AN1
CEMAN-406
FA-431
To DC-411 dwg FD-13
CY-361
CY-360
TV-361
TV-360
From DC-411 dwg FD-13
AC-360
FA-360
AC-361
From AC-413 dwg 13
AC-362
FA-362
PN-402
VA-402 PI-604
To S-605 dwg FD-11
RC-402
PI-607
To AM-407 dwg FD-13
PN-403
RC-403
DC-367
FA-367
TV-367
DC-368
363. DUB
FA-368
TV-368
SAMPLER
AC-363
FA-363
AC-364
FA-365
To AC-606 dwg FD-11
To AC-606 or To AC-365 dwg FD-11
AC-365
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
RAW VERTICAL MILL
PHOENIX CEMENT
No.: PCC012148


Item 3
EQUIPMENT
AC-365 Air slide
AC-600 Air slide
AC-601 Air slide
AC-601A Silo aeration air-slides
AC-602 Air slide
AC-602A Silo aeration air-slides
AC-603 Air slide
AC-604 Air slide
AC-605 Air slide
AC-606 Air slide
AC-607 Air slide
AC-608 Air slide
AC-609 Air slide
AC-610 Air slide
AC-611 Air slide
AC-612 Air slide
AC-613 Air slide
AC-614 Air slide
AF-601 Inlet filter
AF-600 Air filter
AF-604 Air filter
AF-605 Air filter
B-606 Bin
DC-605 Dust collector
DC-606 Dust collector
DC-615 Dust collector
DC-616 Dust collector
DC-617 Dust collector
DG-603 Diverter gate
DG-604 Diverter gate
E-600 Bucket elevator
E-606 Bucket elevator
E-607 Bucket elevator
FA-365B Air Slide fan
FA-605 Dust collector fan
FA-606 Dust collector fan
FA-610 Air Slide fan
FA-612 Air Slide fan
FA-614 Air Slide fan
FA-615 Dust collector fan
FA-616 Dust collector fan
FA-617 Dust collector fan
FDS-606 Feed Distribution System
FG-600 Diverter gate
FG-601 Diverter gate
FG-602 Diverter gate
FG-604 Shut-off gate
FG-605 Shut-off gate
FG-606 Shut-off gate
FG-607 Shut-off gate
FG-608 Shut-off gate
FG-609A Flow Gate
FG-609B Flow Gate
FG-609C Flow Gate
FG-609D Flow Gate
FG-609E Flow Gate
FG-609F Flow Gate
FV-601A Control flow valve (S.W.)
FV-601B Pneumatic flow valve (S.W.)
FV-601C Manual flow valve (S.W.)
FV-601D Control flow valve (N.W.)
FV-601E Pneumatic flow valve (N.W.)
FV-601F Manual flow valve (N.W.)
FV-601G Control flow valve (N.E.)
FV-601H Pneumatic flow valve (N.E.)
FV-601I Manual flow valve (N.E.)
FV-601J Control flow valve (S.E.)
FV-601K Pneumatic flow valve (S.E.)
FV-601L Manual fow valve (S.E.)
FV-602A Control flow valve (S.W.)
FV-602B Pneumatic flow valve (S.W.)
FV-602C Manual flow valve (S.W.)
FV-602D Control flow valve (N.W.)
FV-602E Pneumatic flow valve (N.W.)
FV-602F Manual flow valve (N.W.)
FV-602G Control flow valve (N.E.)
FV-602H Pneumatic flow valve (N.E.)
FV-602I Manual flow valve (N.E.)
FV-602J Control flow valve (S.E.)
FV-602K Pneumatic flow valve (S.E.)
FV-602L Manual flow valve (S.E.)
FV-604A Control flow valve
FV-604B Pneumatic flow valve
FV-604C Manual flow valve
FV-604D Control flow valve (stand by)
FV-604E Pneumatic cut-off valve (stand by)
FV-604F Manual cut off valve (stand by)
FV-605A Control flow valve
FV-605B Pneumatic cut off vlave
FV-605C Manual cut off valve
PI-605 Piping
PI-606 Piping
PH-601 FK pump
PH-602 FK pump
RB-600 Blower
RB-601 Blower
RB-602 Blower
RB-603 Blower
RB-604 Blower
RB-605 Blower
RB-606 Blower
RB-607 Blower
RB-608 Blower
RB-609 Blower
RB-610 Blower
RB-611 Blower
RB-612 Blower
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
EQUIPMENT
RC-601 Compressor
RC-602 Compressor
RC-603 Compressor
RC-604 Compressor
RC-605 Compressor
RC-606 Compressor
RC-607 Compressor
S-601 Silo
S-602 Silo
S-605 Silo
S-606 Silo
SAM-602 Sampler
VA-601 Shut-off gate
VA-602 Shut-off gate
WS-601 Flow meter
WS-602 Flow meter
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
Blending
PHOENIX CEMENT
FD-11

PCC012149

Item 3



EQUIPMENT

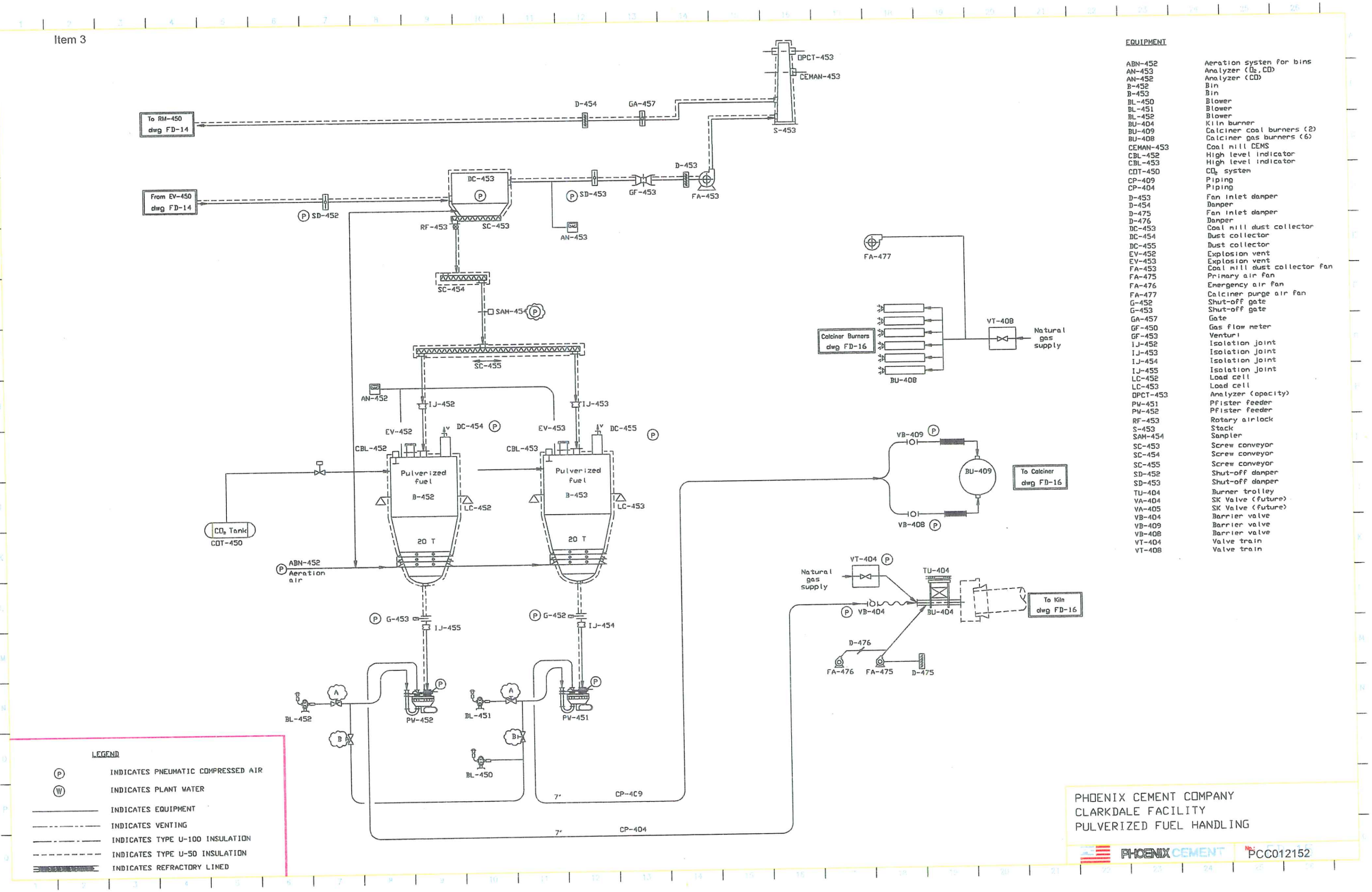
AM-407	Alleviator
DC-409	Dust collector
DC-410	Dust collector
B-407	Feed bin
FA-409	Dust collector fan
FA-410	Dust collector fan
TV-431	Tipping valve
LC-407	Load cell
FBL-407	High level indicator
HL-407	High level indicator
GA-407	Shut-off gate
SAM-407	Sampler
AC-408	Air slide
AC-409	Air slide
AC-410	Air slide
AC-413	Air slide
AC-414	Air slide
AC-415	Air slide
DC-411	Dust collector
RB-414	Blower
RB-415	Blower
DG-410	Diverter gate
DG-411	Diverter gate
DG-412	Diverter gate
DG-413	Diverter gate
WS-404	Feeder
FA-480	Airslide fan
FA-483	Airslide fan
FA-481	Airslide fan
FA-411	Dust collector fan
TV-432	Tipping valve
TV-433	Tipping valve
TV-434	Tipping valve
FG-408	Gate
FG-409	Gate
CFG-408	Proportioning gate
CFG-409	Proportioning gate
RF-406	Rotary airlock
RF-407	Rotary airlock
SG-408	Shut-off gate
SG-409	Shut-off gate
WS-405	Flow meter

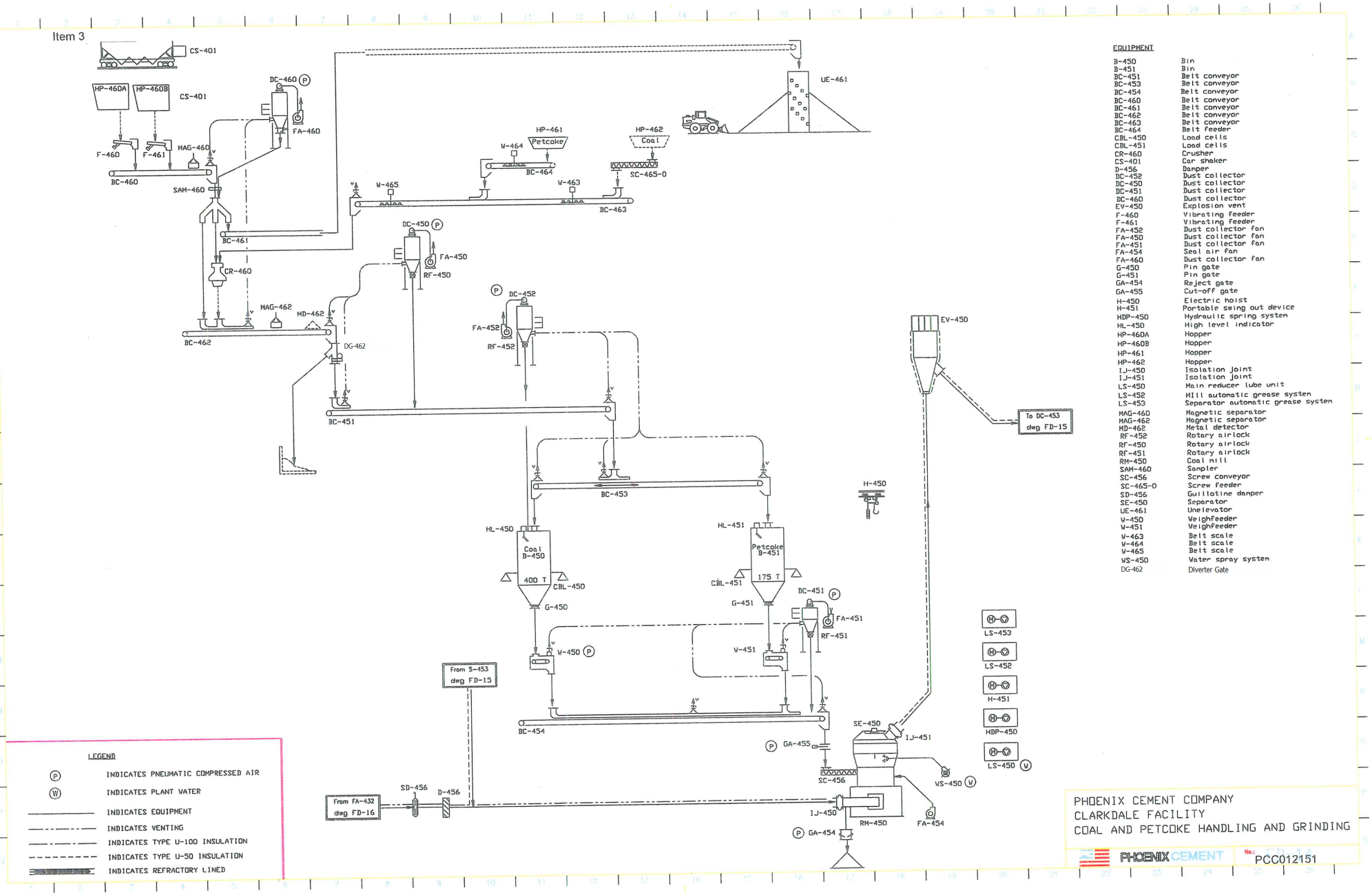
LEGEND

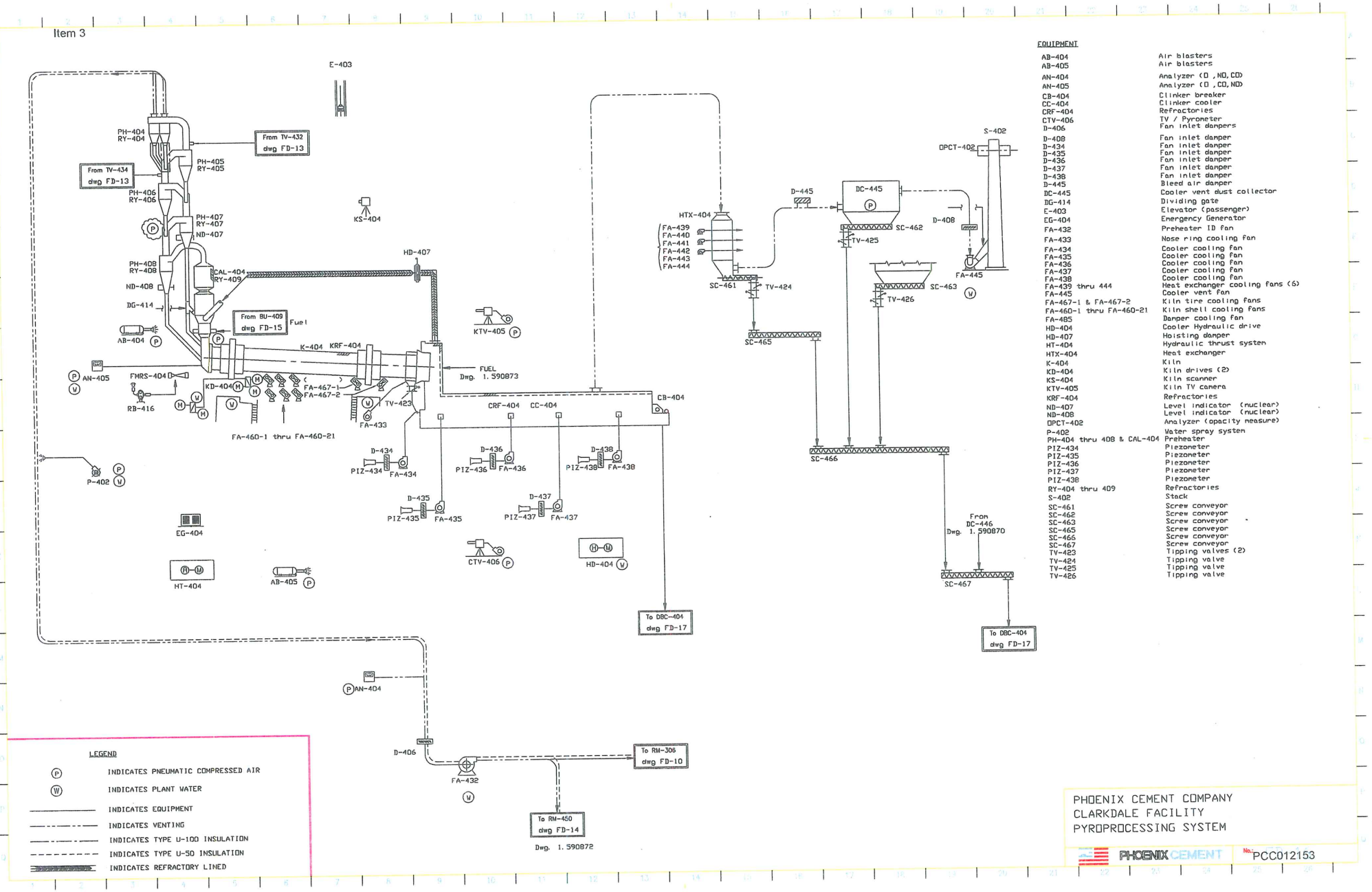
- (P) INDICATES PNEUMATIC COMPRESSED AIR
- (W) INDICATES PLANT WATER
- INDICATES EQUIPMENT
- INDICATES VENTING
- INDICATES TYPE U-100 INSULATION
- INDICATES TYPE U-50 INSULATION
- INDICATES REFRACTORY LINED

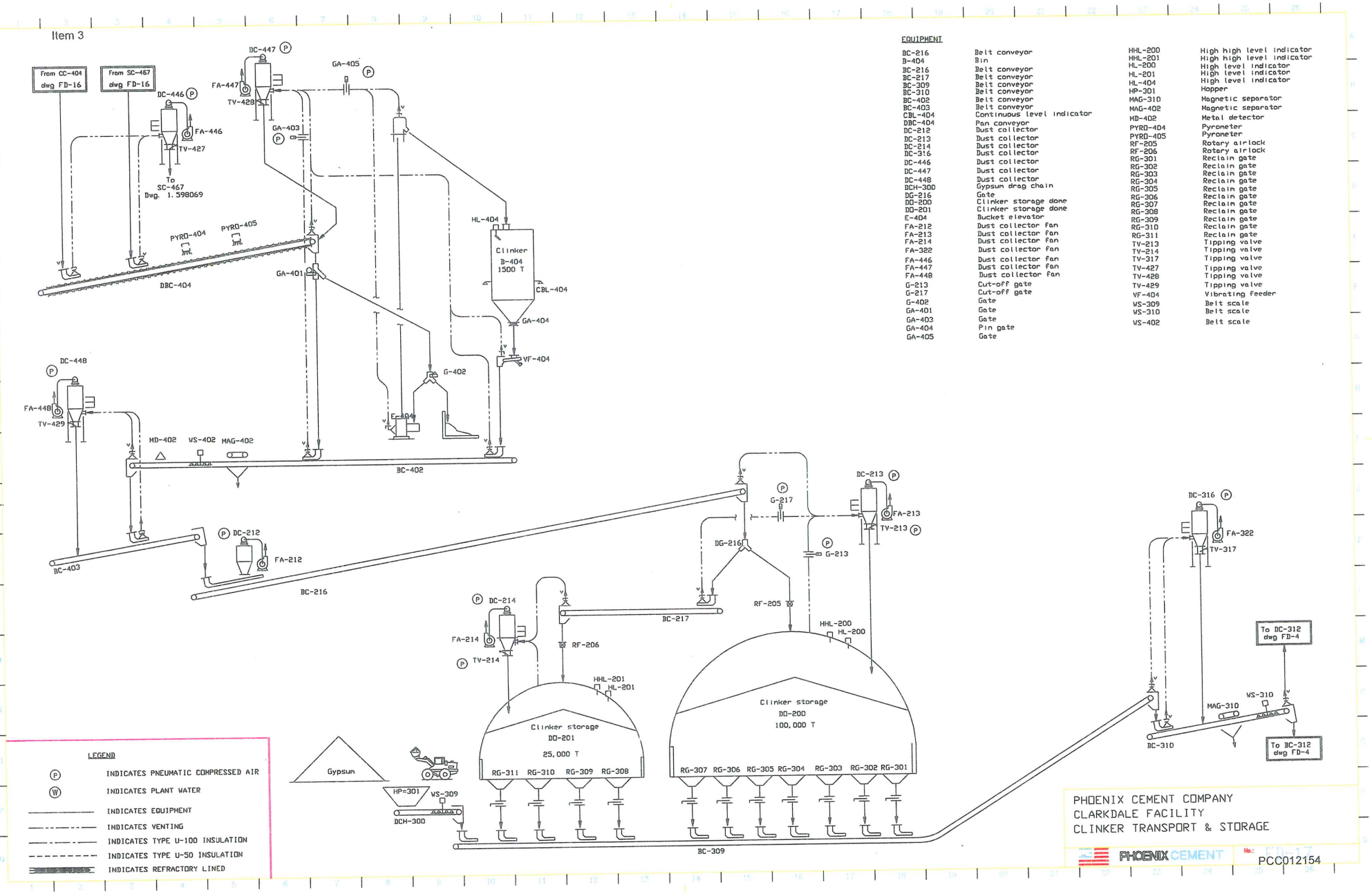
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
KILN FEED

PHOENIX CEMENT PCC012150

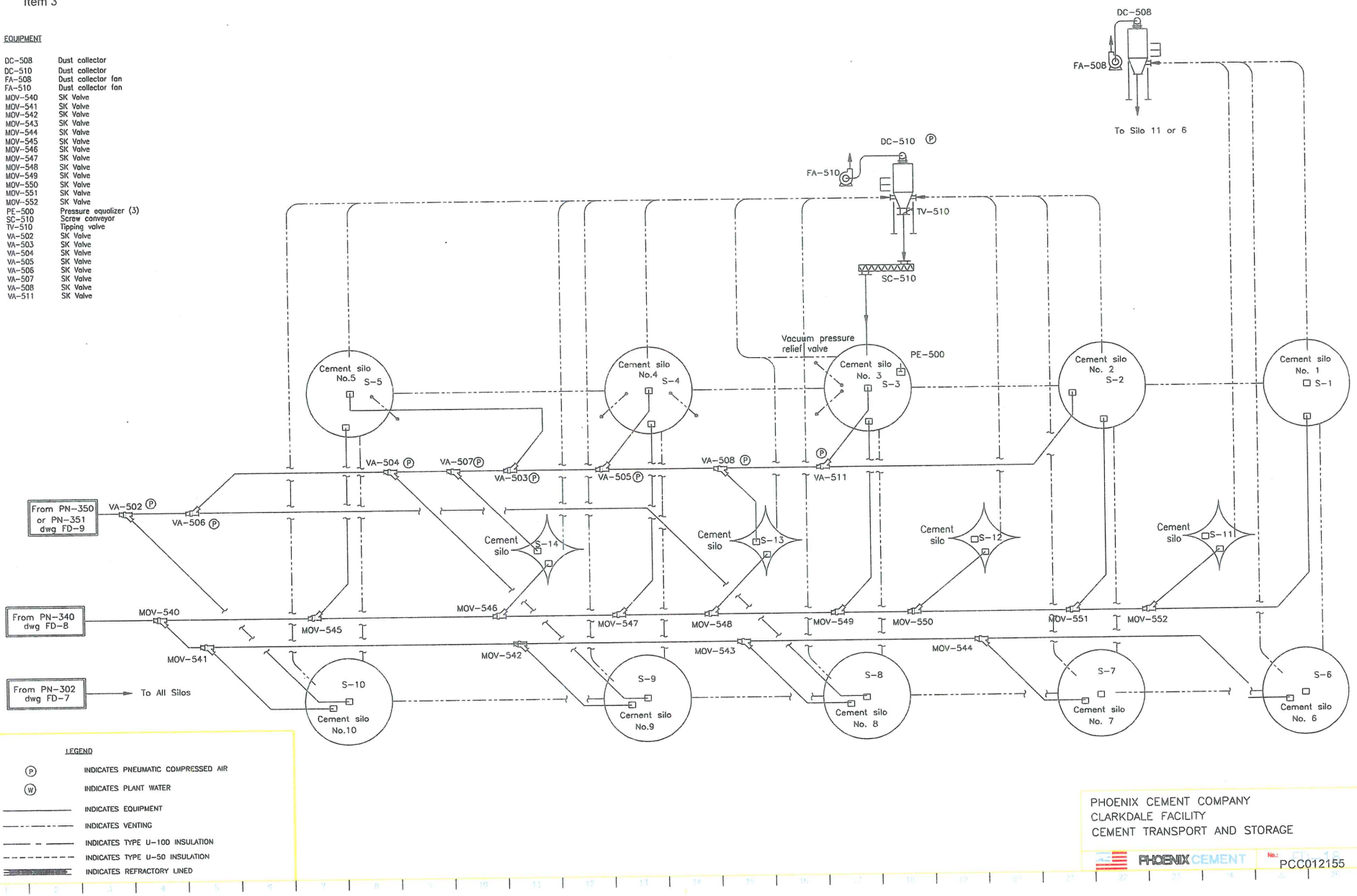

Item 3
EQUIPMENT
ABN-452 Aeration system for bins
AN-453 Analyzer (O2, CO)
AN-452 Analyzer (CO)
B-452 Bin
B-453 Bin
BL-450 Blower
BL-451 Blower
BL-452 Blower
BU-404 Kiln burner
BU-409 Calciner coal burners (2)
BU-408 Calciner gas burners (6)
CEMAN-453 Coal mill CEMS
CBL-452 High level indicator
CBL-453 High level indicator
CDT-450 CO2 system
CP-409 Piping
CP-404 Piping
D-453 Fan inlet damper
D-454 Damper
D-475 Fan inlet damper
D-476 Damper
DC-453 Coal mill dust collector
DC-454 Dust collector
DC-455 Dust collector
EV-452 Explosion vent
EV-453 Explosion vent
FA-453 Coal mill dust collector fan
FA-475 Primary air fan
FA-476 Emergency air fan
FA-477 Calciner purge air fan
G-452 Shut-off gate
G-453 Shut-off gate
GA-457 Gate
GF-453 Gas flow meter
GF-453 Venturi
IJ-452 Isolation joint
IJ-453 Isolation joint
IJ-454 Isolation joint
IJ-455 Isolation joint
LC-452 Load cell
LC-453 Load cell
DPCT-453 Analyzer (opacity)
PV-451 Pfister feeder
PV-452 Pfister feeder
RF-453 Rotary airlock
S-453 Stack
SAM-454 Sampler
SC-453 Screw conveyor
SC-454 Screw conveyor
SC-455 Screw conveyor
SD-452 Shut-off damper
SD-453 Shut-off damper
TU-404 Burner trolley
VA-404 SK Valve (future)
VA-405 SK Valve (future)
VB-404 Barrier valve
VB-409 Barrier valve
VB-408 Barrier valve
VT-404 Valve train
VT-408 Valve train
To RM-450 dwg FD-14
From EV-450 dwg FD-14
DPCT-453
CEMAN-453
S-453
D-454
GA-457
D-453
DC-453
SD-453
GF-453
FA-453
SD-452
RF-453
SC-453
AN-453
SC-454
SAM-454
SC-455
AN-452
IJ-452
IJ-453
EV-452
DC-454
EV-453
DC-455
CBL-452
CBL-453
Pulverized fuel
B-452
B-453
LC-452
LC-453
20 T
CO2 Tank
CDT-450
ABN-452 Aeration air
G-453
IJ-455
G-452
IJ-454
BL-452
BL-451
BL-450
PV-452
PV-451
7"
CP-409
CP-404
FA-477
Calciner Burners dwg FD-16
VT-408
Natural gas supply
BU-408
VB-409
BU-409
To Calciner dwg FD-16
VB-408
VT-404
Natural gas supply
TU-404
VB-404
BU-404
To Kiln dwg FD-16
D-476
FA-476
FA-475
D-475
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
PULVERIZED FUEL HANDLING
PHOENIX CEMENT
PCC012152


Item 3
CS-401
HP-460A
HP-460B
CS-401
DC-460
FA-460
F-460
F-461
MAG-460
BC-460
SAM-460
UE-461
HP-461
Petcoke
W-464
BC-464
HP-462
Coal
SC-465-0
W-465
W-463
BC-463
BC-461
DC-450
FA-450
RF-450
CR-460
MAG-462
MD-462
BC-462
DG-462
DC-452
FA-452
RF-452
BC-451
BC-453
EV-450
To DC-453 dwg FD-15
H-450
HL-450
Coal B-450
400 T
CBL-450
G-450
HL-451
Petcoke B-451
175 T
CBL-451
G-451
DC-451
FA-451
RF-451
W-450
W-451
From S-453 dwg FD-15
BC-454
SE-450
IJ-451
GA-455
SC-456
WS-450
LS-453
LS-452
H-451
HDP-450
LS-450
From FA-432 dwg FD-16
SD-456
D-456
IJ-450
RM-450
FA-454
GA-454
EQUIPMENT
B-450 Bin
B-451 Bin
BC-451 Belt conveyor
BC-453 Belt conveyor
BC-454 Belt conveyor
BC-460 Belt conveyor
BC-461 Belt conveyor
BC-462 Belt conveyor
BC-463 Belt conveyor
BC-464 Belt feeder
CBL-450 Load cells
CBL-451 Load cells
CR-460 Crusher
CS-401 Car shaker
D-456 Damper
DC-452 Dust collector
DC-450 Dust collector
DC-451 Dust collector
DC-460 Dust collector
EV-450 Explosion vent
F-460 Vibrating feeder
F-461 Vibrating feeder
FA-452 Dust collector fan
FA-450 Dust collector fan
FA-451 Dust collector fan
FA-454 Seal air fan
FA-460 Dust collector fan
G-450 Pin gate
G-451 Pin gate
GA-454 Reject gate
GA-455 Cut-off gate
H-450 Electric hoist
H-451 Portable swing out device
HDP-450 Hydraulic spring system
HL-450 High level indicator
HP-460A Hopper
HP-460B Hopper
HP-461 Hopper
HP-462 Hopper
IJ-450 Isolation joint
IJ-451 Isolation joint
LS-450 Main reducer lube unit
LS-452 Mill automatic grease system
LS-453 Separator automatic grease system
MAG-460 Magnetic separator
MAG-462 Magnetic separator
MD-462 Metal detector
RF-452 Rotary airlock
RF-450 Rotary airlock
RF-451 Rotary airlock
RM-450 Coal mill
SAM-460 Sampler
SC-456 Screw conveyor
SC-465-0 Screw feeder
SD-456 Guillotine damper
SE-450 Separator
UE-461 Unelevator
W-450 Weighfeeder
W-451 Weighfeeder
W-463 Belt scale
W-464 Belt scale
W-465 Belt scale
WS-450 Water spray system
DG-462 Diverter Gate
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
COAL AND PETCOKE HANDLING AND GRINDING
PHOENIX CEMENT
No.: PCC012151

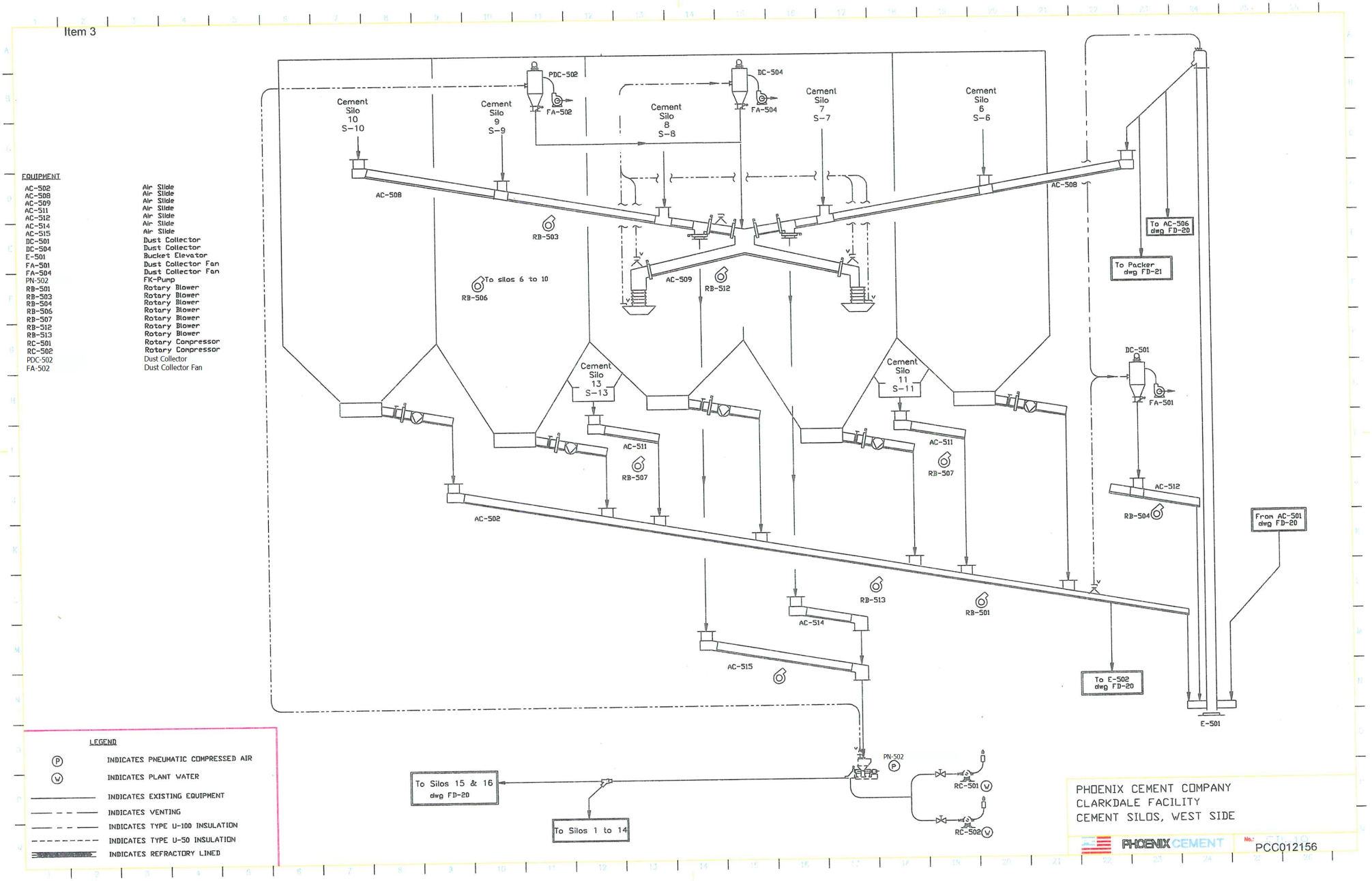

Item 3
E-403
PH-404 RY-404
From TV-432 dwg FD-13
PH-405 RY-405
From TV-434 dwg FD-13
PH-406 RY-406
PH-407 RY-407
ND-407
KS-404
HD-407
PH-408 RY-408
CAL-404 RY-409
ND-408
DG-414
From BU-409 dwg FD-15
Fuel
AB-404
KTV-405
K-404
KRF-404
FUEL Dwg. 1. 590873
AN-405
FMRS-404
KD-404
FA-467-1
FA-467-2
RB-416
TV-423
FA-433
CB-404
CRF-404
CC-404
FA-460-1 thru FA-460-21
D-434
PIZ-434
FA-434
D-436
PIZ-436
FA-436
D-438
PIZ-438
FA-438
D-435
PIZ-435
FA-435
D-437
PIZ-437
FA-437
P-402
EG-404
HT-404
AB-405
CTV-406
HD-404
To DBC-404 dwg FD-17
HTX-404
FA-439
FA-440
FA-441
FA-442
FA-443
FA-444
SC-461
TV-424
D-445
DC-445
SC-462
TV-425
S-402
DPCT-402
D-408
FA-445
SC-463
TV-426
SC-465
SC-466
From DC-446 Dwg. 1. 590870
SC-467
To DBC-404 dwg FD-17
AN-404
D-406
FA-432
To RM-306 dwg FD-10
To RM-450 dwg FD-14
Dwg. 1. 590872
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
EQUIPMENT
AB-404 Air blasters
AB-405 Air blasters
AN-404 Analyzer (O ,NO, CO)
AN-405 Analyzer (O ,CO, NO)
CB-404 Clinker breaker
CC-404 Clinker cooler
CRF-404 Refractories
CTV-406 TV / Pyrometer
D-406 Fan inlet dampers
D-408 Fan inlet damper
D-434 Fan inlet damper
D-435 Fan inlet damper
D-436 Fan inlet damper
D-437 Fan inlet damper
D-438 Fan inlet damper
D-445 Bleed air damper
DC-445 Cooler vent dust collector
DG-414 Dividing gate
E-403 Elevator (passenger)
EG-404 Emergency Generator
FA-432 Preheater ID fan
FA-433 Nose ring cooling fan
FA-434 Cooler cooling fan
FA-435 Cooler cooling fan
FA-436 Cooler cooling fan
FA-437 Cooler cooling fan
FA-438 Cooler cooling fan
FA-439 thru 444 Heat exchanger cooling fans (6)
FA-445 Cooler vent fan
FA-467-1 & FA-467-2 Kiln tire cooling fans
FA-460-1 thru FA-460-21 Kiln shell cooling fans
FA-485 Damper cooling fan
HD-404 Cooler Hydraulic drive
HD-407 Hoisting damper
HT-404 Hydraulic thrust system
HTX-404 Heat exchanger
K-404 Kiln
KD-404 Kiln drives (2)
KS-404 Kiln scanner
KTV-405 Kiln TV camera
KRF-404 Refractories
ND-407 Level indicator (nuclear)
ND-408 Level indicator (nuclear)
DPCT-402 Analyzer (opacity measure)
P-402 Water spray system
PH-404 thru 408 & CAL-404 Preheater
PIZ-434 Piezometer
PIZ-435 Piezometer
PIZ-436 Piezometer
PIZ-437 Piezometer
PIZ-438 Piezometer
RY-404 thru 409 Refractories
S-402 Stack
SC-461 Screw conveyor
SC-462 Screw conveyor
SC-463 Screw conveyor
SC-465 Screw conveyor
SC-466 Screw conveyor
SC-467 Screw conveyor
TV-423 Tipping valves (2)
TV-424 Tipping valve
TV-425 Tipping valve
TV-426 Tipping valve
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
PYROPROCESSING SYSTEM
PHOENIX CEMENT
No. PCC012153


Item 3
From CC-404 dwg FD-16
From SC-467 dwg FD-16
DC-447
GA-405
FA-447
TV-428
DC-446
FA-446
TV-427
To SC-467 Dwg. 1.598069
GA-403
HL-404
Clinker B-404 1500 T
CBL-404
GA-404
VF-404
PYRD-404
PYRD-405
DBC-404
GA-401
G-402
E-404
DC-448
FA-448
TV-429
MD-402
WS-402
MAG-402
BC-402
BC-403
DC-212
FA-212
BC-216
DC-213
G-217
FA-213
TV-213
DG-216
G-213
DC-214
FA-214
TV-214
BC-217
RF-205
RF-206
HHL-200
HL-200
HHL-201
HL-201
Clinker storage DD-201 25,000 T
Clinker storage DD-200 100,000 T
RG-311 RG-310 RG-309 RG-308
RG-307 RG-306 RG-305 RG-304 RG-303 RG-302 RG-301
Gypsum
HP-301
WS-309
DCH-300
BC-309
DC-316
FA-322
TV-317
To DC-312 dwg FD-4
WS-310
MAG-310
BC-310
To BC-312 dwg FD-4
EQUIPMENT
BC-216 Belt conveyor
B-404 Bin
BC-216 Belt conveyor
BC-217 Belt conveyor
BC-309 Belt conveyor
BC-310 Belt conveyor
BC-402 Belt conveyor
BC-403 Belt conveyor
CBL-404 Continuous level indicator
DBC-404 Pan conveyor
DC-212 Dust collector
DC-213 Dust collector
DC-214 Dust collector
DC-316 Dust collector
DC-446 Dust collector
DC-447 Dust collector
DC-448 Dust collector
DCH-300 Gypsum drag chain
DG-216 Gate
DD-200 Clinker storage dome
DD-201 Clinker storage dome
E-404 Bucket elevator
FA-212 Dust collector fan
FA-213 Dust collector fan
FA-214 Dust collector fan
FA-322 Dust collector fan
FA-446 Dust collector fan
FA-447 Dust collector fan
FA-448 Dust collector fan
G-213 Cut-off gate
G-217 Cut-off gate
G-402 Gate
GA-401 Gate
GA-403 Gate
GA-404 Pin gate
GA-405 Gate
HHL-200 High high level indicator
HHL-201 High high level indicator
HL-200 High level indicator
HL-201 High level indicator
HL-404 High level indicator
HP-301 Hopper
MAG-310 Magnetic separator
MAG-402 Magnetic separator
MD-402 Metal detector
PYRD-404 Pyrometer
PYRD-405 Pyrometer
RF-205 Rotary airlock
RF-206 Rotary airlock
RG-301 Reclain gate
RG-302 Reclain gate
RG-303 Reclain gate
RG-304 Reclain gate
RG-305 Reclain gate
RG-306 Reclain gate
RG-307 Reclain gate
RG-308 Reclain gate
RG-309 Reclain gate
RG-310 Reclain gate
RG-311 Reclain gate
TV-213 Tipping valve
TV-214 Tipping valve
TV-317 Tipping valve
TV-427 Tipping valve
TV-428 Tipping valve
TV-429 Tipping valve
VF-404 Vibrating feeder
WS-309 Belt scale
WS-310 Belt scale
WS-402 Belt scale
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
CLINKER TRANSPORT & STORAGE
PHOENIX CEMENT
No.:
PCC012154

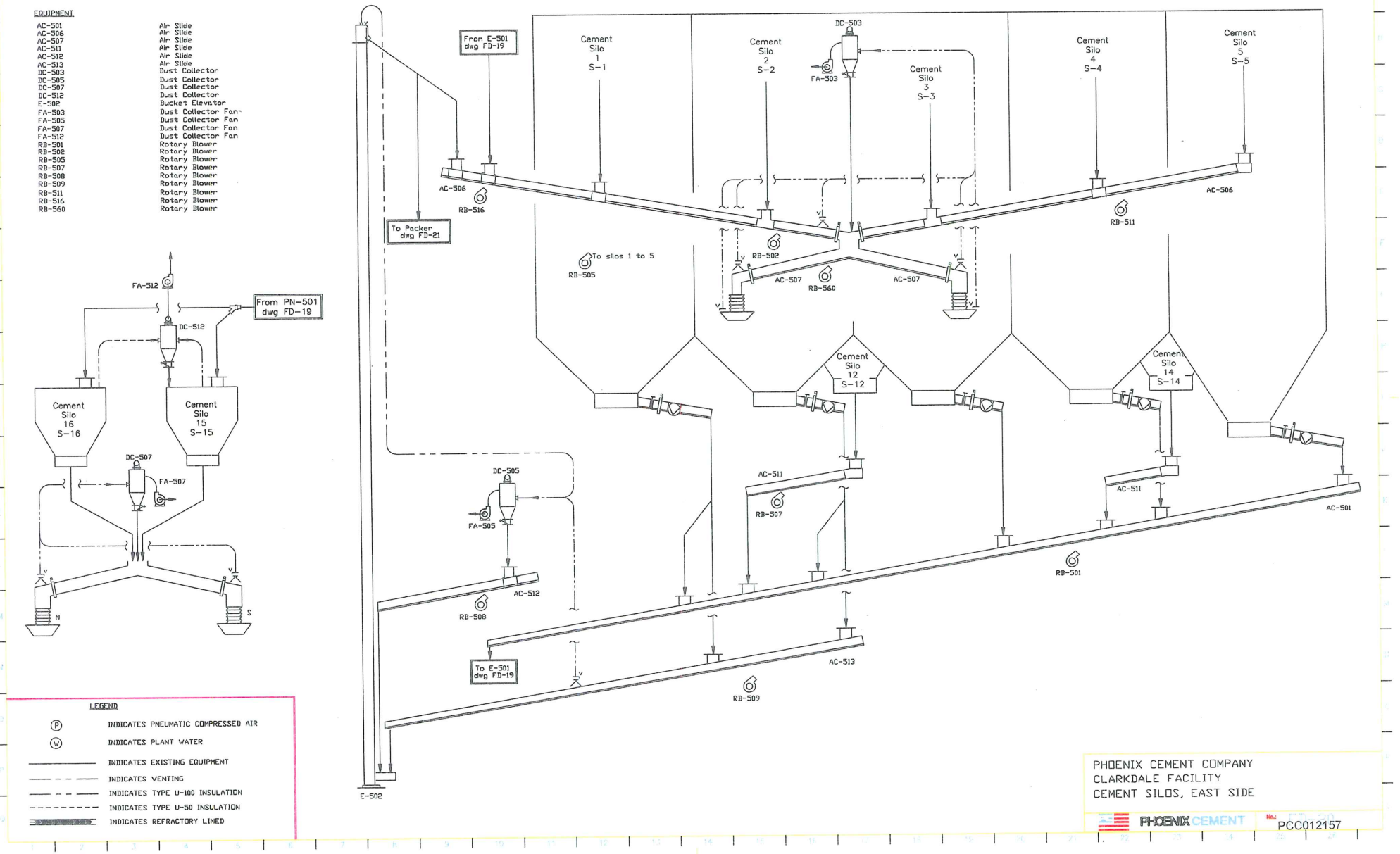
Item 3


EQUIPMENT
DC-508 Dust collector
DC-510 Dust collector
FA-508 Dust collector fan
FA-510 Dust collector fan
MOV-540 SK Valve
MOV-541 SK Valve
MOV-542 SK Valve
MOV-543 SK Valve
MOV-544 SK Valve
MOV-545 SK Valve
MOV-546 SK Valve
MOV-547 SK Valve
MOV-548 SK Valve
MOV-549 SK Valve
MOV-550 SK Valve
MOV-551 SK Valve
MOV-552 SK Valve
PE-500 Pressure equalizer (3)
SC-510 Screw conveyor
TV-510 Tipping valve
VA-502 SK Valve
VA-503 SK Valve
VA-504 SK Valve
VA-505 SK Valve
VA-506 SK Valve
VA-507 SK Valve
VA-508 SK Valve
VA-511 SK Valve
DC-508
FA-508
To Silo 11 or 6
DC-510 (P)
FA-510
TV-510
SC-510
Vacuum pressure relief valve
PE-500
Cement silo No.5 S-5
Cement silo No.4 S-4
Cement silo No. 3 S-3
Cement silo No. 2 S-2
Cement silo No. 1 S-1
VA-504 (P)
VA-507 (P)
VA-503 (P)
VA-505 (P)
VA-508 (P)
VA-511 (P)
From PN-350 or PN-351 dwg FD-9
VA-502 (P)
VA-506 (P)
Cement silo S-14
Cement silo S-13
Cement silo S-12
Cement silo S-11
From PN-340 dwg FD-8
MOV-540
MOV-546
MOV-545
MOV-547
MOV-548
MOV-549
MOV-550
MOV-551
MOV-552
MOV-541
MOV-542
MOV-543
MOV-544
From PN-302 dwg FD-7
To All Silos
S-10 Cement silo No.10
S-9 Cement silo No.9
S-8 Cement silo No. 8
S-7 Cement silo No. 7
S-6 Cement silo No. 6
LEGEND
(P) INDICATES PNEUMATIC COMPRESSED AIR
(W) INDICATES PLANT WATER
INDICATES EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
CEMENT TRANSPORT AND STORAGE
PHOENIX CEMENT
No.: PCC012155

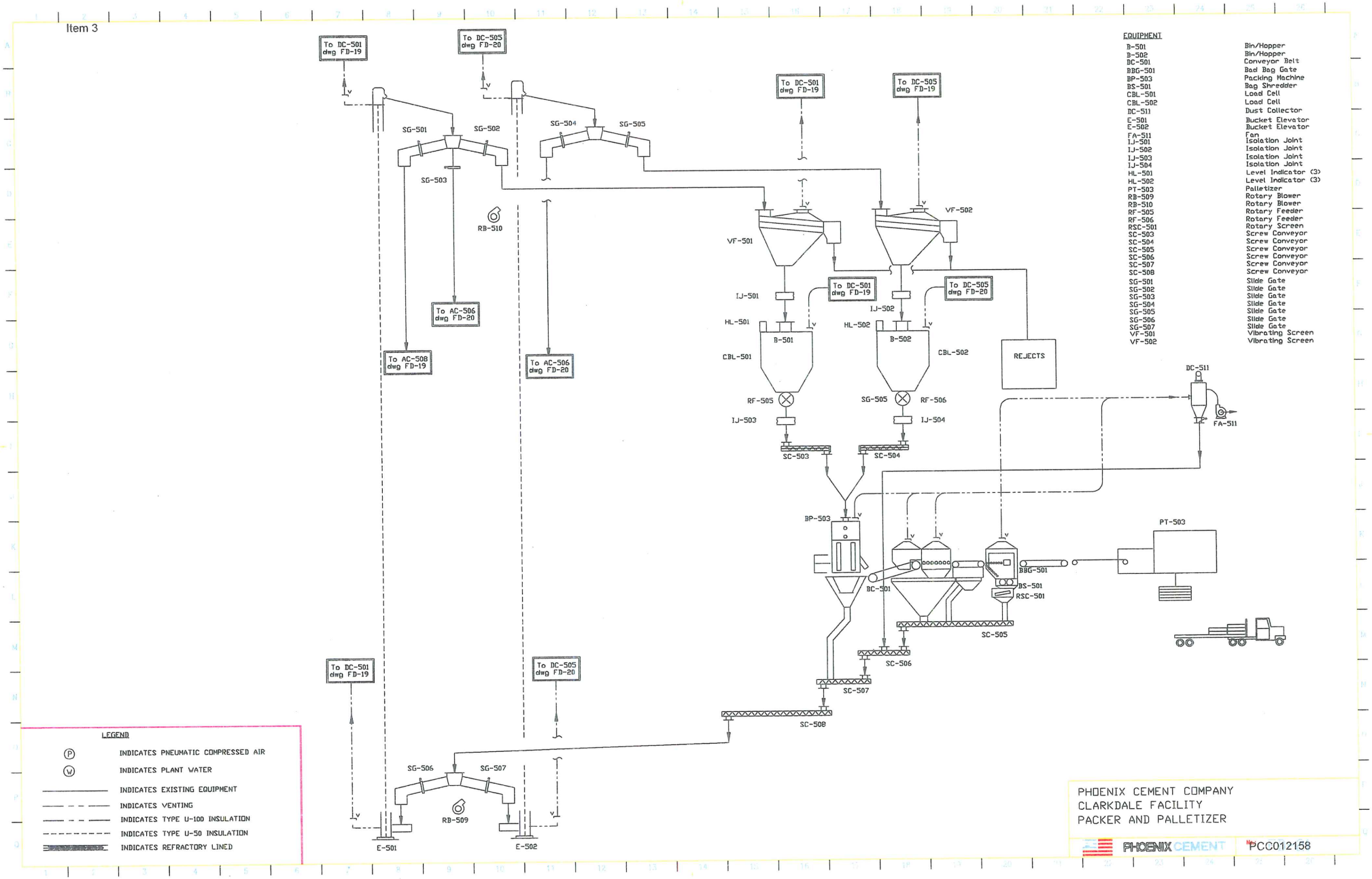
Item 3


EQUIPMENT
AC-502 Air Slide
AC-508 Air Slide
AC-509 Air Slide
AC-511 Air Slide
AC-512 Air Slide
AC-514 Air Slide
AC-515 Air Slide
DC-501 Dust Collector
DC-504 Dust Collector
E-501 Bucket Elevator
FA-501 Dust Collector Fan
FA-504 Dust Collector Fan
PN-502 FK-Pump
RB-501 Rotary Blower
RB-503 Rotary Blower
RB-504 Rotary Blower
RB-506 Rotary Blower
RB-507 Rotary Blower
RB-512 Rotary Blower
RB-513 Rotary Blower
RC-501 Rotary Compressor
RC-502 Rotary Compressor
PDC-502 Dust Collector
FA-502 Dust Collector Fan
Cement Silo 10 S-10
Cement Silo 9 S-9
Cement Silo 8 S-8
Cement Silo 7 S-7
Cement Silo 6 S-6
Cement Silo 13 S-13
Cement Silo 11 S-11
PDC-502
FA-502
DC-504
FA-504
DC-501
FA-501
AC-508
AC-509
AC-511
AC-502
AC-514
AC-515
AC-512
RB-503
RB-506
To silos 6 to 10
RB-512
RB-507
RB-513
RB-501
RB-504
To AC-506 dwg FD-20
To Packer dwg FD-21
From AC-501 dwg FD-20
To E-502 dwg FD-20
E-501
PN-502
RC-501
RC-502
To Silos 15 & 16 dwg FD-20
To Silos 1 to 14
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EXISTING EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
CEMENT SILOS, WEST SIDE
PHOENIX CEMENT
No.: PCC012156

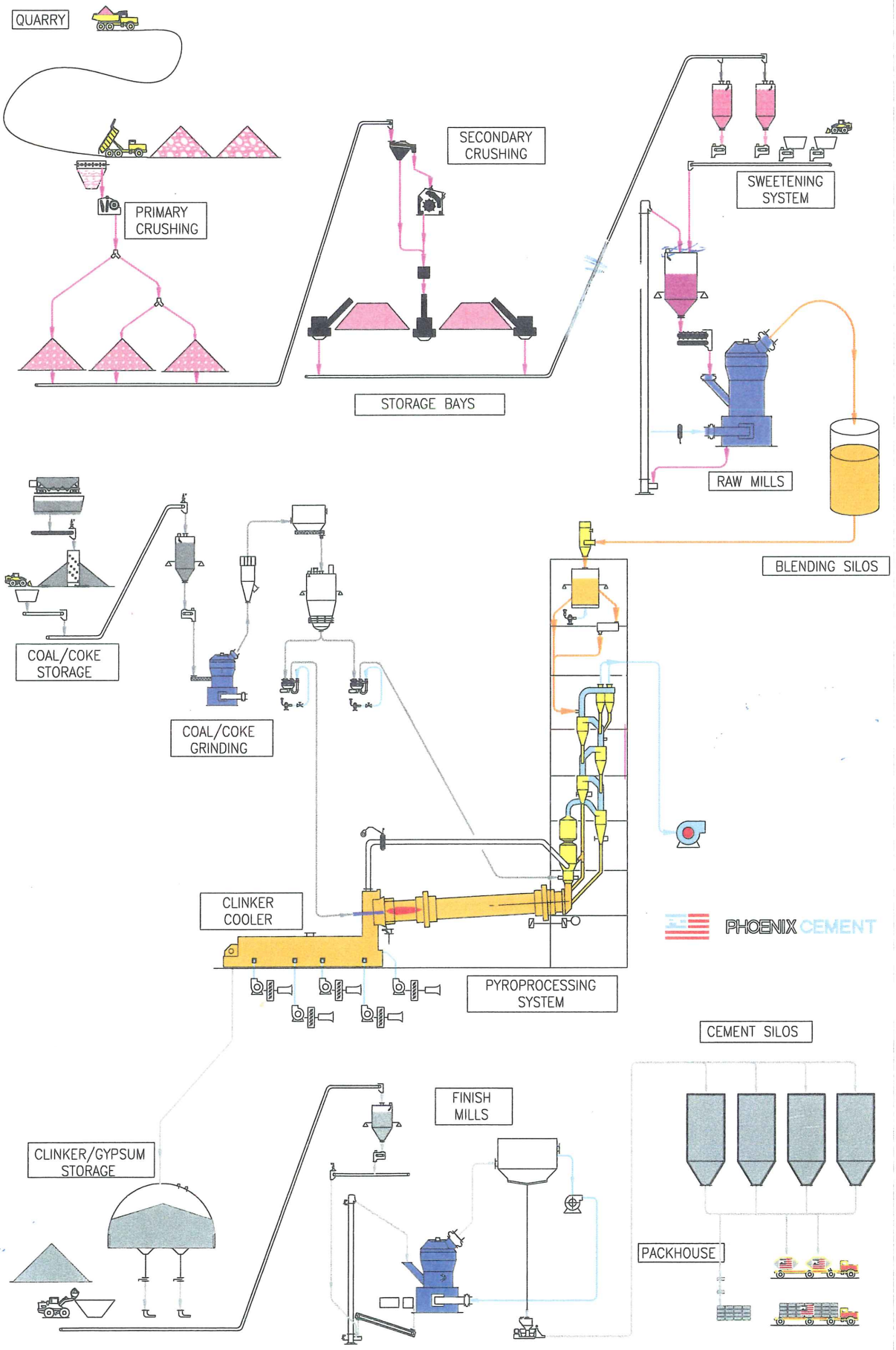
Item 3


EQUIPMENT
AC-501 Air Slide
AC-506 Air Slide
AC-507 Air Slide
AC-511 Air Slide
AC-512 Air Slide
AC-513 Air Slide
DC-503 Dust Collector
DC-505 Dust Collector
DC-507 Dust Collector
DC-512 Dust Collector
E-502 Bucket Elevator
FA-503 Dust Collector Fan
FA-505 Dust Collector Fan
FA-507 Dust Collector Fan
FA-512 Dust Collector Fan
RB-501 Rotary Blower
RB-502 Rotary Blower
RB-505 Rotary Blower
RB-507 Rotary Blower
RB-508 Rotary Blower
RB-509 Rotary Blower
RB-511 Rotary Blower
RB-516 Rotary Blower
RB-560 Rotary Blower
From E-501 dwg FD-19
To Packer dwg FD-21
To silos 1 to 5
Cement Silo 1 S-1
Cement Silo 2 S-2
Cement Silo 3 S-3
Cement Silo 4 S-4
Cement Silo 5 S-5
Cement Silo 12 S-12
Cement Silo 14 S-14
Cement Silo 15 S-15
Cement Silo 16 S-16
From PN-501 dwg FD-19
To E-501 dwg FD-19
E-502
N
S
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EXISTING EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
CEMENT SILOS, EAST SIDE
PHOENIX CEMENT
No.: PCC012157

Item 3


To DC-501 dwg FD-19
To DC-505 dwg FD-20
SG-501
SG-502
SG-503
SG-504
SG-505
RB-510
To AC-506 dwg FD-20
To AC-508 dwg FD-19
VF-501
VF-502
IJ-501
IJ-502
HL-501
HL-502
B-501
B-502
CBL-501
CBL-502
REJECTS
RF-505
RF-506
SG-505
IJ-503
IJ-504
SC-503
SC-504
DC-511
FA-511
BP-503
PT-503
BBG-501
BC-501
BS-501
RSC-501
SC-505
SC-506
SC-507
SC-508
SG-506
SG-507
RB-509
E-501
E-502
EQUIPMENT
B-501 Bin/Hopper
B-502 Bin/Hopper
BC-501 Conveyor Belt
BBG-501 Bad Bag Gate
BP-503 Packing Machine
BS-501 Bag Shredder
CBL-501 Load Cell
CBL-502 Load Cell
DC-511 Dust Collector
E-501 Bucket Elevator
E-502 Bucket Elevator
FA-511 Fan
IJ-501 Isolation Joint
IJ-502 Isolation Joint
IJ-503 Isolation Joint
IJ-504 Isolation Joint
HL-501 Level Indicator (3)
HL-502 Level Indicator (3)
PT-503 Palletizer
RB-509 Rotary Blower
RB-510 Rotary Blower
RF-505 Rotary Feeder
RF-506 Rotary Feeder
RSC-501 Rotary Screen
SC-503 Screw Conveyor
SC-504 Screw Conveyor
SC-505 Screw Conveyor
SC-506 Screw Conveyor
SC-507 Screw Conveyor
SC-508 Screw Conveyor
SG-501 Slide Gate
SG-502 Slide Gate
SG-503 Slide Gate
SG-504 Slide Gate
SG-505 Slide Gate
SG-506 Slide Gate
SG-507 Slide Gate
VF-501 Vibrating Screen
VF-502 Vibrating Screen
LEGEND
INDICATES PNEUMATIC COMPRESSED AIR
INDICATES PLANT WATER
INDICATES EXISTING EQUIPMENT
INDICATES VENTING
INDICATES TYPE U-100 INSULATION
INDICATES TYPE U-50 INSULATION
INDICATES REFRACTORY LINED
PHOENIX CEMENT COMPANY
CLARKDALE FACILITY
PACKER AND PALLETIZER
PHOENIX CEMENT
PCC012158

Item 2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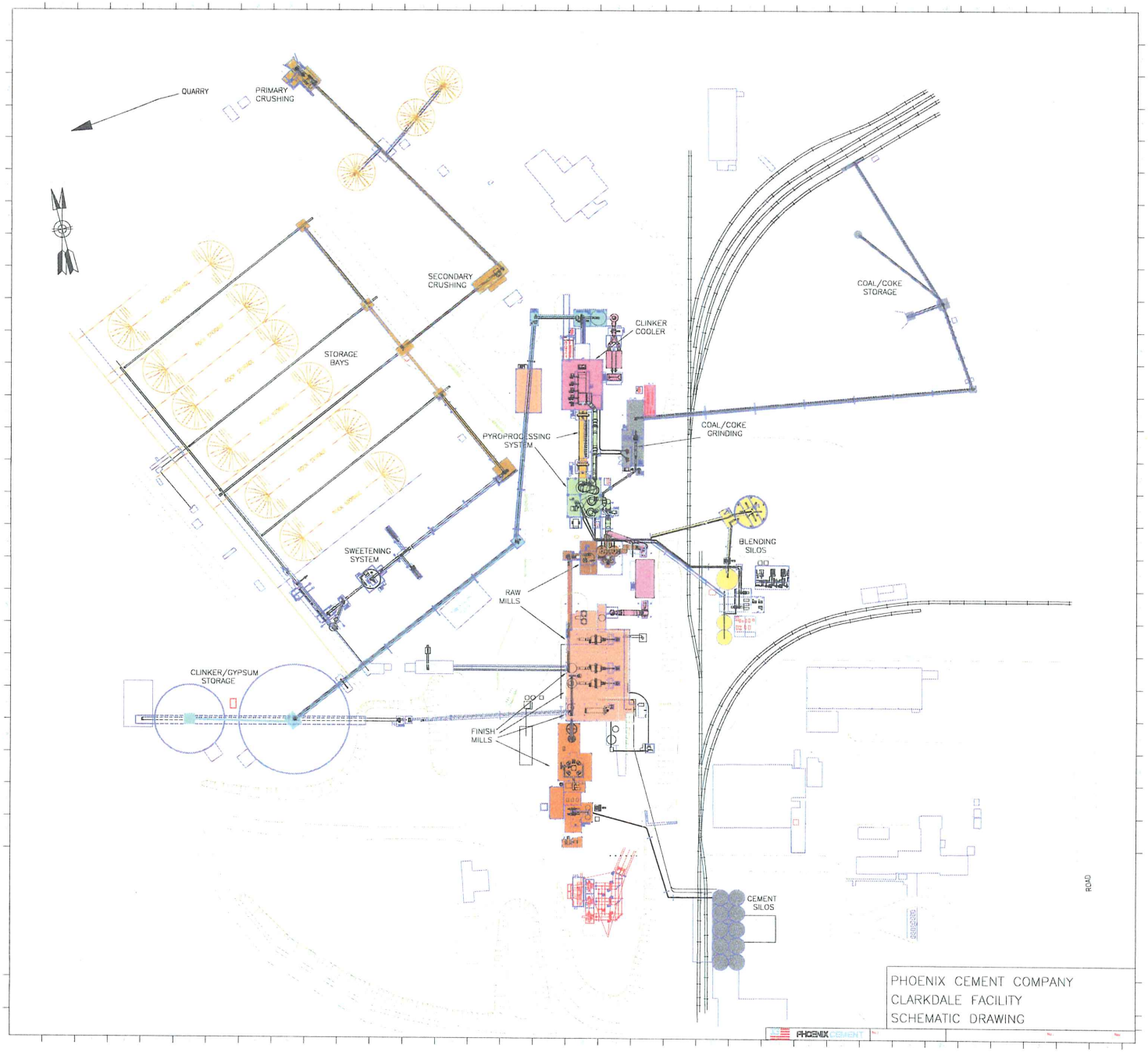
SECONDARY CRUSHING
STORAGE BAYS
SWEETENING SYSTEM
RAW MILLS
BLENDING SILOS
COAL/COKE STORAGE
COAL/COKE GRINDING
CLINKER COOLER
PYROPROCESSING SYSTEM
PHOENIX CEMENT
CEMENT SILOS
FINISH MILLS
CLINKER/GYPSUM STORAGE
PACKHOUSE

Item 3



PCC012138

6. EMISSIONS DATA

The operations at the Clarkdale Facility generate emissions of the following constituents:

- Particulate Matters (PM, PM_{10} and $PM_{2.5}$);
- Nitrogen Oxides (NO_x);
- Carbon Monoxide (CO);
- Sulfur Dioxide (SO_2);
- Volatile Organic Compounds (VOC); and
- Greenhouse Gases (GHGs).

Other than the addition of the 120 eKW emergency generator (EG-800), insignificant activity, there are no physical changes or changes in the method of operation to the emission sources at the Clarkdale Facility being proposed as a part of this permit renewal application with the exception of the changes contained in **Appendix C**.

7. LIST OF INSIGNIFICANT ACTIVITIES

In **Table 7-1**, PCC proposes to include the following list of insignificant activities at the bottom of the equipment list contained in Appendix B (Equipment List).

Table 7-1. Insignificant Activities and Sources

PCC Insignificant Activities and Sources	A.A.C. Citation
Petroleum product storage tanks containing the following substances: ► Diesel fuels and fuel oil in storage tanks with capacity ≤ 40,000 gallons or less ► Lubricating oil ► Transformer oil ► Used oil	R18-2-101.68.a.i
Gasoline storage tanks with capacity ≤ 10,000 gallons	R18-2-101.68.a.ii
Storage and piping of natural gas, butane, propane, or liquefied petroleum gas.	R18-2-101.68.a.iii
Storage and handling of drums or other transportable containers where the containers are sealed during storage, and covered during loading and unloading, including containers of waste and used oil regulated under RCRA.	R18-2-101.68.a.v
Storage tanks of any size containing exclusively soaps, detergents, waxes, greases, aqueous salt solutions, aqueous solutions of acids that are not regulated air pollutants, or aqueous caustic solutions.	R18-2-101.68.a.vi
Electrical transformer oil pumping, cleaning, filtering, drying and the reinstallation of oil back into transformers.	R18-2-101.68.a.vii
Internal combustion engine-driven compressors, internal combustion engine-driven electrical generator sets, and internal combustion engine-driven water pumps used for less than 500 hours per calendar year for emergency replacement or standby service.	R18-2-101.68.b
Batch mixers with rated capacity of 5 cubic feet or less.	R18-2-101.68.c.i
Equipment using water, water and soap or detergent, or a suspension of abrasives in water for purposes of cleaning or finishing.	R18-2-101.68.c.iv
Blast-cleaning equipment using a suspension of abrasive in water and any exhaust system or collector serving them exclusively.	R18-2-101.68.c.v

PCC Insignificant Activities and Sources	A.A.C. Citation
Housekeeping activities and associated products used for cleaning purposes, including collecting spilled and accumulated materials at the source, including operation of fixed vacuum cleaning systems.	R18-2-101.68.d.i
Architectural painting and associated surface preparation for maintenance purposes.	R18-2-101.68.d.iv
Noncommercial (in-house) experimental, analytical laboratory equipment, which is bench scale in nature, including quality control/quality assurance laboratories supporting a stationary source and research and development laboratories.	R18-2-101.68.e.i
Individual sampling points, analyzers, and process instrumentation, whose operation may result in emissions but that are not regulated as emission units.	R18-2-101.68.e.ii
General office activities, such as paper shredding, copying, photographic activities, and blueprinting, but not to include incineration.	R18-2-101.68.f.i
Use of consumer products, including hazardous substances as that term is defined in the Federal Hazardous Substances Act where the product is used at a source in the same manner as normal consumer use.	R18-2-101.68.f.ii
Installation and operation of potable, process, and wastewater observation wells.	R18-2-101.68.g.i

8. AIR POLLUTION CONTROL INFORMATION

The only air pollution control devices (APCD) at the Clarkdale Facility are baghouses and selective non-catalytic reduction (SNCR). The list of baghouses at the Clarkdale Facility is outlined in the Permit 69780 Attachment "C" (Equipment List). No changes to the APCDs at the Clarkdale Facility are being proposed.

9. REGULATORY APPLICABILITY

The following section outlines the regulatory applicability and requirements for the Clarkdale Facility. A list of requested permit updates based on facility and regulatory changes is also outlined in the section below.

9.1 PSD, Major NSR, and Title V Permitting Applicability

There are no physical changes or changes in the method of operation to the emission sources at the Clarkdale Facility being proposed in this permit renewal application. As such this permit action is not subject to any major NSR review at this time. The Clarkdale facility is a categorical source pursuant to A.A.C. R18-2-101.23 (Portland cement plants) i.e., fugitive emissions are included in determining major source status and an emissions threshold of 100 tons per year is used for PSD applicability determination. Note that the Clarkdale facility is an existing Title V and major PSD source.

9.2 Compliance Assurance Monitoring (CAM)

The U.S. Environmental Protection Agency (EPA) promulgated the CAM rule, 40 CFR 64, on October 22, 1997. Per EPA, the purpose of this rule, is "to provide a reasonable assurance of compliance with applicable requirements" pursuant to the Clean Air Act Amendments of 1990.

Per 40 CFR 64.2(a), CAM applies to emission units that satisfy all of the following criteria:

1. Emission units subject to an emission limitation or standard for a regulated air pollutant (or a surrogate thereof) except emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to Section 111 (includes New Source Performance Standards (NSPS) requirements) or 112 (includes National Emission Standard for Hazardous Air Pollutants (NESHAP) requirements) of the Clean Air Act (CAA).
2. Emission units that use a control device to achieve compliance with any such emission limitation or standard.
3. Emission units that have potential pre-control device emissions of the regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

For the emission sources that the pre-controlled emissions are greater than 100 tpy, emissions are monitored by a Continuous Emission Monitoring System (CEMS) satisfies the requirements of CAM.[2] Therefore, PCC continues to meet the requirements of CAM.

9.3 New Source Performance Standards

Based on the sources currently in operation, the Federal New Source Performance Standards (NSPS) program would apply to various sources at the Clarkdale Facility. Compliance with NSPS is also referred to in **Table 9-1**. The following section details the new applicability of NSPS regulations to the Clarkdale Facility for the proposed CAT emergency generator.

[2] Pursuant to 40 CFR 64.3(d)

9.3.1 40 CFR 60 Subpart IIII – Stationary Compression Ignition Internal Combustion Engines

40 CFR § 60.4200(a)(2), NSPS Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, provides standards of performance for owners and operators of stationary compression ignition (CI) Internal Combustion Engines (ICE) that were ordered after July 11, 2005, where the stationary CI ICE was manufactured after April 1, 2006, and is not a fire pump engine. Because PCC is not expecting to operate any stationary diesel engine at the Clarkdale Facility, no equipment will be subject to this subpart.

9.3.2 40 CFR 60 Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines

40 CFR § 60.4230(a)(2), NSPS Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*, provides standards of performance for owners and operators of stationary spark ignition (SI) Internal Combustion Engines (ICE) that were:

- Ordered after June 12th, 2006, if either:
  - Ordered after July 1st, 2007, with a maximum engine power ≥500 HP (except lean burn engines with a maximum engine power between 500 and 1,350 HP)
  - Ordered after January 1st, 2008, with a maximum engine power between 500 and 1,350 HP
  - Ordered after July 1st, 2008, with a maximum engine power ≤ 500 HP
  - Ordered after January 1st, 2009, for emergency engines with a maximum engine power > 25 HP
- Modified or reconstructed after June 12th, 2006

PCC is proposing to install natural gas-fired stationary SI ICEs at the Clarkdale Facility, and therefore this subpart does apply.

9.4 National Emission Standards for Hazardous Air Pollutants

All existing NESHAP requirements will continue to apply to the Clarkdale Facility. This section discusses the revisions to Subpart LLL since the last renewal as well as the NESHAP requirements for the proposed CAT emergency generator. Compliance with NESHAPs is included in **Table 9-1**.

9.4.1 National Emission Standards for Hazardous Air Pollutants (NEHSAPs) are contained in 40 CFR Part 63.

PCC is proposing to maintain all regulatory applicability contained in the current ADEQ Class I Permit 69780. The following are applicable changes in 40 CFR Part 63 Subpart LLL since the 2018 permit revision. PCC aims to keep the language in the permit consistent with the latest version of Subpart LLL (as of 2022), yet the Clarkdale Facility is not equipped with wet/dry scrubber or tray tower, nor does the Facility monitor SO_2 as a surrogate for HCl.

9.4.1.1 40 CFR §63.1350 Monitoring Requirements

- To comply with new requirements in §63.1350(l)(3), during a performance test, if SO_2 levels increase above the 30-day rolling average, PCC will conduct an inspection and take corrective action as soon as possible or within 30 days of exceedance. PCC will also conduct an HCl emissions compliance test within 90 days of an exceedance to determine compliance with the HCl emissions limit and to verify or re-establish the SO_2 CEMS operating limit.

9.4.1.2 40 CFR §63.1354 Reporting Requirements

- PCC, in accordance with §63.1354(b)(9), will submit a summary report semiannually within 60 days of the reporting period. The excess emissions and summary reports must be submitted no later than 60 days after the end of the reporting period, regardless of the method in which the reports are submitted.
- PCC will use the updated Compliance and Emissions Data Reporting Interface (CEDRI) website links in §63.1354(b)(9):
  - https://cdx.epa.gov for submitting a summary report, and;
  - Instead of using the electronic report in CEDRI, PCC may submit an alternate electronic file consistent with extensible markup language (XML) schema listed on the CEDRI website: https://www.epa.gov/electronic-reporting-air-emissions/compliance-and-emissions-data-reporting-interface-cedri
- Per new language in §63.1354(b)(9)(vi), within 60 days after the reporting periods, PCC will report all the calculated 30-operating day rolling average values derived from the SO_2 CEMS.

9.4.1.3 40 CFR §63.1355 Recordkeeping Requirements

- Per new language in §63.1355(e), PCC will continue to maintain records of the daily clinker production rates according to the clinker production monitoring requirements in §63.1350(d).

9.4.2 40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Pursuant to the requirements of 40 CFR § 63.6585, NESHAP Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, applies to facilities that own or operate a stationary reciprocating internal combustion engine (RICE), except if the stationary RICE is being tested at a stationary RICE test cell/stand. The proposed generator at the Clarkdale Facility is not being tested at a stationary RICE test cell/stand. Therefore, the generators will be subject to the requirements of NESHAP Subpart ZZZZ.

However, pursuant to the requirements of 40 CFR § 63.6590(c) "An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part" where 40 CFR § 63.6590(c)(1) states "A new or reconstructed stationary RICE located at an area source." Therefore, PCC will demonstrate compliance with NESHAP Subpart ZZZZ by complying with the applicable requirements in NSPS Subpart JJJJ noted above, and no other NESHAP Subpart ZZZZ requirements are applicable.

9.4.3 NSPS and NESHAP Compliance

Additional details regarding methods used for determining NSPS and NESHAP compliance are contained in **Table 9-1.**

Table 9-1. PCC Applicable Regulatory Requirements of NSPS and NESHAP and Methods for Demonstrating Compliance

Regulatory Citation for Applicable Requirements	Description of Requirements	Methods Used for Determining Compliance
40 CFR 60 Subpart A A.A.C. R18-2-902	Comply with general provisions under 40 CFR 60 Subpart A.	Facility procedure; maintenance of records
40 CFR 60 Subpart F A.A.C. R18-2-705	Comply with 40 CFR 60 Subpart F requirements for Portland cement plants constructed or modified after August 17, 1971.	Facility procedure; maintenance of records
40 CFR 60 Subpart Y A.A.C. R18-2-716	Comply with 40 CFR 60 Subpart Y requirements for coal processing and conveying equipment, coal storage systems, and coal transfer and loading systems.	Facility procedure; maintenance of records
40 CFR 60 Subpart OOO A.A.C. R18-2-702 and 722	Comply with 40 CFR 60 Subpart OOO requirements for quarry, raw material crushing/screening and sweetening operations constructed/modified after August 31, 1983.	Facility procedure; maintenance of records
40 CFR 60 Subpart JJJJ A.A.C. R18-2-901.85	Comply with 40 CFR 60 Subpart JJJJ requirements for emergency engines ordered after July 1, 2007.	Facility procedure; maintenance of records
40 CFR 63 Subpart A A.A.C. R18-2-1102	Comply with general provisions under 40 CFR 63 Subpart A.	Facility procedure; maintenance of records
40 CFR 63 Subpart LLL A.A.C. R18-2-1101	Comply with 40 CFR 63 Subpart LLL requirements for the Portland cement manufacturing industry.	Facility procedure; maintenance of records

9.5 Arizona Administrative Code Applicability

This section summarizes the existing regulations from the A.A.C Title 18 Chapter 2 Department of Environmental Quality – Air Pollution Control. PCC will adhere to the state compliance regulations in **Table 9-1** below and those included in **Table 9-2**.

Table 9-2. Clarkdale Facility Arizona Applicable Regulatory Requirements and Methods for Determining Compliance

Regulatory Citation for Applicable Requirements	Description of Requirements	Methods Used for Determining Compliance
A.A.C. R18-2 Article 3	These standards define permit and permit revision requirements	Facility procedure; maintenance of records

Regulatory Citation for Applicable Requirements	Description of Requirements	Methods Used for Determining Compliance
A.A.C. R18-2-604, 605, 606, 612, and 614	These standards apply to non-point sources that are for limiting emissions from open areas, dry washes, riverbeds, roadways, streets, material handling, and storage piles. Also includes a general 40% opacity limit.	Facility procedure; maintenance of records
A.A.C. R 18-2-702	This standard is applicable to all fugitive dust sources at the facility, any abrasive blasting operations, spray-painting operation, coal preparation, cooling towers, quarry, raw material crushing, screening, and sweetening.	Facility procedure; maintenance of records
A.A.C. R18-2-702.B.3	For all sources described in A.A.C. R18-2-702.A (except as otherwise provided in Title 18, Chapter 2 of the A.A.C. relating to specific types of sources): • Opacity ≤ 20% If the presence of uncombined water is the only reason for an exceedance of the opacity limit, the exceedance shall not constitute a violation.	Facility procedure; records of monthly visual surveys; records of Method 9 observations.
A.A.C. R 18-2-710	This standard is applicable to the 8,000-gallon gasoline storage tank.	Facility procedure; maintenance of records
A.A.C. R 18-2-716	This standard is applicable to coal preparation activities at the facility.	Facility procedure; maintenance of records
A.A.C. R 18-2-719	This standard is applicable to existing stationary rotating machinery such as the emergency fire pump.	Facility procedure; maintenance of records
A.A.C. R 18-2-722	This standard is applicable to all quarry, raw material crushing, screening, and sweetening operations at the facility.	Facility procedure; maintenance of records
A.A.C. R 18-2-726	This standard is applicable to all abrasive blasting sources at the facility.	Facility procedure; maintenance of records
A.A.C. R 18-2-730	The Cooling Tower and Evaporative Condenser are regulated under the Standards of Performance for Unclassified Sources under this rule.	Facility procedure; maintenance of records
A.A.C. R 18-2-801, 802, and 804	These are applicable to off-road mobile sources, which either move while emitting air pollutants or are frequently moved during their utilization.	Facility procedure; maintenance of records
A.A.C. R 18-2-1101.A.12	This standard is applicable to any asbestos related demolition or removing operations.	Facility procedure; maintenance of records

10. PERMIT PROCESSING FEE

In accordance with A.A.C R18-2-326, Fees Related to Individual Permits, and the ADEQ Permit Fee Schedule[3] (effective November 1, 2022), no fee is being submitted with this Class I permit application. However, PCC agrees to pay the $186.10 per hour processing fee required based on the total actual time spent by ADEQ staff on processing this application as well as any fees associated with public notice.

[3] https://static.azdeq.gov/aqd/aqd_class_fees.pdf

11. COMPLIANCE PLAN AND CERTIFICATION

As required by A.A.C. R18-2-304(B)(8)(b), PCC is committed to maintaining compliance as follows:

- Compliance certification.

  The Clarkdale Facility is in compliance with all applicable requirements noted as applicable to the Project in **Table 9-1** and **Table 9-2** of this application. PCC determined compliance using the methods described in each of the tables for the applicable requirements identified therein.

- For applicable requirements with which the source is in compliance at the time of permit issuance.

  The Clarkdale Facility will continue to comply with all existing applicable requirements.

- For applicable requirements that will become effective during the permit term.

  The Clarkdale Facility will meet in a timely manner applicable requirements that become effective during the permit term. PCC is not presently aware of any particular applicable requirements requiring a more specific future schedule. Furthermore, PCC shall submit a compliance certification annually which describes the compliance status of the Clarkdale Facility with respect to each permit condition.

- A schedule of compliance for sources that are not in compliance with all applicable requirements at the time of permit issuance. Such a schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the source will be in noncompliance at the time of permit issuance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject. Any such schedule of compliance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based.

  The Clarkdale Facility is not out of compliance with any applicable requirements. Therefore, no compliance schedule is required.

- A schedule for the submission of certified progress reports no less frequently than every 6 months for sources required to have a schedule of compliance to remedy a violation.

  The Clarkdale Facility is not subject to a compliance schedule and therefore is not subject to a requirement to schedule certified progress reports.

APPENDIX A. O&MP PLAN

OPERATION AND MAINTENANCE PLAN
FOR
AFFECTED SOURCES UNDER 40 CFR 63 SUBPART LLL

PHOENIX CEMENT COMPANY
CLARKDALE, ARIZONA

PHOENIX CEMENT COMPANY
P.O. Box 428
601 North Cement Plant Road
Clarkdale, Arizona 86324

Submitted to:

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
1110 West Washington Street
Phoenix, AZ 85007-2935

Revised December 2017

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PART A

ELEMENTS OF THE OPERATING AND MAINTENANCE PLAN

1. INTRODUCTION

This Operations and Maintenance Plan (O&M Plan) specifies the procedures and actions that must be conducted for all affected sources under Subpart LLL of Title 40 of the Code of Federal Regulations Part 63 (40 CFR 63), and their associated air pollution control devices (APCDs), if applicable. The procedures in the O&M Plan, for proper operation and maintenance of affected sources and APCDs, are specified to ensure compliance with the applicable emission limits and operating limits of Subpart LLL.

The O&M Plan is designed to be a manual for Phoenix Cement Company (PCC) operators and technicians who are responsible for maintaining affected sources and APCDs in proper operating condition. The Plan outlines procedures for operation and maintenance to provide continuing compliance; specific actions to be taken when monitoring indicates such actions are needed; inspection procedures; opacity monitoring procedures; and required installation, calibration and quality assurance specifications for continuous temperature monitors.

This O&M Plan consists of two parts: Part A and Part B. Part A includes the following sections. Section 1.0 is the introduction. Section 2.0 provides a summary of all affected sources and APCDs, applicable emission limits and operating limits, and applicable monitoring requirements. Section 3.0 briefly describes general operation and maintenance for affected sources and APCDs. Section 4.0 briefly describes corrective actions to be taken when visible emissions are observed from the raw mill and finish mill APCDs. Section 5.0 provides procedures to be used during inspections of components of the combustion system of the in-line kiln/raw mill. Section 6.0 contains procedures to be used for periodic monitoring of affected sources subject to opacity standards for raw mills, finish mills, material handling and storage sources.

Part B includes specific, detailed procedures and technical documents. Section 7.0 includes a detailed summary of the operation and maintenance requirements for affected-source dust collectors. Section 8.0 contains a detailed summary of the corrective actions required when visible emissions are observed during visual emissions observations. Section 9.0 includes inspection procedures for components of the combustion system of the in-line kiln/raw mill. Section 10.0 contains the specific procedures of the United States Environmental Protection Agency (EPA) Method 22 and Method 9.

2. AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Table 2-1 is a summary of affected sources, applicable emission limits, operating limits, and monitoring requirements of Subpart LLL.

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Raw Grinding System No. 1	Air Slide	AC-301	DC-301	10% Opacity	Daily Method 22
	Air Slide	AC-302	DC-301	10% Opacity	Daily Method 22
	Air Slide	AC-316	DC-301	10% Opacity	Daily Method 22
	Raw Mix Bin	B-301	DC-304	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-300	DC-304	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-303	DC-301	10% Opacity	Daily Method 22
	Dryer	FR-300	DC-301	10% Opacity	Daily Method 22
	Dryer	FR-301	DC-301	10% Opacity	Daily Method 22
	Ball Mill	BM-301	DC-301	10% Opacity	Daily Method 22
	Elevator	E-301	DC-301	10% Opacity	Daily Method 22
	Separator	SE-300	DC-301	10% Opacity	Daily Method 22
	Cyclone	CY-300	DC-301	10% Opacity	Daily Method 22
	Cyclone	CY-301	DC-301	10% Opacity	Daily Method 22
	FK Pump	PN-301	DC-304	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-341	DC-304	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-301	DC-301	10% Opacity	Daily Method 22
	Weigh Feeder	W-301	DC-304	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-310	DC-304	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Swing Grinding System No. 2	Air Slide	AC-304	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-305	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-306	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-311	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-313	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-314	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-317	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-321	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-322	DC-302	10% Opacity	Daily Method 22
	Air Slide	AC-329	DC-302	10% Opacity	Daily Method 22
	Raw Mix Bin	B-302	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-304	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Ball Mill	BM-302	DC-302	10% Opacity	Daily Method 22
	Dryer BM-302	FR-302	DC-302	10% Opacity	Daily Method 22
	Bucket Elevator	E-302	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-302	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-303	DC-302	10% Opacity	Daily Method 22
	Screw Conveyor	SC-304	DC-302	10% Opacity	Daily Method 22
	Screw Conveyor	SC-308	DC-302	10% Opacity	Daily Method 22
	Screw Conveyor	SC-311	DC-305	10% Opacity	Monthly Method 22 - O&M Plan
	Separator	SE-303	DC-302	10% Opacity	Daily Method 22
	Separator	SE-304	DC-302	10% Opacity	Daily Method 22
	Weigh Feeder	W-303		10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Feed Blending	Air Slide	AC-607	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-608	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Raw Meal Silo	S-601	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Raw Meal Silo	S-602	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Homogenizing Silo	S-605	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-609	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-601	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-602	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-600	DC-606	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-601	DC-606	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-601A	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-602	DC-605	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-602A	DC-601	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-603	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-604	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC·60S	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-606	DC-607	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-600	DC-601	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Kiln Feed	Alleviator	AM-407	DC-409	10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-407	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-408	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-409	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-410	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-413	DC-411	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-414	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-415	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Feeder	WS-404	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
	Feeder	WS-405	DC-410	10% Opacity	Monthly Method 22 - O&M Plan
Raw Grinding System No. 3	Apron Feeder	AF-360	DC-431	[1]	PM CPMS [3]
	Air Slide	AC-360	DC-411	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-361	DC-411	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-362	DC-411	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-363	DC-367	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-364	DC-368	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-360	DC-366	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-361	DC-366	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-363	DC-366	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-360	DC-366	10% Opacity	Monthly Method 22 - O&M Plan
	Raw Mill Seal Bin	B-360	DC-366	10% Opacity	Monthly Method 22 - O&M Plan
	Cyclone	CY-360	DC-431	[1]	PM CPMS [3]
	Cyclone	CY-361	DC-431	[1]	PM CPMS [3]
	Raw Mill	RM-306	DC-431	[1]	PM CPMS [3]

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
	Separator	SE-360	DC-431	[1]	PM CPMS [3]
	Spillage Conveyor	BC-362	DC-431	[1]	PM CPMS [3]
	FK Pump	PN-402	DC-367	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-403	DC-367	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-430	DC-431	[1]	PM CPMS [3]
	Screw Conveyor	SC-431	DC-431	[1]	PM CPMS [3]
	Screw Conveyor	SC-432	DC-431	[1]	PM CPMS [3]
Pyro-Processing System	Eductor	FMRS-404	DC-431	[1]	PM CPMS [3]
	Pre-Heater	PH-404	DC-431	[1]	PM CPMS [3]
	Pre-Heater	PH-405	DC-431	[1]	PM CPMS [3]
	Pre-Heater	PH-406	DC-431	[1]	PM CPMS [3]
	Pre-Heater	PH-407	DC-431	[1]	PM CPMS [3]
	Pre-Heater	PH-408	DC-431	[1]	PM CPMS [3]
	Calciner	CAL-404	DC-431	[1]	PM CPMS [3]
	Kiln	K-404	DC-431	[1]	PM CPMS [3], Continuous Temperature, Continuous Pressure
	Clinker Cooler	CC-404	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-461	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-462	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-463	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-465	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-466	DC-445	[2]	PM CPMS [4]
	Screw Conveyor	SC-467	DC-445	[2]	PM CPMS [4]

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Clinker Transport	Belt Conveyor	BC-402	DC-448	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-403	DC-212	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-404	DC-447	10% Opacity	Monthly Method 22 - O&M Plan
	Pan Conveyor	DBC-404	DC-446	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Bin	B-404	DC-447	10% Opacity	Monthly Method 22 - O&M Plan
	Vibrating Feeder	VF-404	DC-447	10% Opacity	Monthly Method 22 - O&M Plan
Clinker Storage & Transport	Belt Conveyor	BC-216	DC-213	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-217	DC-214	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-309	DC-316	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Storage Dome	DO-200	DC-213	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Storage Dome	DO-201	DC-214	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-310	DC-312	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Feed Loadout	LSP	DC-618	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Mill Feed Clinker & Gypsum Handling	Gypsum Bin	B-300		10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Bin	B-303	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Bin	B-340	DC-342	10% Opacity	Monthly Method 22 - O&M Plan
	Gypsum Bin	B-341	DC-342	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-312	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-312	DC-312	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-313	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-350	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Clinker Bin	B-350	DC-312	10% Opacity	Monthly Method 22 - O&M Plan
	Gypsum Bin	B-351	DC-312	10% Opacity	Monthly Method 22 - O&M Plan
	Scavenger Conveyor	SC-350	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Scavenger Conveyor	SC-351	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Weigh Feeder	W-350	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Weigh Feeder	W-351	DC-352	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Finish Milt BM-303	Air Slide	AC-307	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-308	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-309	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-312	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-315	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-318	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-323	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-324	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-330	DC-303	10% Opacity	Daily Method 22
	Air Slide	AC-331	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-305	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Ball Mill	BM-303	DC-303	10% Opacity	Daily Method 22
	Bucket Elevator	E-303	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-305	DC-303	10% Opacity	Daily Method 22
	Screw Conveyor	SC-309	DC-303	10% Opacity	Daily Method 22
	Screw Conveyor	SC-306	DC-303	10% Opacity	Daily Method 22
	Separator	SE-305	DC-303	10% Opacity	Daily Method 22
	Separator	SE-306	DC-303	10% Opacity	Daily Method 22
	Weigh Feeder	W-305		10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Finish Mill BM-304	Air Slide	AC-340	DC-341	10% Opacity	Daily Method 22
	Air Slide	AC-341	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-342	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-343	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-344	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-346	DC-341	10% Opacity	Daily Method 22
	Air Slide	AC-347	DC-341	10% Opacity	Daily Method 22
	Fly Ash Bin	B-342	DC-309	10% Opacity	Monthly Method 22 - O&M Plan
	Hydrated Lime Bin	B-343	DC-308	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-341	DC-344	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-342	DC-344	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-343	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Ball Mill	BM-304	DC-341	10% Opacity	Daily Method 22
	Bucket Elevator	E-340	DC-341	10% Opacity	Daily Method 22
	FK Pump	PN-340	DC-343	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
	Screw Conveyor	SC-320	DC-341	10% Opacity	Daily Method 22
	Screw Conveyor	SC-316	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-317	DC-306	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-340	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-341	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-342	DC-341	10% Opacity	Daily Method 22
	Separator	SE-307	DC-340	10% Opacity	Monthly Method 22 - O&M Plan
	Weigh Belt Conveyor	W-340	DC-341	10% Opacity	Daily Method 22
	Weigh Belt Conveyor	W-341	DC-341	10% Opacity	Daily Method 22
	Weigh Belt Conveyor	W-342		10% Opacity	Monthly Method 22 - O&M Plan
	Hopper w/Scale	WS-340	DC-341	10% Opacity	Daily Method 22
	Hopper w/Scale	WS-341	DC-341	10% Opacity	Daily Method 22

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Clinker Grinding OK Mill	FKPump	PN-350	PDC-350	10% Opacity	Daily Method 22
	FKPump	PN-351	PDC-351	10% Opacity	Daily Method 22
	Air Slide	AC-350	ACV-352 & ACV-353	10% Opacity	Daily Method 22
	Air Slide	AC-351	ACV-351	10% Opacity	Daily Method 22
	Air Slide	AC-352	AC-352	10% Opacity	Daily Method 22
	Air Slide	AC-353	ACV-353	10% Opacity	Daily Method 22
	Air Slide	AC-354	DC-350	10% Opacity	Daily Method 22
	Air Slide	AC-355	DC-350	10% Opacity	Daily Method 22
	Surge Bin	B-352	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-351	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-350	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Chain Conveyor	DCH-350	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Chain Conveyor	DCH-351	DC-352	10% Opacity	Monthly Method 22 - O&M Plan
	Dryer	FR-350	DC-350	10% Opacity	Daily Method 22
	OK Mill	RM-305	DC-350	10% Opacity	Daily Method 22
	Separator	SE-308	DC-350	10% Opacity	Daily Method 22

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Bag Packing	Air Slide	AC-501	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-502	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-505	DC-503	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-506	DC-503	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-513	DC-505	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-514	DC-504	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-515	DC-504	10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-501	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-502	DC-505	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BBG-501	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-501	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-501	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Bucket Elevator	E-502	DC-505	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
	Bag Packer	BP-503	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Bag Cutter	BS-501	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	FK Pump	PN-502	PDC-502	10% Opacity	Monthly Method 22 - O&M Plan
	Rotary Screen	RSC-501	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-503	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-504	DC-511	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-505	DC-501/505	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-506	DC-501/505	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-507	DC-501/505	10% Opacity	Monthly Method 22 - O&M Plan
	Screw Conveyor	SC-508	DC-501/505	10% Opacity	Monthly Method 22 - O&M Plan
	Vibratory Feeder	VF-501	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Vibratory Feeder	VF-502	DC-505	10% Opacity	Monthly Method 22 - O&M Plan
Bulk Loading	East Side Scale Loadout	AC-507	DC-503	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-508	DC-504	10% Opacity	Monthly Method 22 - O&M Plan
	West Side Scale Loadout	AC-509	DC-504	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-511	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-512	DC-501	10% Opacity	Monthly Method 22 - O&M Plan
	West Side Scale Loadout	LSP	DC-504	10% Opacity	Monthly Method 22 - O&M Plan
	East Side Scale Loadout	LSP	DC-503	10% Opacity	Monthly Method 22 - O&M Plan
	Silo 15/16 Loadout	LSP	DC-507	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Cement Storage	Screw Conveyor	SC-510	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Silo 15	S-15	DC-S12	10% Opacity	Monthly Method 22 - O&M Plan
	Silo 16	S-16	DC-512	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 1	S-1	DC-508	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 2	S-2	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 6	S-6	DC-508	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 7	S-7	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 11	S-11	DC-508	10% Opacity	Monthly Method 22 - O&M Plan
	South Finish Silo 12	S-12	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 3	S-3	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 4	S-4	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 5	S-5	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 8	S-8	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 9	S-9	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 10	S-10	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 13	S-13	DC-510	10% Opacity	Monthly Method 22 - O&M Plan
	Cement Silo 14	S-14	DC-510	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Raw Material Sweetening	Bin	B-224	DC-224	10% Opacity	Monthly Method 22 - O&M Plan
	Apron Feeder	AF-224	DC-224	10% Opacity	Monthly Method 22 - O&M Plan
	Weigh Feeder	WF-224	DC-224	10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-226		10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-227		10% Opacity	Monthly Method 22 - O&M Plan
	Apron Feeder	AF-226		10% Opacity	Monthly Method 22 - O&M Plan
	Apron Feeder	AF-227		10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-226		10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-227		10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	SCV-226		10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	SCV-227		10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-211A	DC-228	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-211B	DC-228	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	DBC-228	DC-228	10% Opacity	Monthly Method 22 - O&M Plan
	Bin	B-228	DC-228	10% Opacity	Monthly Method 22 - O&M Plan
	Apron Feeder	AF-228	DC-228	10% Opacity	Monthly Method 22 - O&M Plan
	Belt Conveyor	BC-228	DC-228	10% Opacity	Monthly Method 22 - O&M Plan

TABLE 2-1: AFFECTED SOURCES AND APPLICABLE REQUIREMENTS

Process	Equipment Type	Equipment ID Number	Dust Collector ID Number	Emissions Limit	Monitoring Requirement
Blending System	Air Slide	AC-365	DC-608/615	10% Opacity	Monthly Method 22 - O&M Plan
	Elevator	E-606	DC-608/615	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-613	DC-608/615	10% Opacity	Monthly Method 22 - O&M Plan
	Feed Discharge System	FDS-606	DC-609/616	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-610	DC-609/616	10% Opacity	Monthly Method 22 - O&M Plan
	Silo	S-606	DC-609/616	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-611	DC-609/616	10% Opacity	Monthly Method 22 - O&M Plan
	Feed Discharge Bin	B-606	DC-610/617	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-614	DC-609/616	10% Opacity	Monthly Method 22 - O&M Plan
	Elevator	E-607	DC-608/615	10% Opacity	Monthly Method 22 - O&M Plan
	Air Slide	AC-612	DC-610/617	10% Opacity	Monthly Method 22 - O&M Plan

[1] - PM <0.30 lb/ton-feed, Opacity <20%, D/F <0.20 ng/dscm (corrected). When the raw mill is operating, temperature of the main in-line kiln/raw mill exhaust gases must not exceed the applicable temperature limit established in the most recent performance test when the raw mill was operating. When the raw mill is not operating, temperature of the main in-line kiln/raw mill exhaust gases must not exceed the applicable temperature limit established in the most recent performance test when the raw mill was not operating.

[2] - PM < 0.10 lb/ton-feed, Opacity <10%.

[3] - PM CPMS is required for Kiln (K-404) /Dust Collector (DC-431) per §63.1350(b).

[4] - PM CPMS is required for Clinker Cooler (CC-404) /Dust Collector (DC-445) per §63.1350(b).

3.1. KILN AND CLINKER COOLER

Operators of the in-line kiln and raw mill, and the clinker cooler shall operate these affected sources according to the Installation, Operation and Maintenance Procedures specified by F.L. Smidth Inc. (FLS) to optimize combustion conditions. Particulate (PM) and visible emissions from the kiln/raw mill are controlled by a Fuller 259,200 acfm fabric filter baghouse (DC-431); and clinker cooler emissions are controlled by a Fuller, 138,000 acfm fabric filter baghouse (DC-445). Both baghouse exhaust streams are monitored by Rosemount Analytical transmissometers. In addition, both baghouses are continuously monitored to demonstrate pressure drop indicator ranges are not exceeded.

3.2. DUST COLLECTORS

Part B, Section 7.0, of this O&M Plan provides a detailed summary of the operation and maintenance requirements for all dust collectors controlling PM emissions from affected sources {identified in Table 2-1} under 40 CFR 63, Subpart LLL.

4. CORRECTIVE ACTIONS

Part B, Section 8.0 of this O&M Plan provides a detailed summary of the corrective actions required (when visible emissions are observed) for dust collectors controlling PM emissions from affected sources (identified in Table 2-1) under 40 CFR 63, Subpart LLL.

This O&M Plan is required to include corrective actions to be taken when required by paragraph (e) of Section 63.1350 of Subpart LLL. Paragraph (f) of that section requires daily, six-minute visual emissions observations of mill sweep and air separator PM control devices for affected raw mills and finish mills. The visual emissions observations must be conducted in accordance with the procedures of EPA Method 22 and conducted while the affected raw mill or finish mill is operating at the highest load or capacity level reasonably expected to occur within the day. If visible emissions are observed, specific actions must be taken, as summarized below:

- Initiate, within one hour, the corrective actions specified in the O&M Plan (Part B, Section 8.0); and
- Within 24 hours of the end of the Method 22 test in which visible emissions were observed, conduct a visual opacity test of each stack from which visible emissions were observed in accordance with EPA Method 9. The duration of the Method 9 test shall be 30 minutes.

5. PROCEDURES FOR COMBUSTION SYSTEM AND INSPECTIONS

The components of the combustion system of the in-line kiln/raw mill shall be inspected at least once per year. Part B, Section 9.0 of this O&M Plan provides comprehensive inspection procedures.

6. OPACITY MONITORING PROCEDURES

As shown in Table 2-1, opacity standards apply to all Subpart LLL affected sources and periodic monitoring requirements are listed for each source. The following paragraphs specify monitoring procedures to be followed for each type of monitoring listed in Table 2-1.

1. Monthly Method 22 (O&M Plan) - At each affected source for which Table 2-1 specifies "Monthly Method 22 (O&M Plan)", conduct a one-minute visible emissions test in accordance with the EPA Method 22 procedures provided in Part B, Section 10.0. *Initially*, the one-minute Method 22 test must be conducted on a monthly basis.

   If no visible emissions are observed in six consecutive monthly tests of any affected source, the frequency of testing may be decreased from monthly to semi-annually for that affected source. If visible emissions are observed during any semi-annual test, a monthly testing frequency must be resumed for that source, and the monthly schedule must be maintained until no visible emissions are observed in six consecutive monthly tests.

   If no visible emissions are observed during the semi-annual test of any affected source, the frequency of testing may be decreased from semi-annually to annually for that affected source. If visible emissions are observed during any annual test, a monthly testing frequency must be resumed for that source and the monthly schedule must be maintained until no visible emissions are observed in six consecutive monthly tests.

   If visible emissions are observed during any Method 22 test, a six-minute test of opacity must be conducted in accordance with EPA Method 9 (Part B, Section 10.0). The Method 9 test must begin within one hour of any observation of visible emissions.

2. Daily Method 22 - At each affected source for which Table 2-1 specifies "Daily Method 22", conduct a six minute Method 22 visible emissions test while the mill is operating at the highest expected capacity. Conduct each test on a daily basis. If visible emissions are observed, corrective action must be initiated within one hour (Part B, Section 8.0). Conduct a 30-minute Method 9 test within 24 hours of the observation of visible emissions.

PART B

SPECIFIC PROCEDURES AND TECHNICAL DOCUMENTS

7. DUST COLLECTOR OPERATION AND MAINTENANCE PROCEDURES

Particulate Matter Control Device Requirements

1. **Specifications:**

   - All particulate matter control devices shall meet an emission rate at or less than an outlet grain loading of 0.02 grains / $ft.^3$ of air.
   - Particulate matter control devices shall be of the Jet-Pulse design with the following features:
     - Self cleaning with high pressure pulse jets of air.
     - Top bag removal.
     - Snap-in bags.
     - Cartridge type filters.
     - Self-supporting cages with integral venturi nozzles.
     - Timer for cleaning individual rows of bags.
     - Double tipping valves and rotary air locks at dust hopper outlet.
     - Differential pressure transmitters for on demand bag cleaning.
     - Noise level less than or equal to 85db at a distance of 3 ft.
     - Service platform and caged ladder when needed.
   - All piping shall meet the following:
     - Air flow velocities shall be between 3500 – 4000 ft./sec.
     - Pipe bends shall have a minimum radius of 2 x pipe diameter.
     - Pick up points shall be designed in accordance with the standards set forth in "Industrial Ventilation" published by American Conference of Governmental Industrial Hygienists.
   - Fans shall be designed so that noise levels are less than or equal to 85db at a distance of 3 ft.

2. **Installation:**

   - All particulate matter control device and fan installations shall provide adequate access for personnel and any maintenance activities that might be needed.
   - Clean air shall be provided for bag the cleaning system.

3. **Operation:**

- All operation shall be followed according to manufactures guidelines and specifications, located in maintenance files. At no time shall a dust collector be modified without proper engineering and required air permitting.

Monitoring – Particulate Matter Control Devices

1. **Process Particulate Matter Control Devices:**

   - Static pressure across the particulate matter control device shall be monitored by the use of a differential pressure transmitter gauge and fan amperes. The differential pressure transmitter will have an output signal to the control room as well as a dial for readings taken at the dust collector. If a control room operator gets an alarm of a high or low differential pressure reading or a variation in fan amperes he will notify the shift foreman. The shift foreman will investigate the nature of the problem and corrective actions will be taken as follows:
     - If the foreman detects visible emissions he will initiate an excursion work order and call a particulate matter control device repairman to fix the problem. The repairman will follow the guide lines in the "Trouble Shooting Section" to make the needed repairs.
     - If no visible emissions are detected he will initiate an excursion work order and call an instrument repairman to check the instruments.
     - The foreman will log all incidents in his shift log.
   - All incidents requiring instrument or particulate matter control device maintenance personnel will be logged into the computerized MP2 maintenance system as an excursion work order, identified by the particulate matter control device nomenclature.
   - After any repairs are done due to visible emissions, a visual emissions check will be made to ensure the particulate matter control device is operating properly before it is released to production personnel.

2. **Utility Particulate Matter Control Devices:**

   - It is the responsibility of all Phoenix Cement Company employees to report any visible emissions from any particulate matter control device when observed. Utility dust collectors are checked weekly by particulate matter control device repairmen and the results of their inspections are recorded in their maintenance logs. If visible emissions are reported by an employee or particulate matter control device repairman the following actions are taken:

- The shift or dust particulate matter control device foreman is notified. In the event a shift foreman is notified he will follow the procedures for process particulate matter control devices. If the dust particulate matter control device foreman is notified he will instruct the needed personnel to repair the problem.
- After repairs have been made according to the particulate matter control device foreman's instructions, repairs will be logged into the computerized MP2 maintenance system. Before releasing the particulate matter control device to production personnel a visual emissions check will be made to ensure the proper operation of the particulate matter control device.

Inspection and Maintenance

1. Scheduled Inspections:

- All particulate matter control devices will have a weekly inspection by a particulate matter control device repairman. The inspections will be setup in the computerized MP2 maintenance system and all inspection reports will be logged onto the system. The following items will be inspected:
  - Inspect for visible emissions.
  - Check differential pressure to be sure it is in the normal range for that particular dust collector.
  - Inspect blow pipe valves for malfunction.
  - Determine whether water trap on air header are properly draining.
  - Inspect fan for vibration, hot bearings, loose belts, and air leaks.
  - Inspect ductwork for holes.
  - Check damper linkage and proper damper setting (if equipped).
  - Check for proper operation of the tipping valves or rotary air lock at the dust hopper outlet.
  - Inspect dust hopper for plugging.
  - Inspect the screw or aeroslide under the tipping valves or rotary feeder for malfunctions.
  - Inspect dust collector inlet pipes for plugging.
  - Check air connections and instrumentation connections.
  - Inspect manometer for fluid (if equipped).
  - Inspect particulate matter control device housing for cracks and holes.
  - Inspect timer operation.

- Inspect timer to determine whether it is operating according with specifications located in maintenance files.

2. Repairman Duties and Responsibilities:

- The primary responsibility of the repairman are to:
  - Install and maintain various types of particulate matter control devices.
  - Maintain internal and external equipment associated with dust collection.
  - Maintain airlines, airline oilers, and cylinders.
  - Make repairs to particulate matter control device equipment.
  - Trouble shoot any particulate matter control device problem and determine what repairs will be needed.
  - Make inspection reports for particulate matter control devices.
  - Check for visible emissions and record differential pressure in inspection report.
  - Immediately notify particulate matter control device foreman of any operational problems associated with the particulate matter control device.
  - Be available on off hours if needed for urgent repair work.

Particulate Matter Control Device Startup and Shutdown

1. General Conditions:

- When new bags are installed, the particulate matter control device must be brought on-line slowly to avoid permanent damage to the filtration media. Without protective dust cake, clean filters are sensitive to dust abrasion and penetration of fine particles. Dust penetration can lead to permanently reduced permeability. The velocity should always be kept low until a sufficient dust cake is built on the bags. This will be indicated by a pressure differential of 1-2 inches water column. The gas flow can then be slowly increased to the design rate.

2. Startup:

- Ensure all particulate matter control device components are in good working order and are in proper operating mode.
- Avoid passing below the dew point when dirty gases are present. The air in the system should be above the dew point before the introduction of feed into the system.
- Check monitoring devices for proper operation and calibration.

3. Shutdown:

- Remove the feed into the system before allowing the temperature to descend below the dew point. As the collector cools, moisture may condense on the bags once dew point is reached. The inlet and outlet temperatures should be consistent and below the dew point.
- Do not store dust in the hopper. The presence of any moisture can cause it to harden, making it very difficult to remove.
- Allow bags to clean down after dust has stopped entering the hopper and remove this material from the hopper, but do not over clean the filters.
- Check to see that all components are in the proper shutdown mode.

General Operation and Troubleshooting

1. Particulate Matter Control Device Fans:

- As ventilation system changes are needed to accommodate increased production, ventilation needs, or process changes, more airflow is required. If a system has not changed, but airflows are not at the designed level, troubleshooting the fan may return the system to the designed performance level. Follow these steps for checking fan performance:
  - **Check the mechanical condition of the fan.**

    Inspect the fan drive belts for loose or out of alignment conditions. This condition could account for as much as a 20% decrease in fan speed. Check the alignment of the inlet cone and fan wheel. Set to manufactures designed settings for maximum fan performance.
  - **Keep the fan clean.**

    If dust buildup is detected on the fan wheel it must be cleaned to return the fan to it's peak designed capacity.
  - **Check for correct rotation.**

    If repairs are done to the fan motor, rotation must be correct for the fan to move the designed airflow. Fan rotation must also be checked on startup of any new fan installation.
  - **Check dampers and controls.**

    Look for stiff operating dampers or looseness in the control linkage.
- At no time shall a fan be operated beyond its designed speed. If more airflow is required for the system, engineering will be consulted as to any desired changes to the fan or particulate matter control device. Prior to any changes to the fan or particulate matter

control device, air operating permits will be checked and a determination will be made as to the need for permit modifications.

2. **Differential Pressures:**

- Differential pressure across a dust collector is of major concern when operating a system. High differential pressure can cause damage to the filters or be an indication of decreased airflow through the system. Low differential pressure can cause fabric bleedthrough and blinding if the dust cake is too light.
- The location of differential pressure taps is critical to proper pressure monitoring. Pressure taps will be located directly above and below the tubesheet to eliminate mechanical losses in the gauge readings. One of the following pressure gauges will be used; manometer, Magnahelic, or differential pressure transmitter. A sudden drop in pressure will indicate a leak in the system. A sharp rise in pressure will indicate the filters are blinded or "caked" with particulate.
- For a particulate matter control device to operate efficiently, the fabric filters must capture and release particulate during the cleaning cycle. The effectiveness of this process depends on the development of an initial control layer of dust that protects the fabric interstices.

3. **Pulse-Jet Types:**

- In pulse-jet particulate matter control devices, the cleaning function not only removes the collected dust, it rearranges the remaining dust cake structure on the bag, resulting in a change in differential pressure. In a unit with high upward gas velocities, mechanical separation of the fine submicron dust can occur, creating a dust cake structure that is very dense. A dense dust cake creates a greater resistance to airflow and higher differential pressures.
- **Pulse Cycle.**

  The cleaning cycle for standard high pressure, low volume pulse-jet collectors should be adjusted so the pulse duration produces a short, crisp pulse that creates an effective shock wave in the bag. This duration is generally set to fire for 0.10 to 0.15 second, based on the manufactures recommendations. (Other styles, such as low pressure, high volume pulsing and medium pressure, medium volume, use different settings to operate and should be examined on an individual basis.)

  The frequency of the pulse cleaning is also vital to proper dust cake retention. This frequency can vary from 1 to 30 seconds or more and is adjusted by means of a setting on the timer board or PLC.

  To ensure proper cleaning frequency, an automatic "clean-on-demand" system utilizing a pressure switch such as a differential pressure transmitter can be installed. This type of system automatically steps through a cleaning cycle that starts when the high differential pressure set point is reached and stops when it cleans down to the low

differential pressure set point. It can also save on compressed air usage. The range on the high/low differential setting should be 0.5-1.0 inches maximum.

On pulse-jet types, the pulse frequency can be increased. However, the next pulse should not be programmed to fire until the compressed air pressure is regained so the same pulse force is obtained for each row cleaned. The regain of air pressure is dependent on the capability of the compressed air system tied to the dust collector and the size of the compressed air piping run to the header tank. The pipe should be large enough to repressurize the header in a minimum time. Typically, the feed line should be a 1 inch diameter pipe, depending on compressed air used.

- **Troubleshooting Pulse-Jet Cleaning.**

  Pulse-valve malfunctions are usually caused by diaphragm failure or dirt, oil, and / or moisture getting into the valve body. These problems can be identified by disassembling the valve and inspecting it. Before checking valves, verify that the tubing and fittings between diaphragm (pulse) valves and solenoid valves are not leaking, and that the tubing is connected to the inlet port on the solenoid valve.

  Prior to servicing the diaphragm valve, the timer board, and the solenoid pilot valve needs to be checked for proper operation. If it is malfunctioning, refer to the troubleshooting flow chart at the end of this section.

- **Cage Inspections.**

  Cages are to be inspected any time a new bag is installed. The most common problems are bent and damaged cages that cannot properly support the filter bag. Cages in corrosive environments can eventually rust and pit.

  Corroded areas begin to abrade the fabric as it flexes during the cleaning cycle. Cage bottom pans with sharp edges can cause similar damage.

- **Bag to Cage Fit.**

  For proper performance of pulse-jet filters, the fit relationship between the bag and cage is critical. Filters that are too loose or too tight will severely limit collection efficiency and lead to premature physical failure.

- **Pulse-Jet Bag Installation.**

  Correct filter bag installation is important to maximize the life of the fabric. Bags with flanges or cuffs that fold over the tops of their support cages should be checked for smoothness around the edge to prevent leakage and bag abrasion. Seam placement on bottom load bags should be 180 degrees from the split or gap in the cage collar. The clamp on these bags should be installed 90 degrees in relation to the seam on the bag and positioned on the groove in the cage. Snapband bags for top access pulse-jet units should be installed with the seams all facing the same direction. This allows for identification of areas where problems are occurring and improved troubleshooting of the unit.

4. **Reverse Air Types:**

- To get the maximum performance in reverse air systems, it is necessary to monitor the manometer or Magnehelic gauge on each compartment during the cleaning cycle. A reading should be taken at each of the following times:
  - Before the module starts to clean.
  - When the module is isolated before the reverse air damper opens.
  - When the reverse air is energized.
  - During the null period after the reverse air.
  - When the module is returned to service.

  When the module is isolated, any reading other than zero on the manometer is an indication that the isolation damper is not sealing. Air moving through the module due to leakage can affect the ability of the reverse air to provide maximum cleaning efficiency. Also, improper tensioning of the filter bag can cause ineffective bag movement resulting in poor cleaning and bag abrasion.

  It is also very important that the "null period" of collection after cleaning be of sufficient time to allow for the fine particles to fall the length of the bag and be collected in the hopper. (This is also true for shaker collection.)

- **Compartmental Valves and Dampers:**

  Off-line compartmental cleaning requires isolation from the rest of the collector to get effective dust removal from the filter bag. Regardless of the type of damper or valve used to achieve this, certain conditions can be checked to ensure proper isolation. The seat of the valve is primary to a good seal.

  Another common problem is material buildup in the plenum around the valve that could prevent the valve or damper from sealing properly, particularly if moisture is present in the gas stream. Corrosion on the valve seat can also prevent a good seal.

  Consideration of valve and damper maintenance requirements during the initial design phase or when making changes to a system will help ensure trouble-free and effective operation of these assemblies. Components that are replaced in difficult access areas may not receive necessary maintenance.

5. **Air Inleakage:**

- Small air leaks will starve a dust collector system. In a ventilation system, the fan is sized to overcome all of the design static resistance in the system. The suction pull is greater at leaks located closer to the fan, and the volume of inleakage increases. To calculate the volume of inleakage, use the following formula:

  $$CFM = 4{,}005 \sqrt{VP} \times \text{Area (ft.}^2\text{)}$$

  VP = velocity pressure in inches w.c.

CFM = airflow in $ft.^3/min.$

- Leakage in a positive pressure system located after the fan outlet will cause dust emissions and housekeeping problems.
- On the negative pressure side of the fan, inleakage causes air volume problems by reducing suction at the pickup points. While not as large a problem as with hot gas, corrosion can still form around leaks due to moisture from ambient air being drawn into the system.
- Opportunities for inleakage exist through the ventilation system. Common trouble spots are expansion joints, access doors, screw conveyor covers, rotary air locks, poorly connected seams, existing corrosion spots, or cracked welds.

6. **Ambient Air Leaks In Hot Gases:**

- The fan is a mechanical pump that moves a set volume of air. The air capacity of the fan is determined by the pressure resistance of the system. The fan is a fixed volume machine since it typically runs at a fixed speed. Temperature changes also cause load changes to the fan drive.
- Inleakage of ambient air satisfies the volumetric needs of the fan reducing the process hot air because of its greater air density. The density of ambient air is almost 1.5 times heavier than process air at 325^0 F.
- Inleakage can also lower the operating temperature below the dew point, causing condensation with the following results:
  - Increased maintenance and replacement expenses due to component corrosion and deterioration.
  - Shortened filter bag life caused by surface agglomeration and chemical attack.
  - Higher static pressure losses across the filters.
  - Lower gas flow because of a denser dust cake.

7. **Sequencing Compartment Cleaning:**

- In systems where dust is delivered to a screw conveyor, the amount of dust removed can be dependent on the sequencing of the modules above the screw.
- Improper sequencing of the cleaning system on a compartmental dust collector with pyramid hoppers can cause overloading of the discharge screw conveyor and poor dust removal. This can cause overfilling of hoppers, and in turn, bag wear, higher pressure drop, and reduced gas flow.
- When a compartment cleans, the material often has substantial volume and fills the lower portion of the hopper. This volume immediately fills the screw conveyor. As subsequent hoppers clean, it may be impossible for the new material to be discharged until the material from the previously cleaned compartment is fully removed from the

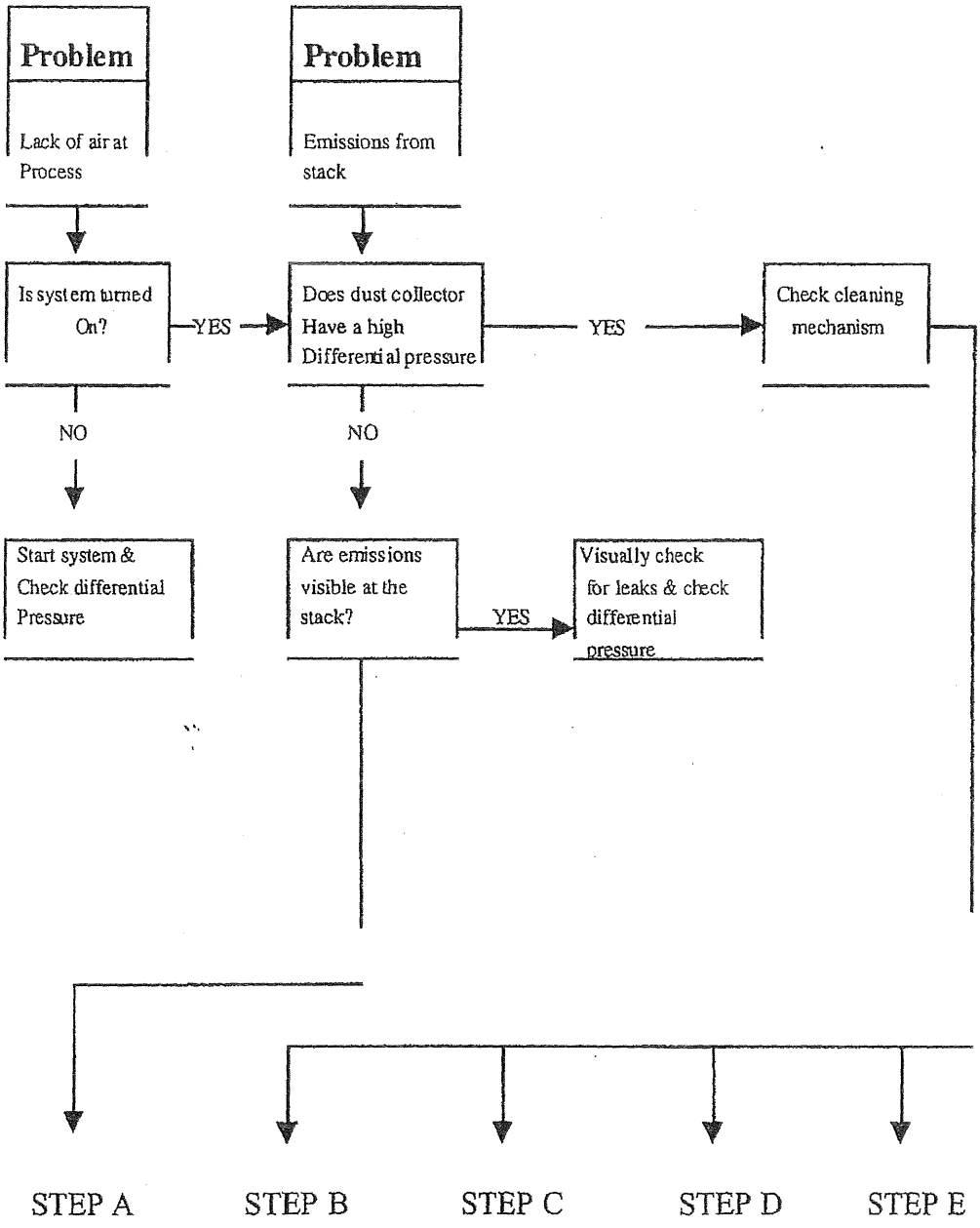
screw conveyor. The compartment cleaning should be sequential in a manner that is concurrent with the screw conveyor flow. Begin cleaning with the compartment furthest from the discharge and finish with the compartment closest to the discharge area. In addition, the air locks and screw conveyor must be adequately sized to handle the maximum dust load the collector may experience.

Bag and Cage Damage evaluation

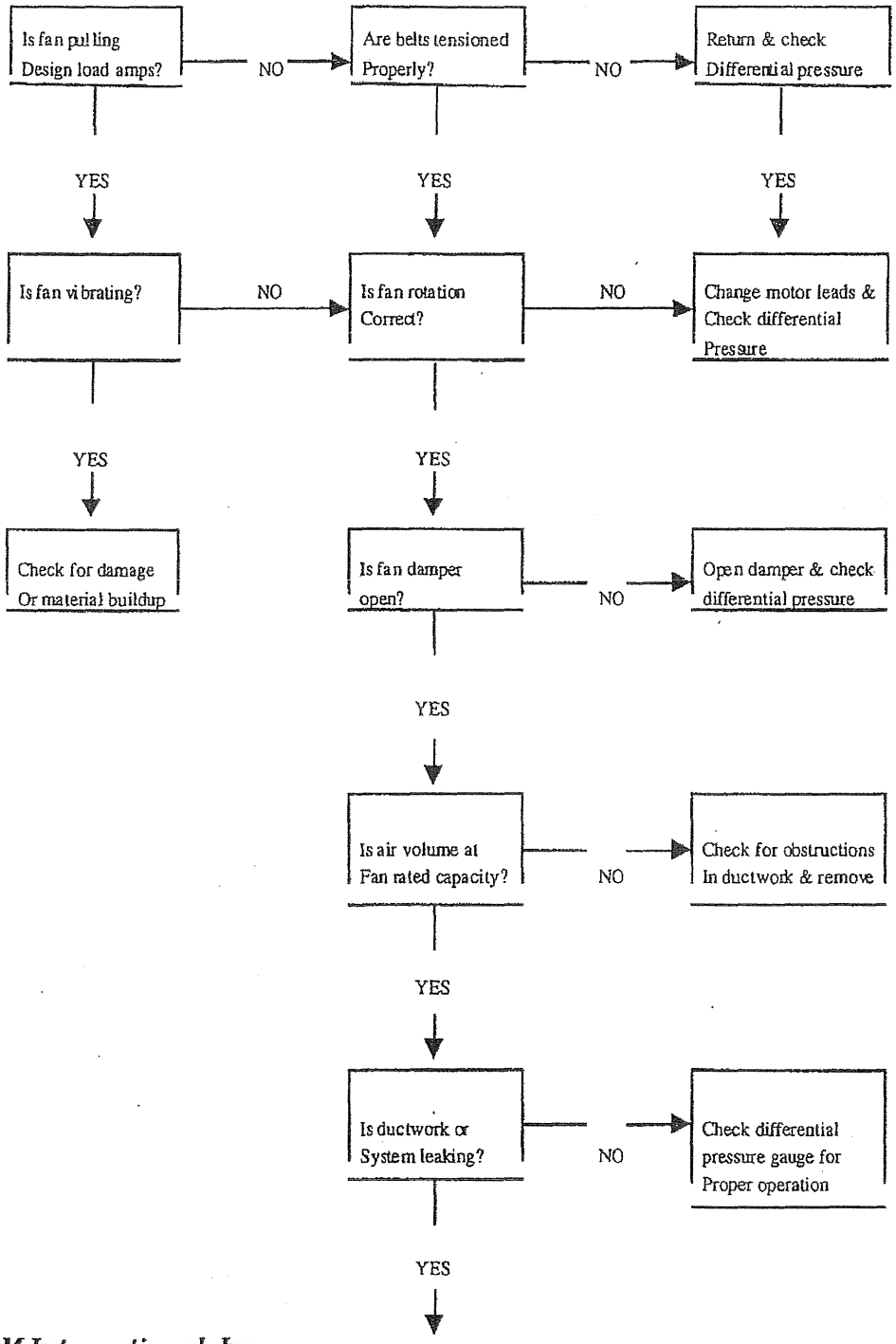
Damage	Cause	Solution	Options
Bags have internal abrasion marks along vertical wires.	1. Cage wires are deeply pitted as a result of excessive corrosion. 2. Bag is oversized.	1. Replace with new galvanized steel cage. 2. Replace with new bag that is the correct size.	1a. Use a mild steel cage if chloride and moisture (HCL) are present. 1b. Use an epoxy coated cage.
Cuts and/or internal damage is noticeable at the bottom of the bag where it contacts with the edge of pan.	Sharp edge on pan.	Use cage with rounded edge pan.	Increase the number of vertical wires to reduce amount of fabric drawn between wires across edge of pan.
Cage body has collapsed; broken welds and bent wires have caused bag wear points.	1. Cage has been weakened by corrosion. 2. Pressure exceeds cage strength. 3. Rough handling by maintenance crews.	1. Replace with standard cage. 2. Change operating conditions to reduce differential pressure.	1. Replace with a coated cage or a stainless cage. 2a. Increase the number of cage rings. 2b. Make cage from heavier gauge wire.
Bag failure resulting from excess fabric slack pinch above top ring or below bottom ring.	Cage is tapered or bowed between the ring and the pan.	Design cage with minimal taper (larger pan or top).	Change ring spacing to minimize taper or bowing.
Flex line failures between the vertical wires.	Bags are not adequately supported by cages.	Replace with cage providing more support (20 vertical wires and/or closer horizontal ring spacing).	1. Convert from 10 or 12 wire cage to 20 wire cage design. 2. Reduce ring spacing.
Bags are difficult to remove from bags.	Corrosion causes rough surfaces which increase friction between the bag and the cage. (Actual chemical bonding between the cage wire and fabric can occur.)	Replace all cages with new standard cage.	1. Use coated or stainless steel cages. 2. Convert to omni top cages to allow for removal of snapband bags and cages as an assembly.

8. CORRECTIVE ACTION PROCEDURES

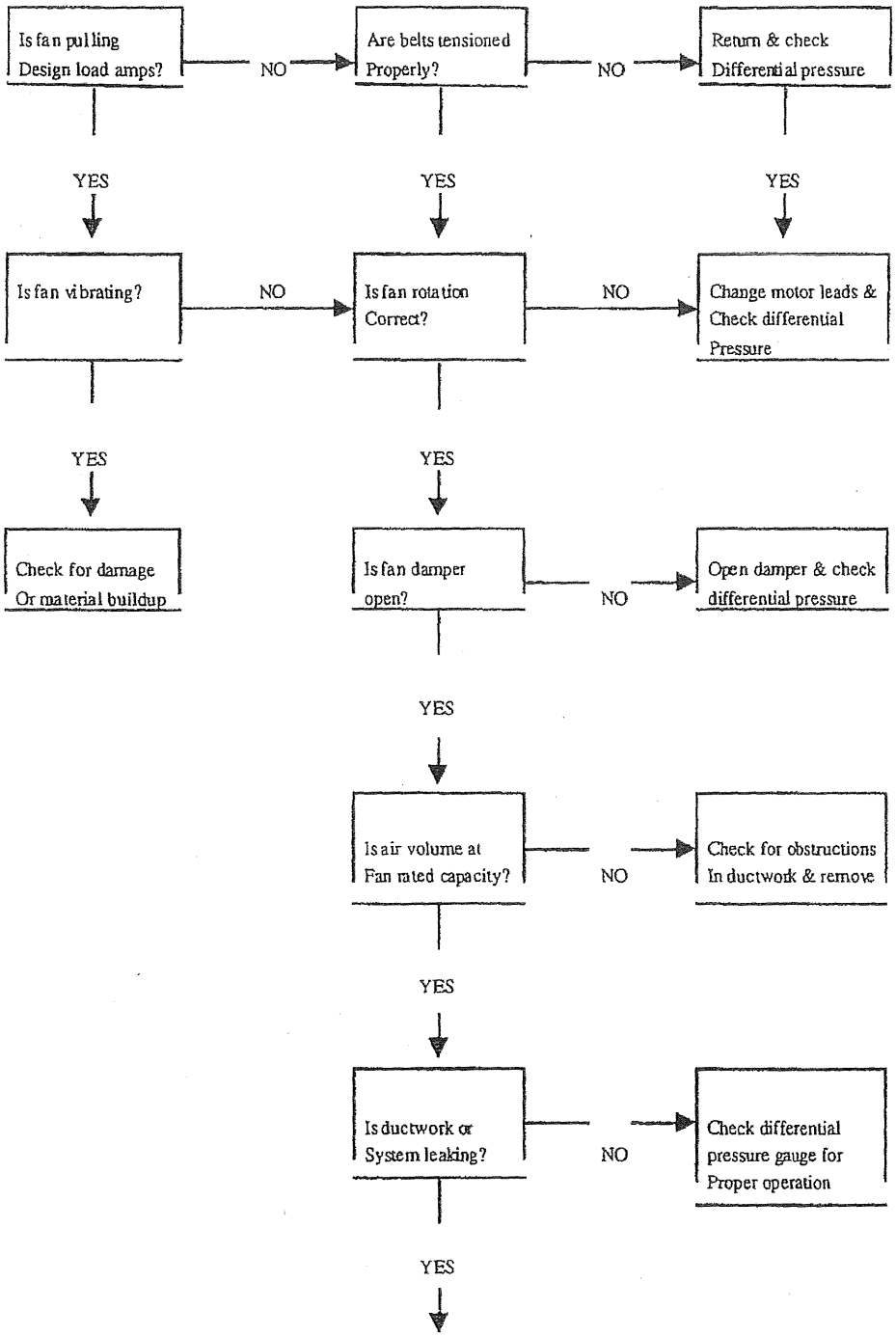
Troubleshooting Chart

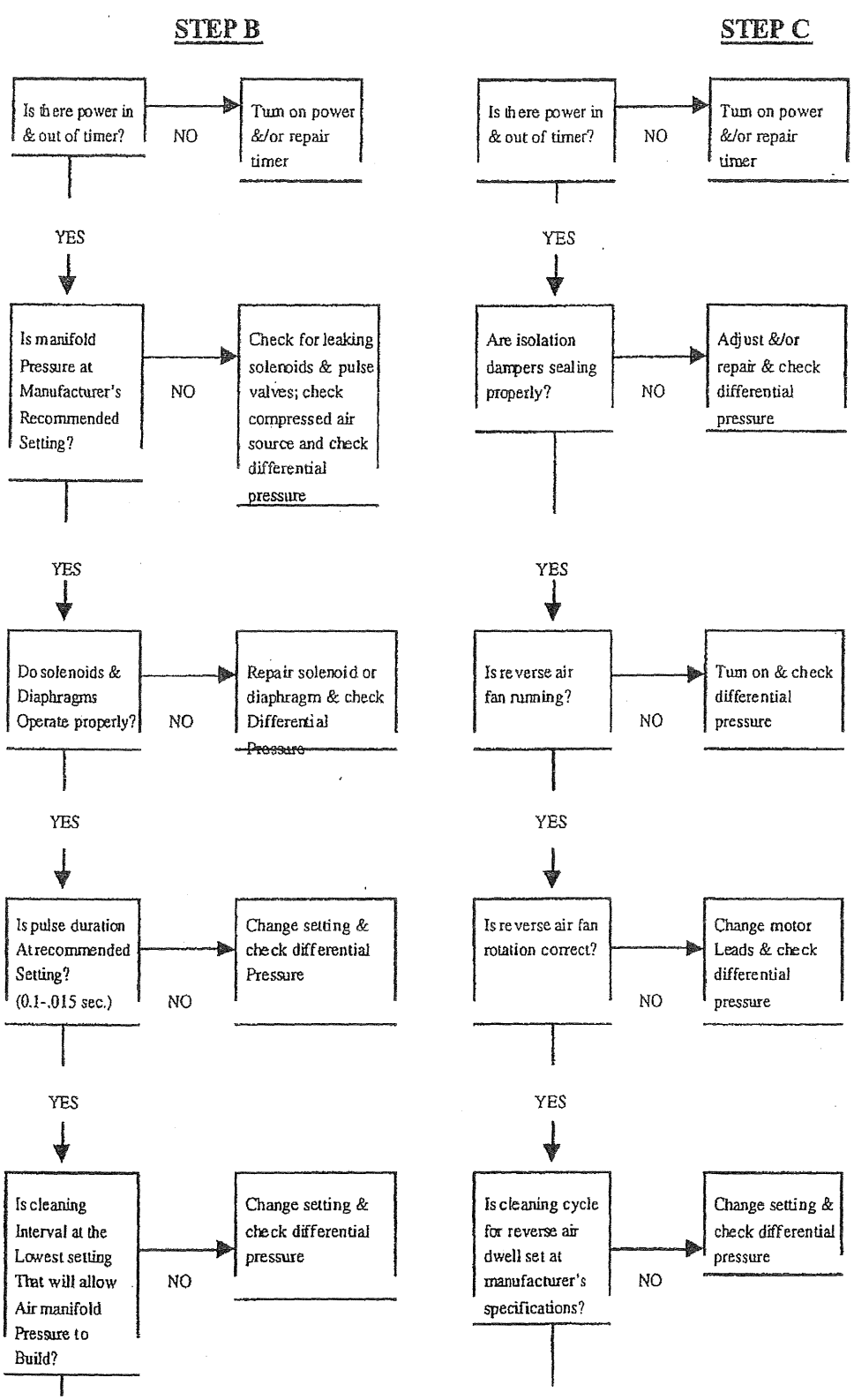


STEP A

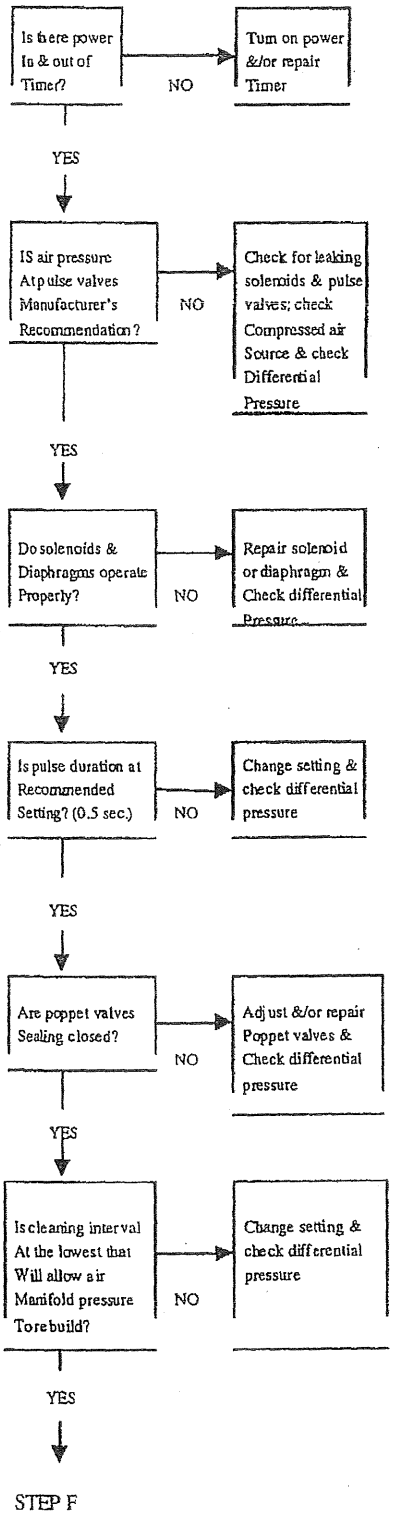

Is fan pulling Design load amps?
NO
Are belts tensioned Properly?
NO
Return & check Differential pressure
YES
YES
YES
Is fan vibrating?
NO
Is fan rotation Correct?
NO
Change motor leads & Check differential Pressure
YES
YES
Check for damage Or material buildup
Is fan damper open?
NO
Open damper & check differential pressure
YES
Is air volume at Fan rated capacity?
NO
Check for obstructions In ductwork & remove
YES
Is ductwork or System leaking?
NO
Check differential pressure gauge for Proper operation
YES

STEP A

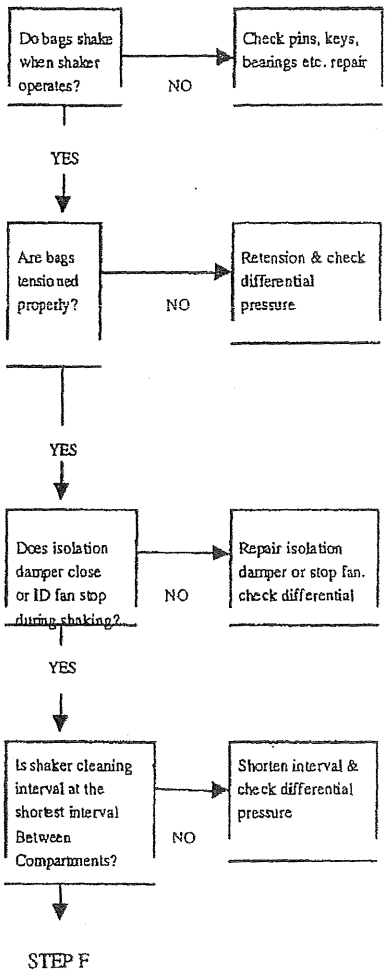

Is fan pulling Design load amps?
NO
Are belts tensioned Properly?
NO
Return & check Differential pressure
YES
YES
YES
Is fan vibrating?
NO
Is fan rotation Correct?
NO
Change motor leads & Check differential Pressure
YES
YES
Check for damage Or material buildup
Is fan damper open?
NO
Open damper & check differential pressure
YES
Is air volume at Fan rated capacity?
NO
Check for obstructions In ductwork & remove
YES
Is ductwork or System leaking?
NO
Check differential pressure gauge for Proper operation
YES

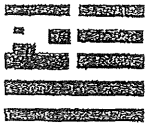

STEP B
Is there power in & out of timer?
NO
Turn on power &/or repair timer
YES
Is manifold Pressure at Manufacturer's Recommended Setting?
NO
Check for leaking solenoids & pulse valves; check compressed air source and check differential pressure
YES
Do solenoids & Diaphragms Operate properly?
NO
Repair solenoid or diaphragm & check Differential Pressure
YES
Is pulse duration At recommended Setting? (0.1-.015 sec.)
NO
Change setting & check differential Pressure
YES
Is cleaning Interval at the Lowest setting That will allow Air manifold Pressure to Build?
NO
Change setting & check differential pressure
STEP C
Is there power in & out of timer?
NO
Turn on power &/or repair timer
YES
Are isolation dampers sealing properly?
NO
Adjust &/or repair & check differential pressure
YES
Is reverse air fan running?
NO
Turn on & check differential pressure
YES
Is reverse air fan rotation correct?
NO
Change motor Leads & check differential pressure
YES
Is cleaning cycle for reverse air dwell set at manufacturer's specifications?
NO
Change setting & check differential pressure

STEP D


Is there power In & out of Timer?
NO
Turn on power &/or repair Timer
YES
IS air pressure At pulse valves Manufacturer's Recommendation?
NO
Check for leaking solenoids & pulse valves; check Compressed air Source & check Differential Pressure
YES
Do solenoids & Diaphragms operate Properly?
NO
Repair solenoid or diaphragm & Check differential Pressure
YES
Is pulse duration at Recommended Setting? (0.5 sec.)
NO
Change setting & check differential pressure
YES
Are poppet valves Sealing closed?
NO
Adjust &/or repair Poppet valves & Check differential pressure
YES
Is cleaning interval At the lowest that Will allow air Manifold pressure To rebuild?
NO
Change setting & check differential pressure
YES
STEP F

STEP E


Do bags shake when shaker operates?
NO
Check pins, keys, bearings etc. repair
YES
Are bags tensioned properly?
NO
Retension & check differential pressure
YES
Does isolation damper close or ID fan stop during shaking?
NO
Repair isolation damper or stop fan. check differential
YES
Is shaker cleaning interval at the shortest interval Between Compartments?
NO
Shorten interval & check differential pressure
STEP F



STEP F

Pull a bag & run a Permeability test To check for Blinding

YES

Is bag blinding? → NO → STEP G

YES

Analyze for cause Of blinding & Correct; replace Bags & check Differential Pressure

STEP G

Does air/cloth exceed 6:1 if Pulse-jet, or 4:1 if plenum pulse or Reverse air → NO → Damper fan volume down/evaluate pleated media conversion

YES

Are bags experiencing high grain loading? → NO → Add mechanical device to reduce load & check Differential pressure

YES

Is material stored or accumulated in hopper? → NO → Remove material continuously & check Differential pressure

YES

Check inlet duct entry Design & modify to Reduce load; check Differential pressure

Formulas

ACFM	Actual cubic feet per minute	**PSI**	Pounds per square inch
AMP	Amperage	**RPM**	Revolutions per minute
Dia	diameter	**SP**	Static pressure
FPM	Feet per minute	**SPWG**	Static pressure water gauge
L	length	**VP**	Velocity pressure, inches of water

Total CFM = Velocity (FPM) x Duct Area ($ft.^2$)

Velocity = 4,005 $\sqrt{VP}$ at standard Conditions (70^0 F at sea Level)

Velocity at Elevated Temperatures and sea Level, Using Standard Pitot Tube:

Velocity, FPM = 174 $\sqrt{(VP \times \text{Air Stream Temperature } {}^0F + 460}$

Total Cloth Area, $ft.^2$ = [(Bag Dia (in.) x 3.14 x Bag L (in.)) ÷ 144] x Total Number of Bags

Gross Air-to Cloth Ratio = ACFM ÷ Total Cloth Area ($ft.^2$)

Net Air-to Cloth Ratio = ACFM ÷ Total On-Line Cloth Area ($ft.^2$)

1 in. SPWG = .578 oz./$in.^2$ = .0361 PSI = .0735 in. Hg (Mercury)

1 PSI Air Pressure = 27.70 in. SPWG = 2.036 in. Hg = 0.068 Bar = 0.0703 $kg./cm^2$

Can Velocity = ACFM ÷ [Total Tube Sheet Area ($ft.^2$) – (Hole Area, ($ft.^2$) x Number of Holes]

7,000 Grains = 1 lb. = 16 oz. = 453.6 grams **1 lb./$ft.^3$** = 0.0624 $kg./m^3$

Grain Loading Expressed in Grains/$ft.^3$ = (Lbs. Of Dust Handled per Minute x 7,000) ÷ ACFM

Lbs. Of Dust/Minute = (Grains/$ft.^3$ x ACFM) x 7,000

1 Horsepower = 1.34 kilowatts

1 inch = 25.4 mm = 0.0254 meter

$^0C = (^0F - 32) \times (5/9)$ $^0F = [^0C \times (9/5] + 32$

$$\frac{(530^0 F)}{}$$

SCFM = ACFM x Actual Temperature (^0F) + 460^0 F

Acknowledgements

Phoenix Cement Company wishes to thank BHA of 8800 East 63rd Street, Kansas City, Missouri for the information presented in this document. BHA has been a leader in helping the cement industry achieve environmentally compliant plants.

9. INSPECTION PROCEDURES – COMBUSTION SYSTEM COMPONENTS

9.1. KILN BURNER INSPECTION AND MAINTENANCE

5. MAINTENANCE

5.1 Preventive maintenance, survey

.1 Lubrication
.2 Cleaning
.3 Inspection and adjustment
.4 Checking of condition
.5 Replacement (incl. lubricants)
.6 Performance test

Pos.	Text	.1	.2	.3	.4	.5	.6
00	Burner installation		4A		A		A
03	Burner			A			
05,44	Expansion joints				A		
20	Burner pipe		D		M	T	
25	Coal inlet				A	T	
33	Central duct				A	T	
40	Conical air nozzle				A	T	

D = per 8-hour operation
S = weekly
M = monthly
A = yearly
T = see text in instruction manual

A number in front of the letter indicates the frequency of procedure. For example, 2M = twice a month.

5.1.2 Clean-up

Burner installation (00). General cleaning on and around the equipment.

Burner pipe (20). Remove deposits from the burner pipe.

5.1.3 Inspection and adjustment

Burner (03). When the kiln is shut down, check that the burner is correctly positioned in the kiln.

5.1.4 Checking of condition

Burner installation (00). Check that all hoses and expansion joints are intact. Check the tightness of the closing plate at the door.

Burner pipe (20). Make a visual check to determine if the ceramic coating has sustained damage.

Coal inlet (25) and central duct (33). Check the Densit lining for wear.

Conical air nozzle (40). In connection with reconditioning of the burner pipe, check the condition of the castable around the conical air nozzle. Also check whether the nozzle is affected by corrosion and/or cracks.

5.1.5 Replacement

Burner pipe (20). If the visual inspection reveals damage involving a partial exposure of the steel surface, the burner pipe must be replaced immediately. The pipe must always be replaced in connection with the annual shutdown for maintenance. A complete spare burner pipe unit consisting of burner pipe with swirler unit and air nozzle, inclusive of lining, must always be held available at the plant.

For replacement of burner pipe, see sub-sections 3.5 and 3.7.

Coal inlet (25) and central duct (33). Densit lining to be replaced when deemed necessary.

Conical air nozzle (40). In connection with the reconditioning of burner pipe, the nozzle unit must be replaced if damaged. A spare unit should always be held available. The spare unit is available in excess length in order to avoid coinciding welds.

5.1.6 Performance test

Burner installation (00). Move all adjustment devices to eliminate the risk of their movement being restricted at any location.

5.2 Faults and remedial action

5.2.1 Trouble-shooting chart

Observation	Potential fault	Remedy Pos. 5.2.2
Large, smooth flame extending across the entire cross-sectional area of kiln	Momentum of primary air too low	1
Hard, very bright flame	Momentum of primary air too high	2
Very short flame plume, resulting in overheated burner tip	Momentum of primary air too high	2
	Swirling of primary air too high	3
Unstable flame with long plume	Defective oil nozzle	4
	Momentum of primary air too low	1
Skew flame	Defective oil nozzle	4
	Clogging of coal duct	5
	Dust deposits on burner pipe	6

5.2.2 Remedial action

Pos.	Fault	Possible cause	Remedy
1	Momentum too low	Incorrect adustment	Adjust, see sub-section 4.1
		Defective burner pipe	Install replace-ment unit
		Incorrect connection of primary air	Install replace-ment unit
		Malfunction of fan	See instruction manual
2	Momentum too high	Incorrect adjustment	Adjust, see sub-section 4.1
3	Excessive swirl	Incorrect adjustment	Adjust damper (33)
4	Oil nozzle defective	Malfunction of oil burner set	See instruction manual
5	Clogging of coal duct	Penetration of coal dust into coal duct	Retract burner and clean it
6	Deposits on burner pipe	Excessive swirl or momentum	Remove deposits regularly. If neces-sary, reduce swirl or momentum.

9.2. PREHEATER INSPECTION AND MAINTENANCE

5. MAINTENANCE

5.1

Preventive maintenance, survey

.1 Lubrication

.2 Cleaning

.3 Inspection and adjustment

.4 Checking of condition

.5 Replacement (incl. lubricants)

.6 Performance test

Pos.	Text	.1	.2	.3	.4	.5	.6
02	Pipe system	.	2A	.	A	.	.
03	Burner asssembly	.	2A	.	A	.	.

D = per 8-hour operation
S = weekly
M = monthly
A = yearly
T = see text in instruction manual

A number in front of the letter indicates frequency of procedure. For instance 2M = twice a month.

5.2

Clean-up

Pipe system (02) and burner assembly (03)

Clean the parts and their surroundings. Always ensure that dust deposits, if any, are removed from the radiation shields.

5.4

Condition checking

Pipe system (02) and burner assembly (03)

Check that the pipe connections are tight.

Check tightness of quick-acting copulings (11).

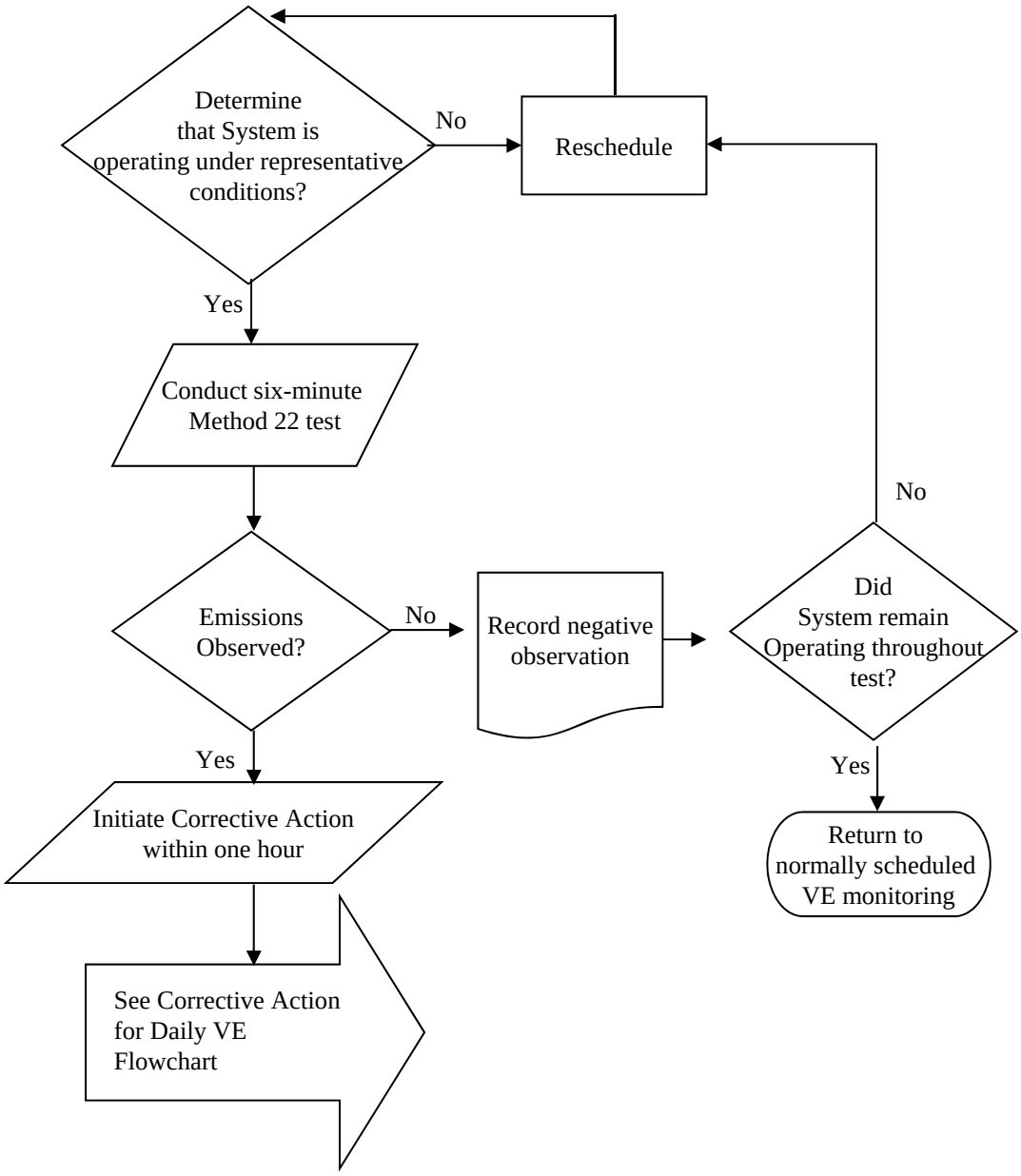
Check the condition of the packing; replace as required.

Check tightness and condition of steel hoses.

Check for bakings in the gas nozzle holes.

10. EPA METHOD 22 AND EPA METHOD 9

Procedure for Daily VE Monitoring



Directions for Daily
Method 22 Observations

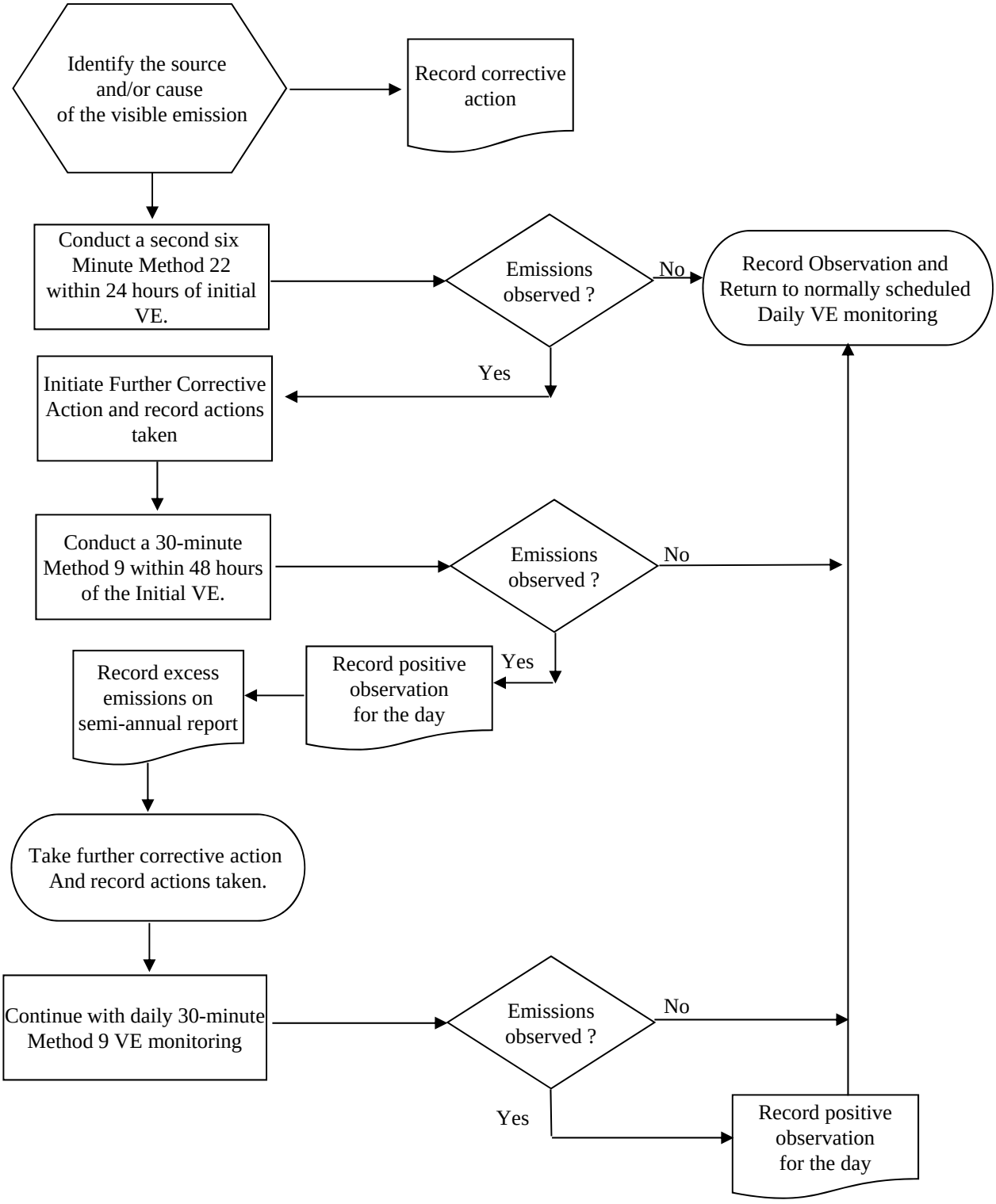
Perform a SIX- (6) minute Method 22 on equipment listed on the Visible Emissions Sheet:

- Observe during daylight hours
- Ensure sun is at observers back
- Observe while equipment is operating
    - If equipment operates *ANY TIME* during daylight hours at normal production rate – Method 22 **SHALL** be performed!
- Record date and start time of observation on the Visible Emissions Sheet
- Observe the equipment for SIX (6) minutes:
    - If no emissions are observed, document "NO" under "DUST (Y/N)" on the Visible Emissions Sheet and continue observations
    - If emissions are observed, document "YES" under "DUST (Y/N)" on the Visible Emissions Sheet and start a corrective action.
    - CORRECTIVE ACTION MUST BE TAKEN WITHIN **1 HOUR** OF A **YES** BEING NOTED ON THE SHEET
    - A WORK ORDER SHALL BE ENTERED INTO THE SYSTEM OR IF REPAIRS CAN BE MADE WITHOUT A WORK ORDER THIS MUST BE DOCUMENTED.
    - ***NOTIFY ENVIRONMENTAL MANAGER ASAP OF A FAILED METHOD 22***
    - Note the corrective action on the Visible Emissions Sheet.
- Record end time of observation on the Visible Emissions Sheet
- Record weather conditions at time of observation

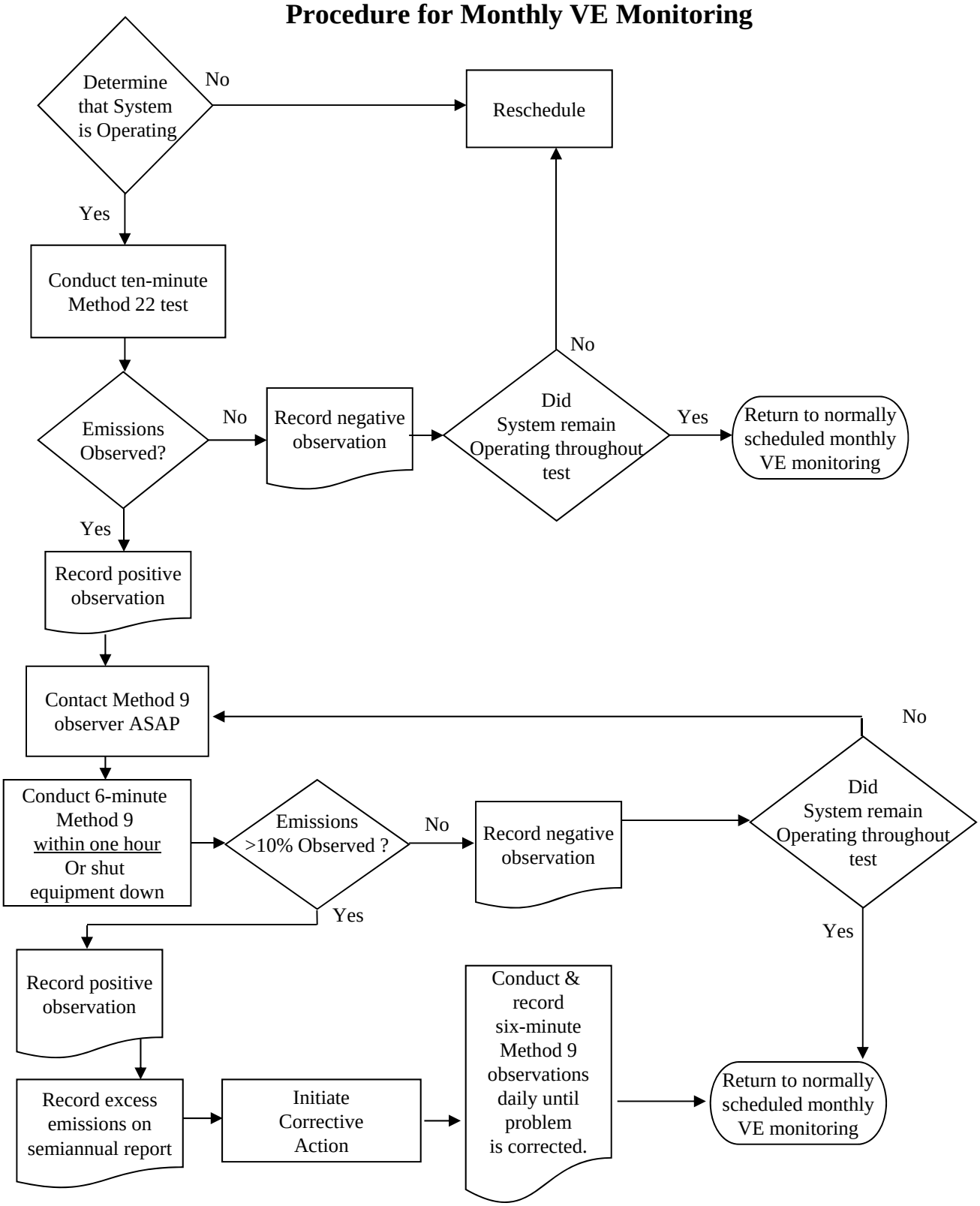
❖ If Method 22 is positive, equipment requires repair. Records of the repair must be made and included with the monthly M-22 reports. Repairs must begin within 1 hour of the noted method 22 or the equipment shall be shutdown.
After startup of the baghouse, another Method 22 will be performed.

❖ Submit the Visible Emissions Sheets and corrective actions to the Environmental Manager when complete.

Corrective Action for Daily VE Observation



Procedure for Monthly VE Monitoring



Directions for Monthly
Method 22 Observations

Perform a TEN- (10) minute Method 22 for applicable equipment.

- Observe during daylight hours
- Ensure sun is at observers back
- Observe while equipment is operating
- Record date and start time of observation on the Fugitive Dust Sheet
- Observe the equipment for required minutes:
    - If no emissions are observed, document "NO" under "Method 22 Y/N" visible emissions on the Visible Emissions Sheet and continue observations
    - If emissions are observed, document "YES" under "Method 22 Y/N" on the Visible Emissions Sheet and start a corrective action.
    - A 30 MINUTE METHOD 9 SHALL BE PERFORMED WITHIN 1 HOUR OF A YES BEING NOTED ON THE SHEET
    - A WORK ORDER SHALL BE ENTERED INTO THE SYSTEM OR IF REPAIRS CAN BE MADE WITHOUT A WORK ORDER THIS MUST BE DOCUMENTED.
    - **NOTIFY ENVIRONMENTAL MANAGER ASAP OF A FAILED METHOD 22**
    - Note the corrective action on the Sheet.
- Record end time of observation on the Sheet

❖ If Method 22 is positive, equipment requires repair. Records of the repair must be made and included with the monthly M-22 reports. Repairs must begin within 1 hour of the noted method 22 or the equipment shall be shutdown.

After startup of the baghouse, another Method 22 will be performed.

❖ Submit the Sheets and corrective actions to the Environmental Manager when complete. A copy will be placed in the Environmental file folder marked Visible Emissions for the appropriate time period.

METHOD 22 - VISUAL DETERMINATION OF FUGITIVE EMISSIONS FROM MATERIAL SOURCES AND SMOKE EMISSIONS FROM FLARES

NOTE: This method is not inclusive with respect to observer certification. Some material is incorporated by reference from Method 9.

1.0 Scope and Application.

This method is applicable for the determination of the frequency of fugitive emissions from stationary sources, only as specified in an applicable subpart of the regulations. This method also is applicable for the determination of the frequency of visible smoke emissions from flares.

2.0 Summary of Method.

2.1 Fugitive emissions produced during material processing, handling, and transfer operations or smoke emissions from flares are visually determined by an observer without the aid of instruments.

2.2 This method is used also to determine visible smoke emissions from flares used for combustion of waste process materials.

2.3 This method determines the amount of time that visible emissions occur during the observation period (*i.e.*, the accumulated emission time.) This method does not require that the opacity of emissions be determined. Since this procedure requires only the determination of whether

visible emissions occur and does not require the determination of opacity levels, observer certification according to the procedures of Method 9 is not required. However, it is necessary that the observer is knowledgeable with respect to the general procedures for determining the presence of visible emissions. At a minimum, the observer must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training is to be obtained from written materials found in References 1 and 2 or from the lecture portion of the Method 9 certification course.

3.0 Definitions.

3.1 *Emission frequency* means the percentage of time that emissions are visible during the observation period.

3.2 *Emission time* means the accumulated amount of time that emissions are visible during the observation period.

3.3 *Fugitive emissions* means emissions generated by an affected facility which is not collected by a capture system and is released to the atmosphere. This includes emissions that (1) escape capture by process equipment exhaust hoods; (2) are emitted during material transfer; (3)

are emitted from buildings housing material processing or handling equipment; or (4) are emitted directly from process equipment.

3.4 *Observation period* means the accumulated time period during which observations are conducted, not to be less than the period specified in the applicable regulation.

3.5 *Smoke emissions* means a pollutant generated by combustion in a flare and occurring immediately downstream of the flame. Smoke occurring within the flame, but not downstream of the flame, is not considered a smoke emission.

4.0 Interferences.

4.1 Occasionally, fugitive emissions from sources other than the affected facility (*e.g.*, road dust) may prevent a clear view of the affected facility. This may particularly be a problem during periods of high wind. If the view of the potential emission points is obscured to such a degree that the observer questions the validity of continuing observations, then the observations shall be terminated, and the observer shall clearly note this fact on the data form.

5.0 Safety.

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its

use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

6.0 Equipment.

6.1 Stopwatches (two). Accumulative type with unit divisions of at least 0.5 seconds.

6.2 Light Meter. Light meter capable of measuring illuminance in the 50 to 200 lux range, required for indoor observations only.

7.0 Reagents and Supplies. [Reserved]

8.0 Sample Collection, Preservation, Storage, and Transfer. [Reserved]

9.0 Quality Control. [Reserved]

10.0 Calibration and Standardization. [Reserved]

11.0 Analytical Procedure.

11.1 Selection of Observation Location. Survey the affected facility, or the building or structure housing the process to be observed, and determine the locations of potential emissions. If the affected facility is located inside a building, determine an observation location that is consistent with the requirements of the applicable regulation (*i.e.*, outside observation of emissions escaping the building/structure or inside observation of emissions

directly emitted from the affected facility process unit). Then select a position that enables a clear view of the potential emission point(s) of the affected facility or of the building or structure housing the affected facility, as appropriate for the applicable subpart. A position at least 4.6 m (15 feet), but not more than 400 m (0.25 miles), from the emission source is recommended. For outdoor locations, select a position where the sunlight is not shining directly in the observer's eyes.

11.2 Field Records.

11.2.1 Outdoor Location. Record the following information on the field data sheet (Figure 22-1): Company name, industry, process unit, observer's name, observer's affiliation, and date. Record also the estimated wind speed, wind direction, and sky condition. Sketch the process unit being observed, and note the observer location relative to the source and the sun. Indicate the potential and actual emission points on the sketch.

11.2.2 Indoor Location. Record the following information on the field data sheet (Figure 22-2): Company name, industry, process unit, observer's name, observer's affiliation, and date. Record as appropriate the type, location, and intensity of lighting on the data sheet. Sketch the process unit being observed, and note the

observer location relative to the source. Indicate the potential and actual fugitive emission points on the sketch.

11.3 Indoor Lighting Requirements. For indoor locations, use a light meter to measure the level of illumination at a location as close to the emission source(s) as is feasible. An illumination of greater than 100 lux (10 foot candles) is considered necessary for proper application of this method.

11.4 Observations.

11.4.1 Procedure. Record the clock time when observations begin. Use one stopwatch to monitor the duration of the observation period. Start this stopwatch when the observation period begins. If the observation period is divided into two or more segments by process shutdowns or observer rest breaks (see Section 11.4.3), stop the stopwatch when a break begins and restart the stopwatch without resetting it when the break ends. Stop the stopwatch at the end of the observation period. The accumulated time indicated by this stopwatch is the duration of observation period. When the observation period is completed, record the clock time. During the observation period, continuously watch the emission source. Upon observing an emission (condensed water vapor is not considered an emission), start the second accumulative stopwatch; stop the watch when the emission stops. Continue

this procedure for the entire observation period. The accumulated elapsed time on this stopwatch is the total time emissions were visible during the observation period (*i.e.*, the emission time.)

11.4.2 Observation Period. Choose an observation period of sufficient length to meet the requirements for determining compliance with the emission standard in the applicable subpart of the regulations. When the length of the observation period is specifically stated in the applicable subpart, it may not be necessary to observe the source for this entire period if the emission time required to indicate noncompliance (based on the specified observation period) is observed in a shorter time period. In other words, if the regulation prohibits emissions for more than 6 minutes in any hour, then observations may (optional) be stopped after an emission time of 6 minutes is exceeded. Similarly, when the regulation is expressed as an emission frequency and the regulation prohibits emissions for greater than 10 percent of the time in any hour, then observations may (optional) be terminated after 6 minutes of emission are observed since 6 minutes is 10 percent of an hour. In any case, the observation period shall not be less than 6 minutes in duration. In some cases, the process operation may be intermittent or cyclic. In such cases, it

may be convenient for the observation period to coincide with the length of the process cycle.

11.4.3 Observer Rest Breaks. Do not observe emissions continuously for a period of more than 15 to 20 minutes without taking a rest break. For sources requiring observation periods of greater than 20 minutes, the observer shall take a break of not less than 5 minutes and not more than 10 minutes after every 15 to 20 minutes of observation. If continuous observations are desired for extended time periods, two observers can alternate between making observations and taking breaks.

11.5 Recording Observations. Record the accumulated time of the observation period on the data sheet as the observation period duration. Record the accumulated time emissions were observed on the data sheet as the emission time. Record the clock time the observation period began and ended, as well as the clock time any observer breaks began and ended.

12.0 Data Analysis and Calculations.

If the applicable subpart requires that the emission rate be expressed as an emission frequency (in percent), determine this value as follows: Divide the accumulated emission time (in seconds) by the duration of the observation period (in seconds) or by any minimum

observation period required in the applicable subpart, if the actual observation period is less than the required period, and multiply this quotient by 100.

13.0 Method Performance. [Reserved]

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 References.

1. Missan, R., and A. Stein. Guidelines for Evaluation of Visible Emissions Certification, Field Procedures, Legal Aspects, and Background Material. EPA Publication No. EPA-340/1-75-007. April 1975.

2. Wohlschlegel, P., and D.E. Wagoner. Guideline for Development of a Quality Assurance Program: Volume IX--Visual Determination of Opacity Emissions from Stationary Sources. EPA Publication No. EPA-650/4-74-005i. November 1975.

17.0 Tables, Diagrams, Flowcharts, and Validation Data.

FUGITIVE OR SMOKE EMISSION INSPECTION OUTDOOR LOCATION	
Company Location Company Rep.	Observer Affiliation Date
Sky Conditions Precipitation	Wind Direction Wind Speed
Industry	Process Unit

Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS	Clock Time	Observation period duration, min:sec	Accumulated emission time, min:sec
Begin Observation			
End Observation			

Figure 22-1

FUGITIVE OR SMOKE EMISSION INSPECTION INDOOR LOCATION	
Company Location Company Rep.	Observer Affiliation Date
Industry	Process Unit

Light type (fluorescent, incandescent, natural)
Light location (overhead, behind observer, etc.)
Illuminance (lux or footcandles)
Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS	Clock Time	Observation period duration, min:sec	Accumulated emission time, min:sec
Begin	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
End Observation	_____		

Figure 22-2

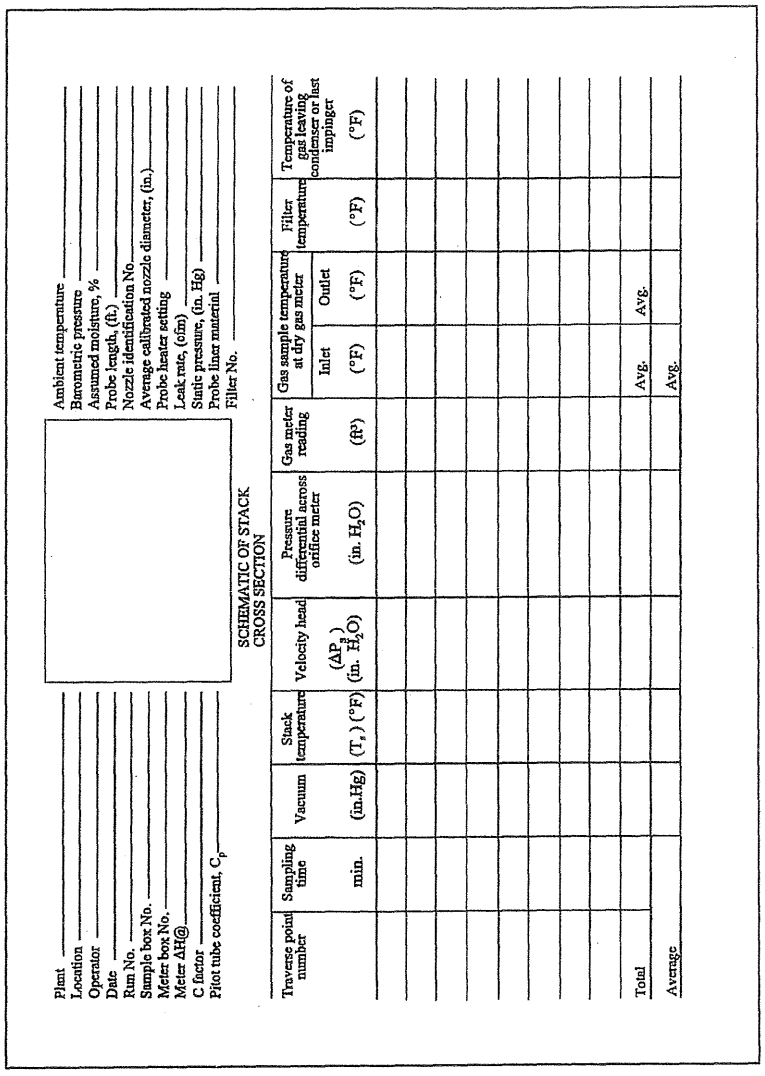


Figure 8-2. Field Data Sheet.

METHOD 9—VISUAL DETERMINATION OF THE OPACITY OF EMISSIONS FROM STATIONARY SOURCES

Many stationary sources discharge visible emissions into the atmosphere; these emissions are usually in the shape of a plume. This method involves the determination of plume opacity by qualified observers. The method includes procedures for the training and certification of observers, and procedures to be used in the field for determination of plume opacity. The appearance of a plume as viewed by an observer depends upon a number of variables, some of which may be controllable and some of which may not be controllable in the field. Variables which can be controlled to an extent to which they no longer exert a significant influence upon

plume appearance include: Angle of the observer with respect to the plume; angle of the observer with respect to the sun; point of observation of attached and detached steam plume; and angle of the observer with respect to a plume emitted from a rectangular stack with a large length to width ratio. The method includes specific criteria applicable to these variables.

Other variables which may not be controllable in the field are luminescence and color contrast between the plume and the background against which the plume is viewed. These variables exert an influence upon the appearance of a plume as viewed by an observer, and can affect the ability of the observer to accurately assign opacity values to the observed plume. Studies of the theory of plume opacity and field studies have demonstrated that a plume is most visible and presents the greatest apparent opacity when viewed against a contrasting background. It follows from this, and is confirmed by field trials, that the opacity of a plume, viewed under conditions where a contrasting background is present can be assigned with the greatest degree of accuracy. However, the potential for a positive error is also the greatest when a plume is viewed under such contrasting conditions. Under conditions presenting a less contrasting background, the apparent opacity of a plume is less and approaches zero as the color and luminescence contrast decrease toward zero. As a result, significant negative bias and negative errors can be made when a plume is viewed under less contrasting conditions. A negative bias decreases rather than increases the possibility that a plant operator will be cited for a violation of opacity standards due to observer error.

Studies have been undertaken to determine the magnitude of positive errors which can be made by qualified observers while reading plumes under contrasting conditions and using the procedures set forth in this method. The results of these studies (field trials) which involve a total of 769 sets of 25 readings each are as follows:

(1) For black plumes (133 sets at a smoke generator), 100 percent of the sets were read with a positive error[1] of less than 7.5 percent opacity; 99 percent were read with a positive error of less than 5 percent opacity.

(2) For white plumes (170 sets at a smoke generator, 168 sets at a coal-fired power plant, 298 sets at a sulfuric acid plant), 99 percent of the sets were read with a positive error of less than 7.5 percent opacity; 95 percent were read with a positive error of less than 5 percent opacity.

[1] For a set, positive error=average opacity determined by observers' 25 observations—average opacity determined from transmissometer's 25 recordings.

The positive observational error associated with an average of twenty-five readings is therefore established. The accuracy of the method must be taken into account when determining possible violations of applicable opacity standards.

1. Principle and Applicability

1.1 Principle. The opacity of emissions from stationary sources is determined visually by a qualified observer.

1.2 Applicability. This method is applicable for the determination of the opacity of emissions from stationary sources pursuant to §60.11(b) and for qualifying observers for visually determining opacity of emissions.

2. Procedures

The observer qualified in accordance with section 3 of this method shall use the following procedures for visually determining the opacity of emissions:

2.1 Position. The qualified observer shall stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. Consistent with maintaining the above requirement, the observer shall, as much as possible, make his observations from a position such that his line of vision is approximately perpendicular to the plume direction, and when observing opacity of emissions from rectangular outlets (e.g., roof monitors, open baghouses, noncircular stacks), approximately perpendicular to the longer axis of the outlet. The observer's line of sight should not include more than one plume at a time when multiple stacks are involved, and in any case the observer should make his observations with his line of sight perpendicular to the longer axis of such a set of multiple stacks (e.g., stub stacks on baghouses).

2.2 Field Records. The observer shall record the name of the plant, emission location, type facility, observer's name and affiliation, a sketch of the observer's position relative to the source, and the date on a field data sheet (Figure 9–1). The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), and plume background are recorded on a field data sheet at the time opacity readings are initiated and completed.

2.3 Observations. Opacity observations shall be made at the point of greatest opacity in that portion of the plume where condensed water vapor is not present. The observer shall not look continuously at the plume, but instead shall observe the plume momentarily at 15-second intervals.

2.3.1 Attached Steam Plumes. When condensed water vapor is present within the

plume as it emerges from the emission outlet, opacity observations shall be made beyond the point in the plume at which condensed water vapor is no longer visible. The observer shall record the approximate distance from the emission outlet to the point in the plume at which the observations are made.

2.3.2 Detached Steam Plume. When water vapor in the plume condenses and becomes visible at a distinct distance from the emission outlet, the opacity of emissions should be evaluated at the emission outlet prior to the condensation of water vapor and the formation of the steam plume.

2.4 Recording Observations. Opacity observations shall be recorded to the nearest 5 percent at 15-second intervals on an observational record sheet. (See Figure 9–2 for an example.) A minimum of 24 observations shall be recorded. Each momentary observation recorded shall be deemed to represent the average opacity of emissions for a 15-second period.

2.5 Data Reduction. Opacity shall be determined as an average of 24 consecutive observations recorded at 15-second intervals. Divide the observations recorded on the record sheet into sets of 24 consecutive observations. A set is composed of any 24 consecutive observations. Sets need not be consecutive in time and in no case shall two sets overlap. For each set of 24 observations, calculate the average by summing the opacity of the 24 observations and dividing this sum by 24. If an applicable standard specifies an averaging time requiring more than 24 observations, calculate the average for all observations made during the specified time period. Record the average opacity on a record sheet. (See Figure 9–1 for an example.)

3. Qualifications and Testing

3.1 Certification Requirements. To receive certification as a qualified observer, a candidate must be tested and demonstrate the ability to assign opacity readings in 5 percent increments to 25 different black plumes and 25 different white plumes, with an error not to exceed 15 percent opacity on any one reading and an average error not to exceed 7.5 percent opacity in each category. Candidates shall be tested according to the procedures described in section 3.2. Smoke generators used pursuant to section 3.2 shall be equipped with a smoke meter which meets the requirements of section 3.3.

The certification shall be valid for a period of 6 months, at which time the qualification procedure must be repeated by any observer in order to retain certification.

3.2 Certification Procedure. The certification test consists of showing the candidate a complete run of 50 plumes—25 black plumes and 25 white plumes—generated by a smoke generator. Plumes within each set of 25 black and 25 white runs shall be presented in random order. The candidate assigns an opacity value to each plume and records his observation on a suitable form. At the completion of each run of 50 readings, the score of the candidate is determined. If a candidate fails to qualify, the complete run of 50 readings must be repeated in any retest. The smoke test may be administered as part of a smoke school or training program, and may be preceded by training or familiarization runs of the smoke generator during which candidates are shown black and white plumes of known opacity.

3.3 Smoke Generator Specifications. Any smoke generator used for the purposes of section 3.2 shall be equipped with a smoke meter installed to measure opacity across the diameter of the smoke generator stack. The smoke meter output shall display instack opacity based upon a pathlength equal to the stack exit diameter, on a full 0 to 100 percent chart recorder scale. The smoke meter optical design and performance shall meet the specifications shown in Table 9–1. The smoke meter shall be calibrated as prescribed in section 3.3.1 prior to the conduct of each smoke reading test. At the completion of each test, the zero and span drift shall be checked and if the drift exceeds ±1 percent opacity, the condition shall be corrected prior to conducting any subsequent test runs. The smoke meter shall be demonstrated, at the time of installation, to meet the specifications listed in Table 9–1. This demonstration shall be repeated following any subsequent repair or replacement of the photocell or associated electronic circuitry including the chart recorder or output meter, or every 6 months, whichever occurs first.

TABLE 9–1—SMOKE METER DESIGN AND PERFORMANCE SPECIFICATIONS

Parameter	Specification
a. Light source	Incandescent lamp operated at nominal rated voltage.
b. Spectral response of photocell.	Photopic (daylight spectral response of the human eye—Citation 3).
c. Angle of view	15° maximum total angle.
d. Angle of projection	15° maximum total angle.
e. Calibration error	±3% opacity, maximum.
f. Zero and span drift	±1% opacity, 30 minutes.
g. Response time	5 seconds.

3.3.1 Calibration. The smoke meter is calibrated after allowing a minimum of 30 minutes warmup by alternately producing simulated opacity of 0 percent and 100 percent. When stable response at 0 percent or 100 percent is noted, the smoke meter is adjusted to produce an output of 0 percent or 100 percent, as appropriate. This calibration shall be repeated until stable 0 percent and 100

percent readings are produced without adjustment. Simulated 0 percent and 100 percent opacity values may be produced by alternately switching the power to the light source on and off while the smoke generator is not producing smoke.

3.3.2 Smoke Meter Evaluation. The smoke meter design and performance are to be evaluated as follows:

3.3.2.1 Light Source. Verify from manufacturer's data and from voltage measurements made at the lamp, as installed, that the lamp is operated within ±5 percent of the nominal rated voltage.

3.3.2.2 Spectral Response of Photocell. Verify from manufacturer's data that the photocell has a photopic response; i.e., the spectral sensitivity of the cell shall closely approximate the standard spectral-luminosity curve for photopic vision which is referenced in (b) of Table 9–1.

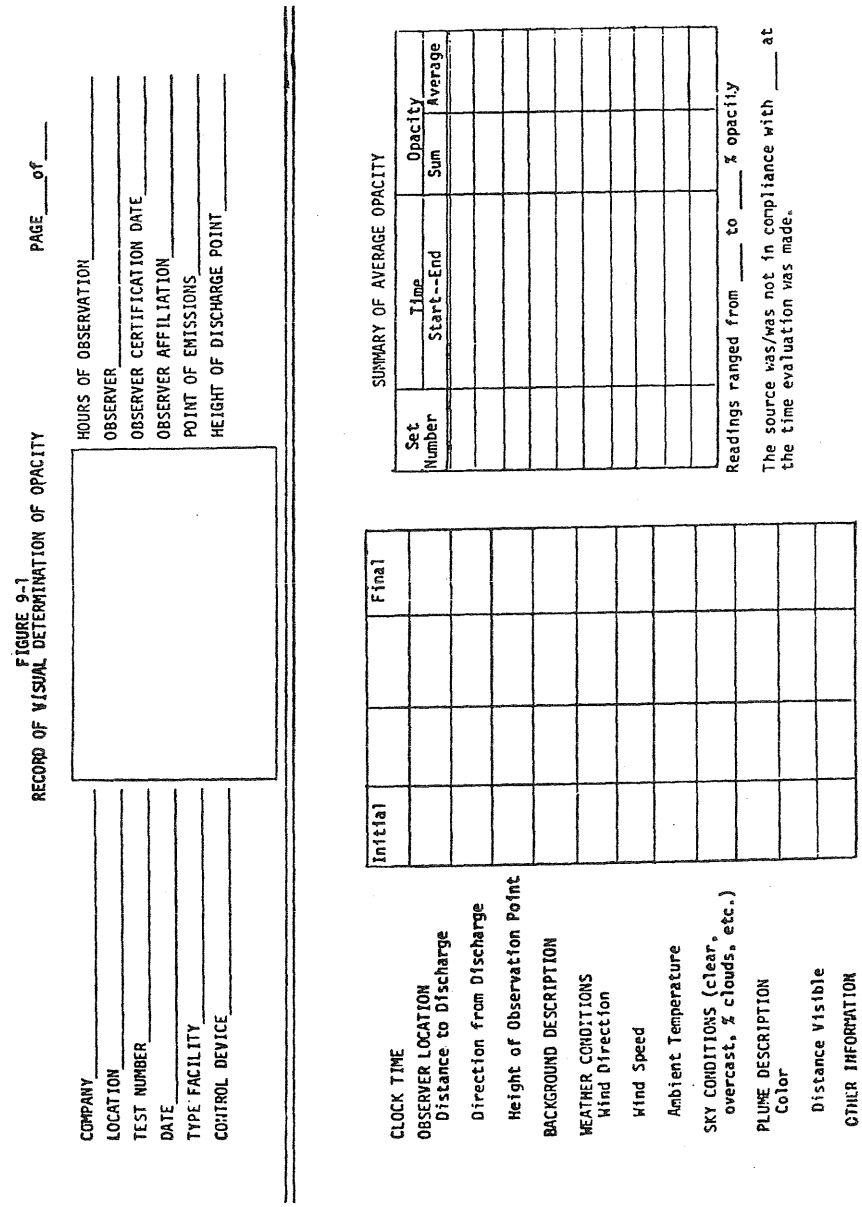


FIGURE 9–2—OBSERVATION RECORD

Page ___ of ___

Company .....
Location .....
Test Number .....
Date.

Observer .....
Type facility .....
Point of emissions .....

Hr.	Min.	Seconds				Steam plume (check if applicable)		Comments
		0	15	30	45	Attached	Detached	
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							

FIGURE 9–2—OBSERVATION RECORD (CONTINUED)

Page ___ of ___

Company .....
Location .....
Test Number .....
Date.

Observer .....
Type facility .....
Point of emissions .....

Hr.	Min.	Seconds				Steam plume (check if applicable)		Comments
		0	15	30	45	Attached	Detached	
	30							

Hr.	Min.	Seconds				Steam plume (check if applicable)		Comments
		0	15	30	45	Attached	Detached	
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
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	58							
	59							

3.3.2.3 Angle of View. Check construction geometry to ensure that the total angle of view of the smoke plume, as seen by the photocell, does not exceed 15°. The total angle of view may be calculated from: $\theta = 2 \tan^{-1} d/2L$, where θ=total angle of view; d=the sum of the photocell diameter+the diameter of the limiting aperture; and L=the distance from the photocell to the limiting aperture. The limiting aperture is the point in the path between the photocell and the smoke plume where the angle of view is most restricted. In smoke generator smoke meters this is normally an orifice plate.

3.3.2.4 Angle of Projection. Check construction geometry to ensure that the total angle of projection of the lamp on the smoke plume does not exceed 15°. The total angle of projection may be calculated from: $\theta = 2 \tan^{-1} d/2L$, where θ=total angle of projection; d=the sum of the length of the lamp filament + the diameter of the limiting aperture; and

L=the distance from the lamp to the limiting aperture.

3.3.2.5 Calibration Error. Using neutral-density filters of known opacity, check the error between the actual response and the theoretical linear response of the smoke meter. This check is accomplished by first calibrating the smoke meter according to 3.3.1 and then inserting a series of three neutral-density filters of nominal opacity of 20, 50, and 75 percent in the smoke meter pathlength. Filters calibrated within ±2 percent shall be used. Care should be taken when inserting the filters to prevent stray light from affecting the meter. Make a total of five nonconsecutive readings for each filter. The maximum error on any one reading shall be 3 percent opacity.

3.3.2.6 Zero and Span Drift. Determine the zero and span drift by calibrating and operating the smoke generator in a normal manner over a 1-hour period. The drift is measured by checking the zero and span at the end of this period.

3.3.2.7 Response Time. Determine the response time by producing the series of five simulated 0 percent and 100 percent opacity values and observing the time required to reach stable response. Opacity values of 0 percent and 100 percent may be simulated by alternately switching the power to the light source off and on while the smoke generator is not operating.

4. Bibliography

1. Air Pollution Control District Rules and Regulations, Los Angeles County Air Pollution Control District, Regulation IV, Prohibitions, Rule 50.

2. Weisburd, Melvin I., Field Operations and Enforcement Manual for Air, U.S. Environmental Protection Agency, Research Triangle Park, NC. APTD–1100, August 1972, pp. 4.1–4.36.

3. Condon, E.U., and Odishaw, H., Handbook of Physics, McGraw-Hill Co., New York, NY, 1958, Table 3.1, p. 6–52.

ALTERNATE METHOD 1—DETERMINATION OF THE OPACITY OF EMISSIONS FROM STATIONARY SOURCES REMOTELY BY LIDAR

This alternate method provides the quantitative determination of the opacity of an emissions plume remotely by a mobile lidar system (laser radar; Light Detection and Ranging). The method includes procedures for the calibration of the lidar and procedures to be used in the field for the lidar determination of plume opacity. The lidar is used to measure plume opacity during either day or nighttime hours because it contains its own pulsed light source or transmitter. The operation of the lidar is not dependent upon ambient lighting conditions (light, dark, sunny or cloudy).

The lidar mechanism or technique is applicable to measuring plume opacity at numerous wavelengths of laser radiation. However, the performance evaluation and calibration test results given in support of this method apply only to a lidar that employs a ruby (red light) laser [Reference 5.1].

1. Principle and Applicability

1.1 Principle. The opacity of visible emissions from stationary sources (stacks, roof vents, etc.) is measured remotely by a mobile lidar (laser radar).

1.2 Applicability. This method is applicable for the remote measurement of the opacity of visible emissions from stationary sources during both nighttime and daylight conditions, pursuant to 40 CFR §60.11(b). It is also applicable for the calibration and performance verification of the mobile lidar for the measurement of the opacity of emissions. A performance/design specification for a basic lidar system is also incorporated into this method.

1.3 Definitions.

Azimuth angle: The angle in the horizontal plane that designates where the laser beam is pointed. It is measured from an arbitrary fixed reference line in that plane.

Backscatter: The scattering of laser light in a direction opposite to that of the incident laser beam due to reflection from particulates along the beam's atmospheric path which may include a smoke plume.

Backscatter signal: The general term for the lidar return signal which results from laser light being backscattered by atmospheric and smoke plume particulates.

Convergence distance: The distance from the lidar to the point of overlap of the lidar receiver's field-of-view and the laser beam.

Elevation angle: The angle of inclination of the laser beam referenced to the horizontal plane.

Far region: The region of the atmosphere's path along the lidar line-of-sight beyond or behind the plume being measured.

Lidar: Acronym for Light Detection and Ranging.

Lidar range: The range or distance from the lidar to a point of interest along the lidar line-of-sight.

Near region: The region of the atmospheric path along the lidar line-of-sight between the lidar's convergence distance and the plume being measured.

Opacity: One minus the optical transmittance of a smoke plume, screen target, etc.

Pick interval: The time or range intervals in the lidar backscatter signal whose minimum average amplitude is used to calculate opacity. Two pick intervals are required, one in the near region and one in the far region.

Plume: The plume being measured by lidar.

Plume signal: The backscatter signal resulting from the laser light pulse passing through a plume.

APPENDIX B. EQUIPMENT LIST

APPENDIX B: EQUIPMENT LIST

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Raw Material Storage & Handling								
Apron Feeder	AF-101	500 tph	Nico	FD-4255	906	1988		Section VI.B
Apron Feeder	AF-102	100 tph	Nico	FD-4255	905	1988		Section VI.B
Apron Feeder	AF-103	700 tph	Metso	AF5-30FS-10.25-15HP	NA	2004		Section VI.B
Surge Bin	B-101	97 tons	NA	NA	NA	1959		Section VI.A
Belt Conveyor	BC-101	950 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Belt Conveyor	BC-l0lA	950 tph	Hewitt Robins	NA	NA	1988		Section VI.B
Belt Conveyor	BC-101B	950 tph	Hewitt Robins	NA	NA	1963		Section VI.A
Belt Conveyor	BC-101C	1,000 tph	S&W Steel	NA	NA	1988		Section VI.B
Belt Conveyor	BC-101D	1,000 tph	S&W Steel	NA	NA	1988		Section VI.B
Belt Conveyor	BC-102	670 tph	Hewitt Robins	NA (CAM-ok)	NA	1959	DC-101	Section VI.A
Belt Conveyor	BC-102A	670 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Belt Conveyor	BC-102B	550 tph	S&W Steel	NA	NA	1988		Section VI.B
Belt Conveyor	BC-103A	1200 tph	Hewitt Robins	NA (CAM-ok)	NA	1959	DC-103	Section VI.A
Belt Conveyor	BC-103B	1200 tph	Hewitt Robins	NA (CAM-ok)	NA	1959	DC-103	Section VI.A
Belt Conveyor	BC-103C	500 tph	S&W Steel	NA	NA	1988	DC-102	Section VI.B
Belt Conveyor	BC-103D	300 tph	S&W Steel	NA	NA	1988		Section VI.B
Belt Conveyor	BC-103E	10 tph	NA	NA	NA	2002		Section VI.B
Belt Conveyor	BC-103F	10 tph	NA	NA	NA	2002	DC-102	Section VI.B
Mill Scale Hopper	MSH-001	100 tons	AEF	NA	NA	2005		Section VI.B
Apron Feeder	AF-104	10 tph	Metso	AF4-24FS-20.83-7.5 hp	NA	2004		Section VI.B
Apron Feeder	AF-105	NA.	NA	NA.	NA	2004		Section VI.B
Scavenger Screw	SCV-104	NA	Metso	NA	NA	2004		Section VI.B

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Belt Conveyor	BC-104	667 tph	Hewitt Robins	NA(CAM-ok)	NA	1959	DC-101	Section VI.A
Belt Conveyor	BC-104A	1000 tph	NA	NA	NA	2004	DC-201A	Section VI.B
Belt Conveyor	BC-104B	700 tph	NA	NA	NA	2004		Section VI.B
Belt Conveyor	BC-214	667 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Primary Crusher	CR-101	900 tph	Allis Chalmers	60x48 A-1	3808	1958		Section VI.A
Secondary Crusher	CR-102	700 tph	Williams	580	NA	1958	DC-102	Section VI.A
Sample Crusher	CR-103	NA	Atlantic Coast Crushers	FSM-1212-BB	NA	2003		Section VI.B
Wobler Feeder	F-101	NA	Universal	NA	424X92	1958		Section VI.A
Vibrating Screen	VS-101	NA	Terex	EQNS1MP6X 122D	NA	2021	DC-101	Section VI.A
Vibrating Screen	VS-102	NA	Hewitt Robins	72X92(CAM-ok)	VD-8182	1958	DC-101	Section VI.A
Vibrating Screen	VS-103	NA	Hewitt Robins	72X92	VD-8183	1958	DC-102	Section VI.A
Rotary Feeder	RF-201	NA	Smoot	FT-12	NA	1986	DC-100	Section VI.B
Dryer	FR-201	0.55 MMBtu/hr	NA	NA	NA	1966		Section VI.A
Sample Mill	RM-201	NA	C.E. Raymond	3036 H.S.	58105	1959	DC-202	Section VI.A
Weigh Feeder	W-101	50 tph	Jeffery	5100	29129	1959		Section VI.A
Screw Conveyor	SC-101	NA	RJ Ruff	NA	NA	1986		Section VI.B
Fly Ash Bin	B-201	187 tons	NA	NA	NA	1986		Section VI.B
Belt Conveyor	BC-201	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Belt Conveyor	BC-202	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Belt Conveyor	BC-203	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Belt Conveyor	BC-205	350 tph	Hewitt Robins	NA	NA	2008	DC-211	Section VI.B
Belt Conveyor	BC-210	700 tph	Hewitt Robins	NA	NA	2005		Section VI.B
Belt Conveyor	BC-212	290 tph	Hewitt Robins	NA	NA	2010		Section VI.B
Belt Conveyor	BC-213A	280 tph	Norfab	NA	NA	1996		Section VI.B

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Belt Conveyor	BC-301	350 tph	Hewitt Robins	NA	NA	1958		Sections III & V
Belt Conveyor	BC-206	350 tph	Hewitt Robins	NA	NA	1959	DC-305	Sections III & V
Belt Conveyor	BC-213	290 tph	Hewitt Robins	NA	NA	1959	DC-305	Sections III & V
Additive Hopper	HP-ADD	NA	Norfab	NA	NA	1996		Section VI.B
Reclaimer	R-201	500 tph	R.E.	NA	NA	1983		Section VI.A
Reclaimer	R-202	500 tph	R.E.	NA	NA	1983		Section VI.A
Stacker	ST-201	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Stacker	ST-202	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Detachable Trailer	TT-201	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Detachable Trailer	TT-202	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Detachable Trailer	TT-203	500 tph	Hewitt Robins	NA	NA	1959		Section VI.A
Raw Grinding System No. 1								
Air Slide	AC-301	22 tph	Fuller	100 MM	NA	1997	DC-304	Sections III & V
Air Slide	AC-302	380tph	Fuller	350 MM	NA	1990	DC-304	Sections III & V
Air Slide	AC-316	760 tph	Fuller	480 MM	NA	1990	DC-301	Sections III & V
Raw Mix Bin	B-301	278 tons	NA	NA	NA	1990	DC-301	Sections III & V
Belt Conveyor	BC-300	360 tph	S&W Steel	NA	NA	1990	DC-301	Sections III & V
Belt Conveyor	BC-303	215 tph	S&W Steel	NA	NA	1990	DC-301	Sections III & V
Dryer	FR-300	24 MM btu/hr	Conamara	Size 25	NA	1990	DC-301	Sections III & V
Dryer	FR-301	21.5 MM btu/hr	Hauck	NMG180A	NA	1959	DC-301	Sections III & V
Ball Mill	BM-301	NA	FLSmidth	12x19	NA	1959	DC-301	Sections III & V
Elevator	E-301	600 tph	Rexnord	NA	1636-2612-D	1990	DC-301	Sections III & V
Separator	SE-300	NA	Sepax	400-1F	NA	1990	DC-301	Sections III & V
Cyclone	CY-300	NA	FLSmidth	NA	NA	1990	DC-301	Sections III & V
Cyclone	CY-301	NA	FLSmidth	NA	NA	1990	DC-301	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
FK Pump	PN-301	NA	Fuller	H-10-8214 Z conv.	NA	1959	DC-304	Sections III & V
FK Pump	PN-341	NA	Fuller	10" Type Z Conv.	NA	1972	DC-304	Sections III & V
Screw Conveyor	SC-301	NA	NA	NA	NA	1990	DC-301	Sections III & V
Weigh Feeder	W-301	215 tph	S&W Steel	NA	NA	1984	DC-301	Sections III & V
Screw Conveyor	SC-310	NA	NA	NA	NA	1984	DC-301	Sections III & V
Swing Grinding System No. 2								
Air Slide	AC-304	380 tph	Fuller	350 MM	NA	1959	DC-305	Sections III & IV
Air Slide	AC-305	475 tph	Fuller	400 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-306	166 tph	Fuller	250 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-311	166 tph	Fuller	250 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-313	166 tph	Fuller	250 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-314	166 tph	Fuller	250 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-317	760 tph	Fuller	480 MM	NA	1959	DC-302	Sections III & V
Air Slide	AC-321	475 tph	Fuller	400 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-322	475 tph	Fuller	400 MM	NA	1959	DC-305	Sections III & V
Air Slide	AC-329	475 tph	Fuller	400 MM	NA	1959	DC-305	Sections III & V
Raw Mix Clinker Bin	B-302	200 Tons	NA	NA	NA	1959	DC-305	Sections III & V
Belt Conveyor	BC-304	100 tph	Hewitt Robins	NA	NA	1958	DC-305	Sections III & V
Ball Mill	BM-302	NA	FLSmidth	12x19	NA	1959	DC-302	Sections III & V
Dryer BM302	FR-302	21.5 MM btu/hr	Hauck	NMG180A	NA	1959	DC-302	Sections III & V
Bucket Elevator	E-302	420 tph	Jeffery	NA	NA	1958	DC-305	Sections III & V
FK Pump	PN-302	NA	Fuller	H2-8-8215	NA	1958	DC-305	Sections III & V
Screw Conveyor	SC-303	210 tph	NA	NA	NA	1959	DC-302	Sections III & V
Screw Conveyor	SC-304	210 tph	NA	NA	NA	1959	DC-302	Sections III & V
Screw Conveyor	SC-308	NA	NA	NA	NA	1959	DC-302	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Screw Conveyor	SC-311	NA	NA	NA	NA	1959	DC-305	Sections III & V
Separator	SE-303	NA	C.E. Raymond	14-0 D.W.	58089	1958	DC-302	Sections III & V
Separator	SE-304	NA	C.E. Raymond	14-0 D.W.	58090	1958	DC-302	Sections III & V
Weigh Feeder	W-303	3 tph	Ramsey	NA	NA	1990		Sections III & V
Feed Blending								
Air Slide	AC-607	760 tph	BMH	500 MM	NA	1995	DC-601	Sections III & V
Air Slide	AC-608	760 tph	BMH	500 MM	NA	1995	DC-607	Sections III & V
Raw Meal Silo	S-60l	1500 tons	NA	NA	NA	1959	DC-601	Sections III & V
Raw Meal Silo	S-602	1600 tons	NA	NA	NA	1959	DC-601	Sections III & V
Homogenizing Silo	S-605	2000 tons	NA	NA	NA	1959	DC-607	Sections III & V
Air Slide	AC-609	475 tph	FBH	400 MM	NA	2001-2002	DC-607	Sections III & V
FK Pump	PN-601	NA	FBH	350-M-00-10428-116	NA	2001-2002	DC-607	Sections III & V
FK Pump	PN-602	NA	FBH	350-M-00-10428-116-1	NA	2001-2002	DC-607	Sections III & V
Air Slide	AC-600	475 tph	BMH	400 MM	NA	1995	DC-606	Sections III & V
Air Slide	AC-601	475 tph	BMH	400 MM	NA	1995	DC-606	Sections III & V
Air Slide	AC-601A	NA	BMH	200 MM	NA	1995	DC-601	Sections III & V
Air Slide	AC-602	475 tph	BMH	400 MM	NA	1995	DC-605	Sections III & V
Air Slide	AC-602A	NA	BMH	200 MM	NA	1995	DC-601	Sections III & V
Air Slide	AC-603	475 tph	BMH	400 MM	NA	1995	DC-605	Sections III & V
Air Slide	AC-604	475 tph	FBH	400 MM	NA	2001	DC-607	Sections III & V
Air Slide	AC-605	NA	NA	NA	NA	2001	DC-607	Sections III & V
Air Slide	AC-606	475 tph	BMH	400 MM	NA	1995	DC-607	Sections III & V
Bucket Elevator	E-600	595 tph	Rexnord	1636-2812G	23361-1A	1995	DC-601	Sections III & V
Kiln Feed								
Alleviator	AM-407	NA	FBH	90-0830-21320-	106	2001-2002	DC-409	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
				532				
Bin	B-407	60 tons	Schuff Steel	NA	NA	2001-2002	DC-410	Sections III & V
Air Slide	AC-408	380 tph	FBH	350 MM	NA	2001-2002	DC-410	Sections III & V
Air Slide	AC-409	380 tph	FBH	350 MM	NA	2001-2002	DC-410	Sections III & V
Air Slide	AC-410	380 tph	FBH	350 MM	NA	2001-2002	DC-410	Sections III & V
Air Slide	AC-413	380 tph	FBH	350 MM	NA	2001-2002	DC-411	Sections III & V
Air Slide	AC-414	380 tph	FBH	350 MM	NA	2001-2002	DC-410	Sections III & V
Air Slide	AC-415	380 tph	FBH	350 MM	NA	2001-2002	DC-410	Sections III & V
Feeder	WS-404	NA	Pfister	NA	NA	2001-2002	DC-410	Sections III & V
Feeder	WS-405	280 tph	Schenck	DLM-26	NA	2001-2002	DC-410	Sections III & V
Clinker Feed Loadout	LSP	380 tph	DCL	UN800EV-06VT	NA	2016	DC-618	Section V
Raw Grinding System No. 3								
Apron Feeder	AF-360	410 tph	Rexnord	R2342-K21	NA	2001-2002	DC-431	Sections III & V
Air Slide	AC-360	285 tph	F.B.H.	300 MM	NA	2001-2002	DC-411	Sections III & V
Air Slide	AC-361	285 tph	F.B.H.	300 MM	NA	2001-2002	DC-411	Sections III & V
Air Slide	AC-362	475 tph	F.B.H.	400 MM	NA	2001-2002	DC-411	Sections III & V
Air Slide	AC-363	475 tph	F.B.H.	400 MM	NA	2001-2002	DC-367	Sections III & V
Air Slide	AC-364	475 tph	F.B.H.	400 MM	NA	2001-2002	DC-368	Sections III & V
Belt Conveyor	BC-360	315 tph	Conveyor Engineering	NA	NA	2001-2002	DC-366	Sections III & V
Belt Conveyor	BC-361	500 tph	Conveyor Engineering	NA	NA	2001-2002	DC-366	Sections III & V
Belt Conveyor	BC-363	184 tph	Conveyor Engineering	NA	NA	2001-2002	DC-366	Sections III & V
Bucket Elevator	E-360	184 tph	Rexnord	2126-2410F	NA	2001-2002	DC-366	Sections III & V
Raw Mill Seal Bin	B-360	220 Tons	Schuff Steel	NA	NA	2001-2002	DC-366	Sections III & V
Cyclone	CY-360	NA	FLSmidth	L6300	NA	2001-2002	DC-431	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Cyclone	CY-361	NA	FLSmidth	L6300	NA	2001-2002	DC-431	Sections III & V
Raw Mill	RM-306	NA	FLSmidth	FRM38/170	NA	2001-2002	DC-431	Sections III & V
Separator	SE-360	NA	FLSmidth	RAR37.5	NA	2001-2002	DC-431	Sections III & V
Spillage Conveyor	BC-362	NA	Rexnord	NA	NA	2001-2002	DC-431	Sections III & V
FK Pump	PN-402	NA	FLSmidth	8-H2Z-00-10428-116-2	NA	2001-2002	DC-367	Sections III & V
FK Pump	PN-403	NA	FLSmidth	8-H2Z-00-10428-116	NA	2001-2002	DC-367	Sections III & V
Screw Conveyor	SC-430	NA	FBH	10M320C166	NA	2001-2002	DC-431	Sections III & V
Screw Conveyor	SC-431	NA	FBH	10M320C166	NA	2001-2002	DC-431	Sections III & V
Screw Conveyor	SC-432	NA	FBH	10M320C166	NA	2001-2002	DC-367	Sections III & V
Pyroprocessing System								
Eductor	FMRS-404	0.5 tph	Fox Venturi	4"	NA	2004	DC-431	Sections III & V
Pre-Heater	PH-404	NA	FLSmidth	NA	NA	2001-2002	DC-431	Sections III & V
Pre-Heater	PH-405	NA	FLSmidth	NA	NA	2001-2002	DC-431	Sections III & V
Pre-Heater	PH-406	NA	FLSmidth	NA	NA	2001-2002	DC-431	Sections III & V
Pre-Heater	PH-407	NA	FLSmidth	NA	NA	2001-2002	DC-431	Sections III & V
Pre-Heater	PH-408	NA	FLSmidth	NA	NA	2001-2002	DC-431	Sections III & V
Calciner	CAL-404	NA	FLSmidth	ILC Low Nox	NA	2001-2002	DC-431	Sections III & V
Kiln	K-404	NA	FLSmidth	4400x48000	NA	2001-2002	DC-431	Sections III & V
Clinker Cooler	CC-404	NA	FLSmidth	SF3X4F	NA	2001-2002	DC-445	Sections III & V
Screw Conveyor	SC-461	26 tph	Transmission Products	NA	NA	2001-2002	DC-445	Sections III & V
Screw Conveyor	SC-462	45 tph	Transmission Products	NA	NA	2001-2002	DC-445	Sections III & V
Screw Conveyor	SC-463	45 tph	Transmission Products	NA	NA	2001-2002	DC-445	Sections III & V
Screw Conveyor	SC-465	26 TPH	Transmission	NA	NA	2001-2002	DC-446	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
			Products					
Screw Conveyor	SC-466	71 tph	Transmission Products	NA	NA	2001-2002	DC-446	Sections III & V
Screw Conveyor	SC-467	71 tph	Transmission Products	NA	NA	2001-2002	DC-446	Sections III & V
Clinker Transport								
Belt Conveyor	BC-402	300 tph	Conveyor Engineering	NA	NA	2001-2002	DC-448	Sections III & V
Belt Conveyor	BC-403	300 tph	Conveyor Engineering	NA	NA	2001-2002	DC-212	Sections III & V
Bucket Elevator	E-404	190 tph	Rexnord	1626-1410B	NA	2001-2002	DC-447	Sections III & V
Pan Conveyor	DBC-404	190 TPH	Rexnord	AFT	NA	2001-2002	DC-446	Sections III & V
Clinker Bin	B-404	1500 tons	Schuff Steel	NA	NA	2001-2002	DC-447	Sections III & V
Vibrating Feeder	VF-404	165 tph	Jeffery	NF 3605	1006919A	2001-2002	DC-447	Sections III & V
Mill Feed/ Clinker & Gypsum Handling								
Gypsum Bin	B-300	100 tons	NA	NA	NA	Pre-3/24/98	DC-306	Sections III & V
Clinker Bin	B-303	200 tons	NA	NA	NA	1959	DC-342	Sections III & V
Clinker Bin	B-340	100 tons	NA	NA	NA	1974	DC-342	Sections III & V
Gypsum Bin	B-341	40 tons	NA	NA	NA	1974	DC-304	Sections III & V
Screw Conveyor	SC-312	NA	NA	NA	NA	1974	DC-306	Sections III & V
Belt Conveyor	BC-312	300 tph	Conveyor Engineering	NA	NA	2001-2002	DC-312	Sections III & V
Belt Conveyor	BC-313	300 tph	Conveyor Engineering	NA	NA	2001-2002	DC-306	Sections III & V
Belt Conveyor	BC-350	176 tph	Conveyor Engineering	NA	NA	2001-2002	DC-352	Sections III & V
Clinker Bin	B-350	250 tons	Schuff Steel	NA	NA	2001-2002	DC-312	Sections III & V
Gypsum Bin	B-351	100 tons	Schuff Steel	NA	NA	2001-2002	DC-312	Sections III & V
Scavenger Conveyor	SC-350	NA	Schenck	NA	NA	2001-2002	DC-352	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Scavenger Conveyor	SC-35l	NA	Schenck	NA	NA	2001-2002	DC-352	Sections III & V
Weigh Feeder	W-350	161 tph	Schenck	DMO	NA	2001-2002	DC-352	Sections III & V
Weigh Feeder	W-351	15 tph	Schenck	DMO	NA	2001-2002	DC-352	Sections III & V
Finish Milling								
Gypsum Hopper	HP-301	NA	NA	NA	NA	2001-2002		Sections III & V
Gypsum Feeder	F-301/DCH-300	300 tph	Oldenburg Stamler	BF-7Q-0-100	13609	2001-2002		Sections III & V
Finish Mill BM 303								
Air Slide	AC-307	166 tph	Fuller	250 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-308	475 tph	Fuller	400 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-309	166 tph	Fuller	250 MM	NA	1959	DC-303	Sections III & V
Aft Slide	AC-312	166 tph	Fuller	250 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-315	166 tph	Fuller	250 MM	NA	1959	DC-306	Sections III & V
Air Slide	AC-318	760 tph	Fuller	480 MM	NA	1958	DC-306	Sections III & V
Air Slide	AC-323	475 tph	Fuller	400 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-324	475 tph	Fuller	400 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-330	475 tph	Fuller	400 MM	NA	1959	DC-303	Sections III & V
Air Slide	AC-331	166 tph	Fuller	250 MM	NA	1959	DC-306	Sections III & V
Belt Conveyor	BC-305	100 tph	Hewitt Robins	NA	NA	1958	DC-306	Sections III & V
Ball Mill	BM-303	NA	NA	NA	NA	1959	DC-303	Sections III & V
Bucket Elevator	E-303	420 tph	Jeffery	NA	NA	1958	DC-306	Sections III & V
Screw Conveyor	SC-305	NA	NA	NA	NA	1959	DC-303	Sections III & V
Screw Conveyor	SC-309	NA	NA	NA	NA	1959	DC-303	Sections III & V
Clinker Storage and Transport								
Belt Conveyor	BC-216	336 tph	Watkins	NA	NA	2001-2002	DC-213	Sections III & V
Belt Conveyor	BC-217	336 tph	Watkins	NA	NA	2001-2002	DC-214	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Belt Conveyor	BC-309	336 tph	Watkins	NA	NA	2001-2002	DC-316	Sections III & V
Clinker Storage Dome	DO-200	100,000 tons	Dome Technology	NA	NA	2001-2002	DC-213	Sections III & V
Clinker Storage Dome	DO-201	25,000 tons	Dome Technology	NA	NA	2001-2002	DC-214	Sections III & V
Belt Conveyor	BC-310	300 tph	Conveyor Engineering	NA	NA	2001-2002	DC-312	Sections III & V
Coal and Coke Handling and Grinding								
Belt Conveyor	BC-460	250 tph	Thomas Conveyor	NA	NA	1974	DC-460	Section VII.A
Belt Conveyor	BC-461	250 tph	Thomas Conveyor	NA	NA	1974		Section VII.A
Belt Conveyor	BC-462	250 tph	Thomas Conveyor	NA	NA	1974	DC-450	Section VII.A
Belt Conveyor	BC-463	250 tph	Thomas Conveyor	NA	NA	1974	DC-460	Section VII.A
Belt Feeder	BC-464	32 tph	Thomas Conveyor	NA	NA	1974		Section VII.A
Crusher	CR-460	250 tph	Pennsylvania Crusher	TK-8-32B	4160-02	1974	DC-460	Section VII.A
Vibrating Feeder	F-460	150 tph	Westinghouse	V4ALT-PLAN-10T-SPL	NA	1974		Section VII.A
Vibrating Feeder	F-461	150 tph	Westinghouse	V4ALT-PLAN-10T-SPL	NA	1974		Section VII.A
Screw Feeder	SC-465-0	32 tph	NA	NA	NA	1974		Section VII.A
Belt Conveyor	BC-451	150 tph	Transmission Products	NA	NA	2001-2002	DC-452	Section VII.B
Belt Conveyor	BC-453	150 tph	Transmission Products	NA	NA	2001-2002	DC-452	Section VII.B
Coal Bin	B-450	400 tons	Schuff Steel	NA	NA	2001-2002	DC-452	Section VII.B
Diverter Gate	DG-462	200 tph	Arizona Equipment Fabrication	NA	NA	2020	DC-450	Section VII.B

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Pet-Coke Bin	B-451	175 tons	Schuff Steel	NA	NA	2001-2002	DC-452	Section VII.B
Weigh Feeder	W-450	33.9 tph	Schenck	DMO	NA	2001-2002	DC-451	Section VII.B
Weigh Feeder	W-451	33.9 tph	Schenck	DMO	NA	2001-2002	DC-451	Section VII.B
Belt Conveyor	BC-454	34 tph	Conveyor Engineering	NA	NA	2001-2002	DC-451	Section VII.B
Separator	SE-450	NA	FLSmidth	KF-128-A160	481-104-579	2001-2002	DC-453	Sections III & V
Coal Mill	RM-450	NA	FLSmidth	FRM19/26	NA	2001-2002	DC-453	Sections III & V
Screw Conveyor	SC-456	NA	FLSmidth	MSDS-A 290	NA	2001-2002	DC-453	Section VII.B
Rail Car Hopper	HP-460A	44.5	NA	NA	NA	1974		Section VII.A
Rail Car Hopper	HP-460B	44.5	NA	NA	NA	1974		Section VII.A
Coal Unelevator	UE-461	NA	NA	NA	NA	1974		Section VII.A
Coal Hopper	HP-461	100 tons	NA	NA	NA	1974		Section VII.A
Coke Hopper	HP-462	100 tons	NA	NA	NA	1974		Section VII.A
Coal and Coke Grinding and Firing								
Pulverized Fuel Bin	B-452	20 tons	Schuff Steel	NA	NA	2001-2002	DC-454	Sections III & V
Pulverized Fuel Bin	B-453	20 tons	Schuff Steel	NA	NA	2001-2002	DC-455	Sections III & V
Screw Conveyor	SC-453	48 tph	Conveyor Engineering	NA	NA	2001-2002	DC-453	Sections III & V
Screw Conveyor	SC-454	48 tph	Conveyor Engineering	NA	NA	2001-2002	DC-454/455	Sections III & V
Screw Conveyor	SC-455	48 tph	Conveyor Engineering	NA	NA	2001-2002	DC-454/455	Sections III & V
Feeder	PW-452	NA	Pfister	DRW 3.10	NA	2001-2002	DC-431	Sections III & V
Feeder	PW-451	NA	Pfister	DRW 3.10	NA	2001-2002	DC-431	Sections III & V
Screw Conveyor	SC-306	210 tph	NA	NA	NA	1959	DC-303	Sections III & V
Separator	SE-305	210 tph	C.E. Raymond	14-0 D.W.	58091	1958	DC-303	Sections III & V
Separator	SE-306	NA	C.E. Raymond	14-0 D.W.	58092	1958	DC-303	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Weigh Feeder	W-305	3 tph	Ramsey	NA	NA	1981		Sections III & V
Finish Mill BM 304								
Air Slide	AC-340	380 tph	Fuller	350 MM	NA	1972	DC-341	Sections III & V
Air Slide	AC-341	166 tph	Fuller	250 MM	NA	1972	DC-340	Sections III & V
Air Slide	AC-342	166 tph	Fuller	250 MM	NA	1972	DC-340	Sections III & V
Air Slide	AC-343	166 tph	Fuller	250 MM	NA	1972	DC-340	Sections III & V
Air Slide	AC-344	166 tph	Fuller	250 MM	NA	1972	DC-340	Sections III & V
Air Slide	AC-346	22 tph	Fuller	100 MM	NA	1983	DC-309	Sections III & V
Air Slide	AC-347	22 tph	Fuller	100 MM	NA	1983	DC-308	Sections III & V
Fly Ash Bin	B-342	500 tons	Brown Tank	NA	NA	1983	DC-309	Sections III & V
Hydrated Lime Bin	B-343	105 tons	Brown Tank	NA	NA	1983	DC-308	Sections III & V
Belt Conveyor	BC-341	10 tph	Airbelt	NA	NA	1974	DC-344	Sections III & V
Belt Conveyor	BC-342	10 tph	Airbelt	NA	NA	1974	DC-344	Sections III & V
Belt Conveyor	BC-343	21.7 tph	Cambelt	CWR2445-6	NA	1997	DC-340	Sections III & V
Ball Mill	BM-304	NA	Allis Chalmers	9.5 X 33	NA	1972	DC-341	Sections III & V
Bucket Elevator	E-340	300 tph	Rexnord	NA	4120-04	1972	DC-341	Sections III & V
FK Pump	PN-340	125 tph	Fuller	8" Z Conv	NA	1972	DC-343	Sections III & V
Screw Conveyor	SC-320	NA	NA	NA	NA	1974	DC-306 DC-341 DC-343	Sections III & V
Screw Conveyor	SC-316	NA	NA	NA	NA	1974	DC-306	Sections III & V
Screw Conveyor	SC-317	NA	NA	NA	NA	1974	DC-306	Sections III & V
Screw Conveyor	SC-340	204 tph	NA	NA	NA	1974	DC-340	Sections III & V
Screw Conveyor	SC-341	NA	NA	NA	NA	1974	DC-340	Sections III & V
Screw Conveyor	SC-342	NA	NA	NA	NA	1974	DC-341	Sections III & V
Separator	SE-307	NA	C.E. Raymond	16-0 D.W.	NA	1972	DC-340	Sections III & V
Weigh Belt Conveyor	W-340	50 tph	Merrick	NA	NA	1974	DC-341	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Weigh Belt Conveyor	W-341	5 tph	Merrick	NA	NA	1974	DC-341	Sections III & V
Weigh Belt Conveyor	W-342	NA	NA	NA	NA	1974		Sections III & V
Hopper w/ Scale	WS-340	NA	NA	NA	NA	1974	DC-309	Sections III & V
Hopper w/ Scale	WS-341	NA	NA	NA	NA	1974	DC-308	Sections III & V
Clinker Grinding OK Mill								
FK Pump	PN-350	NA	Fuller	10" Z Conv	NA	2001-2002	PDC-350	Sections III & V
FK Pump	PN-351	NA	Fuller	10" Z Conv	NA	2001-2002	PDC-351	Sections III & V
Air Slide	AC-350	285 tph	F.B.H.	300 MM	NA	2001-2002	ACV-352 & ACV-353	Sections III & V
Air Slide	AC-351	285 tph	F.B.H.	300 MM	NA	2001-2002	ACV-351	Sections III & V
Air Slide	AC-352	285 tph	F.B.H.	300 MM	NA	2001-2002	ACV-352	Sections III & V
Air Slide	AC-353	285 tph	F.B.H.	300 MM	NA	2001-2002	ACV-353	Sections III & V
Air Slide	AC-354	285 tph	F.B.H.	300 MM	NA	2001-2002	DC-350	Sections III & V
Air Slide	AC-355	285 tph	F.B.H.	300 MM	NA	2001-2002	DC-350	Sections III & V
Surge Bin	B-352	NA	Schuff Steel	NA	NA	2001-2002	DC-352	Sections III & V
Belt Conveyor	BC-351	241 tph	Conveyor Engineering	NA	NA	2001-2002	DC-352	Sections III & V
Bucket Elevator	E-350	240 tph	Rexnord	1626-1810B	NA	2001-2002	DC-352	Sections III & V
Chain Conveyor	DCH-350	65 tph	Rexnord	20"	NA	2001-2002	DC-350	Sections III & V
Chain Conveyor	DCH-351	65 tph	Rexnord	20"	NA	2001-2002	DC-350	Sections III & V
Dryer	FR-350	15 MM btu/hr	Conamara	NA	NA	2001-2002	DC-350	Sections III & V
OK Mill	RM-305	NA	FLSmidth	OK 33-4	NA	2001-2002	DC-350	Sections III & V
Separator	SE-308	NA	FLSmidth	OKS 70	NA	2001-2002	DC-350	Sections III & V
Bag Packing								
Air Slide	AC-501	475 tph	Halliburton	400 MM	NA	1985	DC-501	Sections III & V
Air Slide	AC-502	475 tph	Halliburton	400 MM	NA	1985	DC-505	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Air Slide	AC-505	475 tph	Fuller	400 MM	NA	1959	DC-504	Sections III & V
Air Slide	AC-506	475 tph	Fuller	400 MM	NA	1959	DC-501	Sections III & V
Air Slide	AC-513	285 tph	Fuller	300 MM	NA	1987	DC-505	Sections III & V
Air Slide	AC-514	475 tph	Fuller	400 MM	NA	2005	DC-504	Sections III & V
Air Slide	AC-515	475 tph	Fuller	400 MM	NA	2005	DC-504	Sections III & V
Bin	B-501	NA	TWI	NA	NA	2005	DC-501	Sections III & V
Bin	B-502	NA	TWI	NA	NA	2005	DC-505	Sections III & V
Belt Conveyor	BBG-501	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Belt Conveyor	BC-501	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Bucket Elevator	E-501	NA	Link Belt	NA	NA	1959	DC-501	Sections III & V
Bucket Elevator	E-502	NA	Link Belt	NA	NA	1959	DC-505	Sections III & V
Bag Packer	BP-503	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Bag Cutter	BS-501	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
FK Pump	PN-502	NA	Fuller	10" Z Conv	NA	2005	PDC-502	Sections III & V
Rotary Screen	RSC-501	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-503	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-504	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-505	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-506	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-507	NA	Vento Matic	NA	NA	2005	DC-511	Sections III & V
Screw Conveyor	SC-508	NA	Vento Matic	NA	NA	2005	DC-501/505	Sections III & V
Vibratory Feeder	VF-501	NA	Vento Matic	NA	NA	2005	DC-501	Sections III & V
Vibratory Feeder	VF-502	NA	Vento Matic	NA	NA	2005	DC-505	Sections III & V
Bulk Loading								
East Side Scale Loadout	AC-507	475 tph	Fuller	400 MM	NA	1959	DC-503	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Air Slide	AC-508	475 tph	Halliburton	400 MM	NA	1985	DC-504	Sections III & V
West Side Scale Loadout	AC-509	475 tph	Halliburton	400 MM	NA	1985	DC-504	Sections III & V
Air Slide	AC-511	475 tph	Fuller	400 MM	NA	1976	DC-501/505	Sections III & V
Air Slide	AC-5l2	118 tph	Fuller	200 MM	NA	1976	DC-504	Sections III & V
West Side Scale Loadout	LSP	1282 tph	DCL	UN600EV-06VT	NA	2003	DC-504	Sections III & V
East Side Scale Loadout	LSP	1282 tph	DCL	UN600EV-06VT	NA	2003	DC-503	Sections III & V
Silo 15/16 Loadout	LSP	1282 tph	Midwesco	NA	NA	1976	DC-507	Sections III & V
Cement Storage								
Screw Conveyor	SC-510	NA	NA	NA	NA	2001-2002	DC-510	Sections III & V
Silo 15	S-15	753 tons	NA	NA	NA	1980	DC-512	Sections III & V
Silo 16	S-16	753 tons	NA	NA	NA	1980	DC-512	Sections III & V
South Finish Silo 1	S-1	2764 tons	NA	NA	NA	1959	DC-508	Sections III & V
South Finish Silo 2	S-2	3257 tons	NA	NA	NA	1959	DC-508	Sections III & V
South Finish Silo 6	S-6	3156 tons	NA	NA	NA	1959	DC-508	Sections III & V
South Finish Silo 7	S-7	3244 tons	NA	NA	NA	1959	DC-508	Sections III & V
South Finish Silo 11	S-11	881 tons	NA	NA	NA	1959	DC-508	Sections III & V
South Finish Silo 12	S-12	881 tons	NA	NA	NA	1959	DC-508	Sections III & V
Cement Silo 3	S-3	3136 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 4	S-4	3029 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 5	S-5	2922 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 8	S-8	3136 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 9	S-9	3012 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 10	S-10	2922 tons	NA	NA	NA	1959	DC-510	Sections III & V
Cement Silo 13	S-13	834 tons	NA	NA	NA	1959	DC-510	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Cement Silo 14	S-14	650 tons	NA	NA	NA	1959	DC-510	Sections III & V
Raw Material Sweetening								
Belt Conveyor	BC-221	700 tph	NA	NA	NA	2008	DC-222	Section VI.B
Belt Conveyor	BC-222	700 tph	NA	NA	NA	2008	DC-224	Section VI.B
Bin	B-224	1500 tons	NA	NA	NA	2008	DC-224	Section VI.B
Apron Feeder	AF-224	50 tph	NA	NA	NA	2008	DC-224	Section VI.B
Weigh Feeder	WF-224	50 tph	NA	NA	NA	2008	DC-224	Section VI.B
Bin	B-226	50 tph	NA	NA	NA	2008		Section VI.B
Bin	B-227	50 tph	NA	NA	NA	2008		Section VI.B
Apron Feeder	AF-226	10 tph	NA	NA	NA	2008		Section VI.B
Apron Feeder	AF-227	5 tph	NA	NA	NA	2008		Section VI.B
Belt Conveyor	BC-226	10 tph	NA	NA	NA	2008		Section VI.B
Belt Conveyor	BC-227	5 tph	NA	NA	NA	2008		Section VI.B
Belt Conveyor	SCV-226	NA	NA	NA	NA	2008		Section VI.B
Belt Conveyor	SCV-227	NA	NA	NA	NA	2008		Section VI.B
Belt Conveyor	BC-211A	350 tph	NA	NA	NA	2008	DC-228	Section VI.B
Belt Conveyor	BC-211B	350 tph	NA	NA	NA	2008	DC-228	Section VI.B
Belt Conveyor	DBC-228	350 tph	NA	NA	NA	2008	DC-228	Section VI.B
Bin	B-228	220 tph	NA	NA	NA	2008	DC-228	Section VI.B
Apron Feeder	AF-228	350 tph	NA	NA	NA	2008	DC-228	Section VI.B
Belt Conveyor	BC-228	350 tph	NA	NA	NA	2008	DC-228	Section VI.B
Blending System								
Air Slide	AC-365	NA	NA	NA	NA	2008	DC-608	Sections III & V
Elevator	E-606	350 tph	NA	NA	NA	2008	DC-608	Sections III & V
Air Slide	AC-613	NA	NA	NA	NA	2008	DC-608	Sections III & V
Feed Discharge System	FDS-606	NA	NA	NA	NA	2008	DC-609	Sections III & V

Type/Description	Equipment ID	Max Capacity	Manufacturer	Model Number	Serial Number	Date of Mfg.	Control Device	Applicable Section
Air Slide	AC-610	NA	NA	NA	NA	2008	DC-609	Sections III & V
Silo	S-606	10000 tons	NA	NA	NA	2008	DC-609	Sections III & V
Feed Discharge Air Slide	AC-611	NA	NA	NA	NA	2008	DC-609	Sections III & V
Feed Discharge Bin	B-606	NA	NA	NA	NA	2008	DC-610	Sections III & V
Air Slide	AC-614	NA	NA	NA	NA	2008	DC-609	Sections III & V
Elevator	E-607	350	NA	NA	NA	2008	DC-608	Sections III & V
Feed Discharge Air Slide	AC-612	NA	NA	NA	NA	2008	DC-610	Sections III & V
Cooling Towers								
Mill Cooling Tower	CTWR-300	598 gpm	Marley	NA	NA	1959		Section IX
RM-305 Cooling Tower	CTWR-302	598 gpm	Marley	AV-61002, G-235	NA	2001-2002		Section IX
Kiln - Raw Mill Cooling Tower	CTWR-400	907 gpm	Marley	AV-61002, G-235	NA	2001-2002		Section IX
Emergency Generator	EG-404	587 HP				Pre December 19, 2002		Section VIII
Gasoline Storage Tank	TK-702	8,000 gallons	NA	NA	NA	NA		Section XIV
Diesel Storage Tank	TK-703	15,000 gallons	NA	NA	NA	NA		Section XV
Auxiliary Equipment								
Aqueous Ammonia Storage Tank	TBD	TBD	TBD	TBD	TBD	TBD	N/A	N/A
Selective Non-Catalytic Reduction Control System	TBD	TBD	TBD	TBD	TBD	TBD	N/A	Section XVI

Dust Collectors

Equipment ID	Installation Date	Manufacturer	Capacity (cfm)
DC-100	1986	Dusty Dustless	1000
DC-101	2009	FLS Airtech	23050
DC-102	2009	FLS Airtech	26300
DC-103	2009	FLS Airtech	6736
DC-201A	2006	FLS Airtech	4000
DC-202	1985	Ultra Industry	5000
DC-205	1959	Norblo	5832
DC-228A/DC-211	2008	FLS Airtech	2000
DC-212	2002	Sly	2000
DC-213	2002	Sly	4000
DC-214	2002	Sly	4000
DC-222	2008	FLS Airtech	2000
DC-224	2008	FLS Airtech	6000
DC-228B/DC-228	2008	FLS Airtech	8000
DC-301	1984	Fabric Filters NW	60000
DC-302	2007	GE Energy	32700
DC-303	2008	GE Energy	32700
DC-304	1959	Norblo	12000
DC-305	1959	Norblo	12000
DC-306	1959	Norblo	12000
DC-308	2019	FLS Airtech	1600
DC-309	1983	FlexKleen	2400
DC-312	2002	FBH	6050
DC-316	2002	FBH	3100
DC-340	1972	Mikropul	20000
DC-341	2009	FLS Airtech	10000
DC-342	1972	Mikropul	5000
DC-343	1998	Mikropul	1500
DC-344	1972	Mikropul	5000
DC-350	2002	FBH	228000
DC-352	2002	FBH	10000
DC-366	2002	FBH	8400
DC-367	2002	FBH	1850
DC-368	2002	FBH	1600
DC-409	2002	FBH	11350
DC-410	2002	FBH	2950
DC-411	2002	FBH	1300
DC-431	2002	FBH	259200
DC-445	2002	FBH	138000
DC-446	2002	FBH	2900

Equipment ID	Installation Date	Manufacturer	Capacity (cfm)
DC-447	2002	FBH	7150
DC-448	2002	FBH	3100
DC-450	2002	FBH	3000
DC-451	2002	FBH	3720
DC-452	2002	FBH	5360
DC-453	2002	FBH	38800
DC-454	2002	FBH	30
DC-455	2002	FBH	30
DC-460	1974	FBH	6000
DC-501	2003	BHA	8210
DC-503	1959	Mikropul	3000
DC-504	1959	Pangborn	6000
DC-505	2004	BHA	8210
DC-507	2006	US Filter	755
DC-508	1986	Ecolaire	5000
DC-510	2002	FBH	13300
DC-511	2005	Scientific	13300
DC-512	2005	FLS Airtech	8000
DC-601	1972	Mikropul	7200
DC-607	2007	FLS Airtech	11500
DC-605	1996	Fuller Kovako	2500
DC-606	1996	Wheelabrator	500
DC-608/DC-615	2008	FLS Airtech	6000
DC-609/DC-616	2008	FLS Airtech	6000
DC-610/DC-617	2008	FLS Airtech	4000
DC-618	2016	DCL	2000
PDC-350	2017	DCL	500
PDC-351	2017	DCL	500
ACV-351	2017	DCL	250
ACV-352	2017	DCL	250
ACV-353	2017	DCL	250
PDC-502	2023	IAC	3500

APPENDIX C. FACILITY CHANGES ALLOWED WITHOUT PERMIT REVISIONS SINCE LAST RENEWAL

Salt River Materials Group

100% AMERICAN™

August 14, 2019

RE: Facility Changes Allowed Without Permit Revision to Air Quality Permit #69780

VIA OVERNIGHT MAIL

Dan Czecholinksi, Acting Director
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Czecholinski:

This letter is a formal request for a facility change allowed without a permit revision as per Arizona Administrative Code R-18-2-317. The change involves the replacement of the dust collector identified as DC-308 (Ultra Industries) and can be found in the equipment list contained in Permit #69780, Attachment "C". This dust collector controls particulate emissions from the hydrated lime bin (B-343) and an air slide (AC-347). The replacement dust collector will retain the same equipment number DC-308. The following are design and operational specifications for the new replacement dust collector:

- Model – FLS Airtech Pulse Jet Dust Collector
- Volume – 1,600 acfm
- Total Cloth Area – 706 square feet
- Interstitial Velocity – 169 fpm
- Air-to-Cloth Ratio – 2.27 : 1

In addition, there will be no change in emissions of any regulated pollutants or permit terms or conditions due to the replacement of this equipment (see attachment). The work described above is scheduled to begin in August 2019 and be completed by September 2019.

If you need further information please contact Brett Lindsay at (928) 634-2261 Extension 8062 your earliest convenience.

Regards,

Gregg St. Clair
VP Cement Operations
Phoenix Cement Company

Cc: EPA Region 9

PHOENIX CEMENT COMPANY - CLARKDALE MANUFACTURING PLANT

PERMIT NUMBER **Air Quality Permit #69780**
SIC CODE **3241**

PROJECT IDENTIFICATION **Replacement of DC-308**
DATE OF PROPOSED CHANGE **Aug-19**

POLLUTANT MODIFICATION ANALYSIS **PM10**

Description of Change	Airflow (acfm)	Outlet Grain Loading (gr/acf)	Hours of Operation per Year (hrs)	Potential Hourly Emissions (lbs/hr)	Potential Annual Emissions (TPY)
Premodification : DC-308 (Ultra Industry) **[1]**	2500	0.011	8760	0.236	1.032
Postmodification : DC-308 (FLS)	1600	0.01	8760	0.137	0.601
NET EMISSIONS CHANGE				-0.099	-0.432

Notes

[1] - Based upon Air Quality Control Permit No. 69780. These are our current short-term (hourly) and long-term (annual) emissions limitations.

Salt River Materials Group

100% AMERICAN™

April 17, 2020

RE: Facility Changes Allowed Without Permit Revision to Air Quality Permit #69780

VIA EMAIL

Dan Czecholinksi, Director
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Czecholinski:

This letter is a formal request for a facility change allowed without a permit revision as per Arizona Administrative Code R-18-2-317. The change involves the installation of a diverter gate (DG-462) between conveyor belts (BC-462) and (BC-451), which will enable the option of offloading bauxite via railcar instead of the current method of delivery of truck transport. During normal transport of coal and pet coke to the coal mill from the coal/coke storage pile, material will still be conveyed from belt conveyor (BC-462) to belt conveyor (BC-451). However, when offloading bauxite, the material that is being transported on belt conveyor (BC-452) will be diverted to a concrete lined bunker instead of transferring to belt conveyor (BC-451). From there the bauxite will be eventually be transported (via loader and dump truck) to feed hopper (B-227) for addition to the raw feed.

Bauxite is currently used in our cement manufacturing process to increase the aluminum content of the raw feed above what can be provided from the native minerals in the quarry or other alternative materials like bottom ash. This became significantly more important when the chloride content of the bottom ash we were utilizing increased, causing compliance issues with the hydrogen chloride (HCl) emissions standard (that is part of NESHAP Subpart LLL).

The following are design and operational specifications for the new diverter gate:

- Manufacturer – Arizona Equipment Fabrication
- Size – Approximately 48" x 39"

In addition, there will be no increase in emissions of any regulated pollutants above de minimus thresholds or changes to the permit terms or conditions due to the installation or operation of this equipment (see attachment). The work described above is scheduled to begin in April 2020 and be completed by May 2020.

If you need further information please contact Brett Lindsay at (928) 634-2261 Extension 8062 your earliest convenience.

Regards,

Gregg St. Clair
VP Cement Operations
Phoenix Cement Company

PHOENIX CEMENT COMPANY - CLARKDALE MANUFACTURING PLANT

PERMIT NUMBER **Air Quality Permit #69780**
SIC CODE **3241**

PROJECT IDENTIFICATION **Installation of DG-462**
DATE OF PROPOSED CHANGE **Apr-20**

POLLUTANT MODIFICATION ANALYSIS **PM10**

Description of Change	Hourly Throughput (tph)	Batch Drop/Conveyor Transfer Operations EF (lbs/ton)	Annual Throughput (tpy)	Potential Hourly Emissions (lbs/hr)	Potential Annual Emissions (tpy)
Premodification :					
N/A				0.000	0.000
Postmodification :					
DG-462 (to be installed)	200	0.000526	50000	0.105	0.013
HP-460A/HP-460B (existing)	200	0.000526	50000	0.105	0.013
F-460/F-461 (existing)	200	0.000526	50000	0.105	0.013
BC-460 (existing and controlled by DC-460)	200	0.000046	50000	0.009	0.001
BC-462 (existing and controlled by DC-450)	200	0.000046	50000	0.009	0.001
NET EMISSIONS CHANGE				0.334	0.042

SRMG
Salt River Materials Group
100% AMERICAN™

May 27, 2021

RE: Facility Changes Allowed Without Permit Revision to Air Quality Permit #69780

VIA EMAIL

Dan Czecholinksi, Director
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Czecholinski:

This letter is a formal request for a facility change allowed without a permit revision as per Arizona Administrative Code R-18-2-317. The change involves the replacement of the vibratory screen identified as VS-101 and can be found in the equipment list contained in Permit #69780, Attachment "C". This vibratory screen separates the various raw material size fractions for further processing in our secondary crushing system. The replacement vibratory screen will retain the same equipment number VS-101. The following are design and operational specifications for the new replacement vibratory screen:

- Manufacturer – Terex
- Model – 6' x 12' Simplicity Two Deck Bearing Incline Screen
- Model Number – EQNSIMP6X122D
- Max Capacity - NA

In addition, because there will be no change in throughput, there will be no change in emissions of any regulated pollutants or permit terms or conditions due to the replacement of this equipment. The work described above is scheduled to begin and be completed during the month of June 2021.

If you need further information please contact me at (928) 634-2261 Extension 8062 at your earliest convenience.

Regards,

Brett Lindsay
Senior Director, Cement Operations and Environmental
Phoenix Cement Company

PHOENIXCEMENT SR SALT RIVER™ SAND & ROCK

Tel: 480-850-5757 • Fax: 480-850-5758 • 8800 E Chaparral Rd • Ste 155 • Scottsdale, AZ 85250

Salt River Materials Group

100% AMERICAN™

November 7, 2022

RE: Facility Changes Allowed Without Permit Revision to Air Quality Permit #69780

VIA EMAIL

Dan Czecholinksi, Director
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Czecholinski:

This letter is a formal request for a facility change allowed without a permit revision as per Arizona Administrative Code R-18-2-317. The change involves the installation of the dust collector identified as PDC-502 (IAC). This dust collector will control particulate emissions from the recycled cement pneumatic pump (PN-502). This pump allows us to remove cement from the west side silos and recycle to east side loadout silos for loadout or back into the west side silos for blending purposes. This pump currently is being vented by DC-504 (Pangborn), however due to a larger proportion of cement being loaded into railcars on the west side loadout versus into bulk trucks, we are having difficulty simultaneously recycling cement from the west side silos and loading railcars on the west side loadout. The installation of this dust collector will alleviate that problem. The following are design and operational specifications for the new dust collector:

- Model – IAC Dust Collector
- Volume – 3,500 acfm
- Total Cloth Area – 1,180 square feet
- Interstitial Velocity – 216 fpm
- Air-to-Cloth Ratio – 2.96 : 1

In addition, there will be no increase in emissions of any regulated pollutants above de minimus thresholds or changes to the permit terms or conditions due to the installation or operation of this equipment (see attachment). The work described above is scheduled to begin in late November 2022 and be completed by December 2022.

If you need further information, please contact Brett Lindsay at (928) 634-2261 Extension 8062 your earliest convenience.

Regards,

Gregg St. Clair
VP Cement Operations
Phoenix Cement Company

PHOENIX CEMENT COMPANY - CLARKDALE MANUFACTURING PLANT

PERMIT NUMBER **Air Quality Permit #69780**
SIC CODE **3241**

PROJECT IDENTIFICATION **Installation of PDC-502**
DATE OF PROPOSED CHANGE **Nov-22**

POLLUTANT MODIFICATION ANALYSIS **PM10**

Description of Change	Airflow (acfm)	Outlet Grain Loading (gr/acf)	Hours of Operation per Year (hrs)	Potential Hourly Emissions (lbs/hr)	Potential Annual Emissions (TPY)
Premodification :					
Postmodification : PDC-502 (IAC)	3500	0.01	8760	0.300	1.314
NET EMISSIONS CHANGE				0.300	1.314

APPENDIX D. EMERGENCY ENGINE SPEC SHEET

SUBMITTAL FOR:

SRMG CLARKDALE

(1) GILLETTE 120ekW NATURAL GAS GENERATOR

Prepared By:

Empire Power Systems
840 North 43rd Avenue
Phoenix, AZ. 85009
602-627-5707

Project Manager : Brenden Ring
Phone: 602-333-5682

Project Engineer : Shreyas Patel
Phone: 602-327-5707

24x7 service : 602-333-5622

24x7 Rental : 602-333-5604

CSQ#:NA

IMACS #: 220120

Revision: -

Date:11/22/2022

BILL OF MATERIAL

QTY	ITEM / DESCRIPTION
1	SP-1200-3-4N2 120 KW, 277/480 V, 3 PH, 60 HZ PSI NATURAL GAS FUEL ENGINE DRIVEN GEN-SET IN LEVEL 2 SOUND AND WEATHER PROTECTED ALUMINUM ENCLOSURE
1	STANDARDEQUIP *UL 2200 CERTIFIED *EPA CERTIFIED ENGINE *STAMFORD GENERATOR *180 MPH WIND RATED HOUSING *DEEPSEA 7420MKII CONTROLLER *BATTERY CHARGER *HIDDEN CRITICAL GRADE MUFFLER *FLEXIBLE RADIATOR & OIL DRAINS *BATTERY RACK & CABLES (BATTERY NOT INCLUDED) *RADIATOR FILLED WITH MIXTURE OF GREEN GLYCOL AND DE-IONIZED WATER *ENGINE CRANKCASE FILLED WITH SAE 10W30 OIL
1	CB1-200-3-4 200 AMP 277/480V 3 POLE THERMAL MAGNETIC CIRCUIT BREAKER
1	S-10B 1 1/4" FLEXIBLE DRY FUEL LINE 16" LONG FOR 80-150 KW GEN-SETS
1	S-13D 1500 WATT 120V 1PH ENGINE COOLANT HEATER FOR 80-150 KW DRY FUEL / 100-210KW DIESEL FUEL
1	S-8A ETERNAL PMG EXCITATION
1	S19A-2 LED DISPLAY ANNUNCIATOR IN NEMA 1 ENCLOSURE - 8 LEDS

GILLETTE GENERATORS

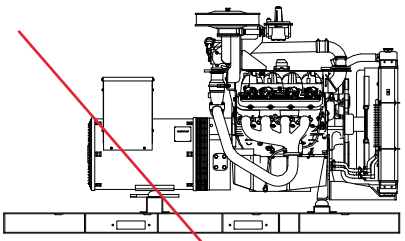
60 HZ MODEL

SP-1200

NATURAL GAS ONLY

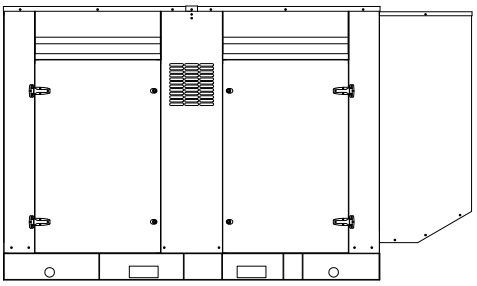
LIQUID COOLED LPG/NG ENGINE GENERATOR SET

Model		STANDBY 120°C RISE	
	HZ	N.G.	LPG
SP-1200-60 HERTZ	60	120	N/A



"OPEN" GEN-SET

There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Silencer not supplied, as installation requirements are not known. However, this item is available as optional equipment.



"LEVEL 2" HOUSED GEN-SET

Full aluminum weather protection and superior sound attenuation for specific low noise applications. Critical grade muffler is standard.

All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.

UL2200, UL1446, UL508, UL142, UL498

NFPA 110, 99, 70, 37
All generator sets meet NFPA-110 Level 1, when equipped with the necessary accessories and installed per NFPA standards.

NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05

ASCE 7-05 & 7-10
All generator sets meet 180 MPH rating.

EPA 40CFR Part 60, 1048, 1054, 1065, 1068

GENERATOR RATINGS

GENERATOR MODEL	VOLTAGE		PH	HZ	NATURAL GAS FUEL 120°C RISE STANDBY RATING		LIQUID PROPANE GAS FUEL 120°C RISE STANDBY RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP
SP-1200-1-1	120	240	1	60	120/120	500	N/A	
SP-1200-3-2	120	208	3	60	120/150	416	N/A	
SP-1200-3-3	120	240	3	60	120/150	361	N/A	
SP-1200-3-4	277	480	3	60	120/150	180	N/A	
SP-1200-3-5	127	220	3	60	120/150	394	N/A	
SP-1200-3-16	346	600	3	60	120/150	144	N/A	

RATINGS: All single phase gen-sets are dedicated 4 lead windings, rated at unity (1.0) power factor. All three phase gen-sets are 12 lead windings, rated at .8 power factor. 120°C "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 120°C (standby) R/R winding temperature, within a maximum 40°C ambient condition. Generators operated at standby power ratings must not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

APPLICATION & ENGINEERING DATA FOR MODEL SP-1200-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type.....UCI274F-06, 4 Pole, 4 Lead, Single Phase
..... UCI274E-311, 4 Pole, 12 Lead re-connectable, Three Phase
.....UCI274E-17, 4 Pole, 6 Lead, 600 V, Three Phase
Exciter.....Brushless, shunt excited
Voltage Regulator .....Solid State, HZ/Volts
Voltage Regulation .....½%, No load to full load
Frequency.....Field convertible, 60 HZ to 50 HZ
Frequency Regulation .....½% (½ cycle, no load to full load)
Unbalanced Load Capability.....100% of standby amps
One Step Load Acceptance ..... 100% of nameplate rating
Total Stator and Load Insulation.....Class H, 180°C
Temperature Rise ..... 120°C R/R, standby rating @ 40°C amb.
1 Ø Motor Starting @ 30% Voltage Dip (240V) .....415 kVA
3 Ø Motor Starting @ 30% Voltage Dip (208-240V).....450 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V) .....580 kVA
3 Ø Motor Starting @ 30% Voltage Dip (600V) .....635 kVA
Bearing..... 1, Pre-lubed and sealed
Coupling.....Direct flexible disc
Total Harmonic Distortion..... Max 3½% (MIL-STD705B)
Telephone Interference Factor .....Max 50 (NEMA MG1-22)
Deviation Factor..... Max 5% (MIL-STD 405B)
Ltd. Warranty Period..... 24 Months from date of start-up or
.....1000 hours use, first to occur.

GENERATOR FEATURES

- World Renown Stamford Electric Generator having UL-1446 certification on full amortisseur windings.
- Full generator protection with **Deep Sea 7420** controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Generator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Complete engine-generator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-generator sets, before shipping.
- Self ventilating and drip-proof & revolving field design

ENGINE SPECIFICATIONS AND APPLICATIONS DATA

ENGINE

Manufacturer.....Power Solutions, Inc. (PSI)
Model and Type .....Ind. Power Train, 8.8LT, 4 cycle
Aspiration.....Turbocharged
Cylinder Arrangement.....8 Cylinders, V-8
Displacement Cu. In. (Liters).....537 (8.8)
Bore & Stroke In. (Cm.).....4.35 x 4.50 (11.0 x 11.4)
Compression Ratio..... 10.1:1
Main Bearings & Style..... 5, Bi-Metal Steel and Aluminum
Cylinder Head .....Cast Iron
Pistons.....Cast Aluminum
Crankshaft.....Nodular Iron
Exhaust Valve .....Inconel, A193
Governor .....Electronic
Frequency Reg. (no load-full load) .....Isochronous
Frequency Reg. (steady state) .....± 1/4%
Air Cleaner.....Dry, Replaceable Cartridge
Engine Speed .....1800 RPM
Piston Speed, ft/min (m./min)…… .1311 (399)
Max Power, bhp (kwm) Standby/LPG..... .....178 (134)
Max Power, bhp (kwm) Standby/NG..... .....197 (147)
Ltd. Warranty Period.....12 Months or 2000 hrs., first to occur

FUEL SYSTEM

Type .....NAT. GAS (ONLY), Vapor Withdrawal
Fuel Pressure (kpa), in. H_2O* .....(1.74-2.74), 7”-11”
Secondary Fuel Regulator..... NG (ONLY) Vapor System
Auto Fuel Lock-Off Solenoid ..... Standard on all sets
Fuel Supply Inlet Line.....1¼” NPTF
*Measured at gen-set fuel inlet, down stream from any dry fuel accessories

FUEL CONSUMPTION

LP GAS: FT^3/HR (M^3/HR)	STANDBY
100% LOAD	N/A
75% LOAD	N/A
50% LOAD	N/A
LPG = 2500 BTU X FT^3/HR = Total BTU/HR LPG Conversion: 8.50 FT^3 = 1 LB. : 36.4 FT^3 = 1 GAL.	

NAT. GAS: FT^3/HR (M^3/HR)	STANDBY
100% LOAD	1950 (47)
75% LOAD	1500 (42)
50% LOAD	1110 (31)
NG = 1000 BTU X FT^3/HR = Total BTU/HR	

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Capacity qt. (L) 8.5 (8.0)
Oil Pan Cap. W/ filter qt. (L) 9.0 (8.5)
Oil Filter..... 1, Replaceable Spin-On

ELECTRICAL SYSTEM

Ignition System .....Electronic
Eng. Alternator and Starter:
Ground…..…… Negative
Volts, DC……..……12
Recommended Battery to -18°C (0°F):... 12 VDC, Size BCI# 27, Max Dimensions: .....12" lg X 6 3/4” wi X 9" hi, with standard round posts. Min output at 700 CCA. Battery tray (max. dim. at 12”lg x 7”wi), hold down straps, battery cables, and battery charger, is furnished. Installation of (1) starting battery is required, with possible higher AMP/HR rating, as described above, if normal environment averages -13°F (-25°C) or cooler.

APPLICATION & ENGINEERING DATA FOR MODEL SP-1200-60 HZ

COOLING SYSTEM

Type of System ..... Pressurized, closed recovery
Coolant Pump ..... Pre-lubricated, self-sealing
Cooling Fan Type (no. of blades) ..... Pusher (7)
Fan Diameter inches (cm) ..... 26" (660)
Ambient Capacity of Radiator °F (°C) 125 (51.6)
Engine Jacket Coolant Capacity Gal (L) 3.6 (13.7)
Radiator Coolant Capacity Gal. (L) 4.3 (16.2)
Maximum Restriction of Cooling Air Intake
and discharge side of radiator in. H_20 (kpa) ..... 0.5 (.125)
Water Pump Capacity gpm (L/min) 33 (125)
Heat Reject Coolant: Btu/min (kw) 6260 (110)
Low Radiator Coolant level Shutdown ..... Standard
Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix.

COOLING AIR REQUIREMENTS

Combustion Air, cfm (m^3/min) 315 (8.9)
Radiator Air Flow cfm (m^3/min) 12,000 (340)
Heat Rejected to Ambient:
Engine: kw (btu/min) 84 (4790)
Alternator: kw (btu/min) 16 (912)

EXHAUST SYSTEM

Exhaust Outlet Size ..... 3.5"
Max. Back Pressure, in. hg (KPA) 3.0 (10.2)
Exhaust Flow, at rated kw: cfm (m^3/min) 1017 (28.8)
Exhaust Temp., at rated kw: °F (ºC) 1300 (704)
Engines are EPA certified for LPG and Natural Gas.

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 1, Residential Silencer	91	N/A
Level 2, Critical Silencer	88	81
Level 3, Hospital Silencer		75

Note: Open sets (no enclosure) have silencer system choices due to unknown job-site applications. Level 2 enclosure has installed critical silencer with upgrade to Level 3 hospital silencer. Sound tests are averaged from several test points and taken at 23 ft. (7 m) from source of noise at normal operation.

DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. (305m) above 3000 ft. (914m) from sea level

DERATE GENERATOR FOR TEMPERATURE

2% per 10°F(5.6°C) above 104°F (40°C)

DIMENSIONS AND WEIGHTS

	Open Set	Level 2 Enclosure
Length in (cm)	98 (248)	122 (310)
Width in (cm)	48 (122)	48 (122)
Height in (cm)	64 (163)	72.5 (183)
1 Ø Net Weight lbs (kg)	2684 (1217)	3484 (1580)
1 Ø Ship Weight lbs (kg)	2874 (1303)	3734 (1694)
3 Ø Net Weight lbs (kg)	2624 (1190)	3444 (1562)
3 Ø Ship Weight lbs (kg)	2814 (1276)	3694 (1676)

DEEP SEA 7420MKII DIGITAL MICROPROCESSOR CONTROLLER

Deep Sea 7420MKII

The "**7420MKII**" controller is an auto start mains (utility) failure module for single gen-set applications. This controller includes a backlit LCD display which continuously displays the status of the engine and generator at all times.

The "**7420MKII**" controller will also monitor speed, frequency, voltage, current, oil pressure, coolant temp., and fuel levels. These modules have been designed to display warning and shut down status. It also includes: (11) configurable inputs • (8) configurable outputs • voltage monitoring • mains (utility) failure detection • (250) event logs • configurable timers • automatic shutdown or warning during fault detection • remote start (on load) • engine preheat • advanced metering capability • hour meter • text LCD 132 x 64 pixel ratio display • protected solid state outputs • test buttons for: stop/reset • manual mode • auto mode • lamp test • start button • power monitoring (kWh, kVAr, kVAh, kVArh) • IP65 rating (with supplied gasket)

This controller includes the expansion features including RS232, RS484 (using MODBUS-RTU/TCP), direct USB connection with PC, expansion optioned using DSENet for remote annunciation and remote relay interfacing for a distance of up to 3300FT. The controller software is freely downloadable from the internet and allows monitoring with direct USB cable, LAN, or by internet via the built in web interface.

Advanced Features:

PLC editor allow user configurable functions to meet specific application requirements • Data logging to assist with fault finding with 20 parameter data logging and recording on USB drives • Multiple date and time scheduler • Set maintenance periods can be configured to maintain optimum engine performance • Modules can be integrated into building management systems (BMS) using MODBUS • Configurable MODBUS pages with RTU & TCP support • Fully configurable via DSE Configuration Suite PC software • Remote SCADA monitoring via DSE Configuration Suite PC software • Engine exerciser • Automatic load transfer • Multiple configurations

STANDARD FEATURES FOR MODEL SP-1200-60 HZ

STANDARD FEATURES

CONTROL PANEL:

Deep Sea 7420 digital microprocessor with logic allows programming in the field. Controller has:

- STOP-MANUAL-AUTO modes and automatic engine shutdowns, signaled by full text LCD indicators:
- Low oil pressure
- High engine temp
- Low Radiator Level
- Three auxiliary alarms
- Battery fail alarm
- Engine fail to start
- Engine over speed
- Engine under speed
- Over & under voltage

Also included is tamper-proof engine hour meter

ENGINE:

Full flow oil filter • Air filter • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump • Thermostat • Pusher fan and guard • Exhaust manifold • 12 VDC battery charging alternator • Flexible exhaust connector • "Isochronous" duty, electronic governor • Secondary dry fuel regulator • Dry fuel lock-off solenoid • Vibration isolators • Closed coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator drain hose.

AC GENERATOR SYSTEM:

AC generator • Shunt excited • Brushless design • Circuit Breaker installed and wired to gen-set • Direct connection to engine with flex disc • Class H, 180°C insulation • Self ventilated • Drip proof construction • UL Certified

VOLTAGE REGULATOR:

½% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

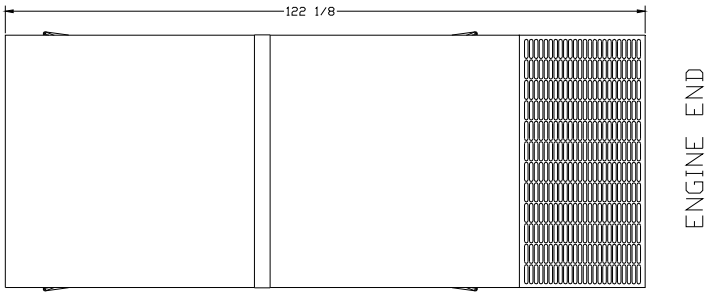
DC ELECTRICAL SYSTEM:

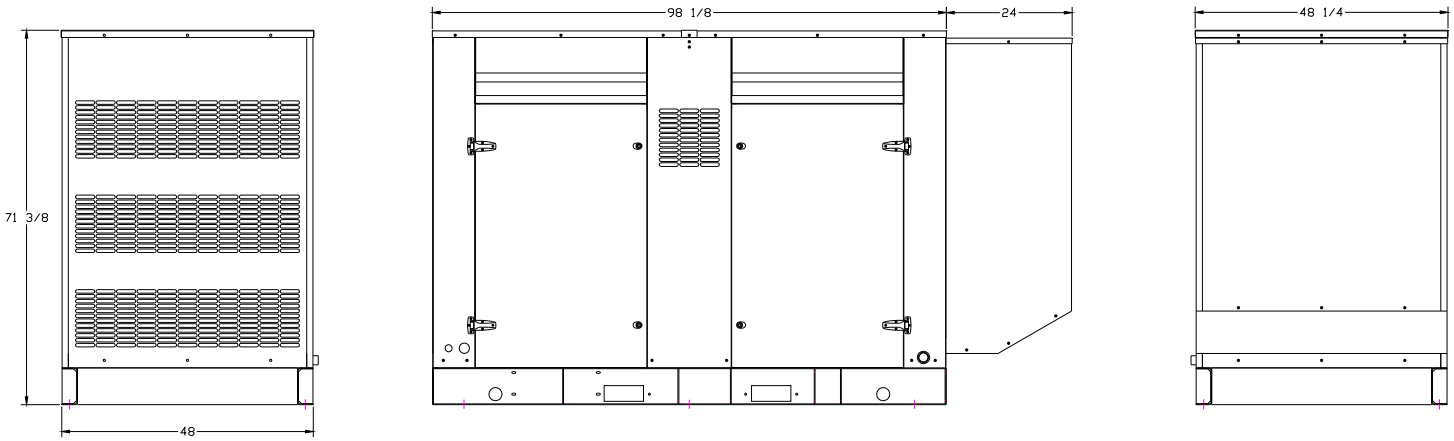
Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger with maintaining & recharging automatic charge stages.

WEATHER/SOUND PROOF ALUMINUM HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

- 9 Heated And Agitated Wash Stages
- Zinc Phosphate Etching-coating Stage
- Final Baked On Enamel Powder
- 18/8 Stainless Steel Hardware

Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings. DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.





POWER SOLUTIONS INTERNATIONAL

8.8L Turbocharged Stationary

EMERGENCY "STANDBY"

Date:	7/7/2015
Rev:	E

		Units		8.8L T			
		Std	Metric	1500		1800	
General Engine Data							
	Type	N/A		PSI V-Type 4 Cycle			
	Number of cylinders	N/A		8			
	Aspiration	N/A		Forced Induction			
	Bore	in	mm	4.35	110.5	4.35	110.5
	Stroke	in	mm	4.5	114.3	4.5	114.3
	Displacement	in^3	L	535	8.8	535	8.8
	Compression Ratio	N/A		10.1:1			
	RPM Range (Min-Max)	RPM		1500-1800			
	Rotation Viewed from Flywheel	N/A		Counter Clockwise			
	Firing Order	N/A		1-8-7-2-6-5-4-3			
	Dry Weight (long Block)	lb	kg	730	307	730	307
Gross Standby Power Rating[1,2,3] Per ISO 3046 at the Flywheel				**HP**	**KW**	**HP**	**KW**
	LP			N/A	N/A	N/A	N/A
	Standby Rating Average Load Factor - LP			N/A	N/A	N/A	N/A
	NG			164.30	122.52	197.32	147.20
	Standby Rating Average Load Factor - NG			134.72	100.46	162.68	121.36
The 8.8L Turbocharged Engine is not offered in a PRIME Application							
Exhaust System							
	Type			Air Cooled Manifold			
	Emergency Standby Rating Catalyst Configuration for US Certified Product			Dual Substrate		Dual Substrate	
	Maximum allowable Back pressure	in HG	kPa	3	10.2	3	10.2
	Exhaust Volumetric Flow at Rated Power @ 1350 F	cfm	m^3/min	838.7	23.75	1017.9	28.82
Air Induction System							
	Maximum allowable Intake Air Restriction with Air Cleaner						
	Clean	inH2O	kPa	3	1.49	3	1.49
	Dirty	inH2O	kPa	13	3.24	13	3.24
	Combustion Air required (volume)	cfm	m^3/min	259.7	7.35	315.2	8.93
Cooling System							
	Coolant Capacity						
	Engine only	qts	L	14.5	13.7	14.5	13.7
	Heat rejected to Cooling water at rated Load	btu/min	kcal/sec	2466	10.36	4184	17.58
	Cracking Temperature	F	C	160	71	160	71
	Full Open Temperature	F	C	185	85	185	85
Lubrication System							
	Oil Specification			SAE 5W-30 API Rating of SM or Newer			
	Maximum Allowable Oil Temperature	F	C	250	121	250	121
	Engine Oil Capacity						
	Min	Qts	L	8	7.57	8	7.57
	Max	Qts	L	8	7.57	8	7.57
Fuel System							
	Fuel Consumption @ Rated Load						
	NG	lb/hr	kg/hr	N/A	N/A	67.75	30.73
	LP	lb/hr	kg/hr	N/A	N/A	N/A	N/A
	Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
	Recommended Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11.0	2.7	11.0	2.7
	Recommended Minimum Running pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
	Minimum NG Supply Pipe Size			1-1/4" NPT			
	Minimum LPG Supply Pipe Size[4]			3/4"			

[1] Standby and overload ratings based on ISO 3046. See PSI technical standard 3630000A for additional duty cycle and engine rating information

[2] All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

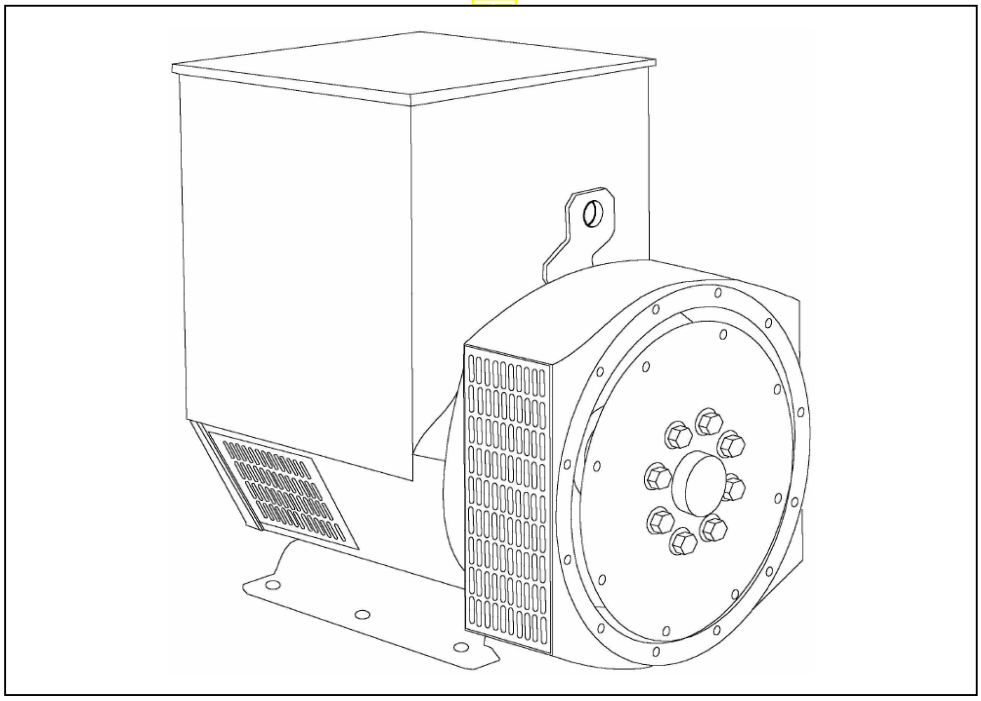
[4] The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

For information not listed in this document, please contact you PSI sales representative

STAMFORD®

UCI274E - Winding 311

Technical Data Sheet



SPECIFICATIONS & OPTIONS

STANDARDS

Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.
Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX460 AVR - STANDARD

With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

AS440 AVR

With this self-excited system the main stator provides power via the AVR to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.
The AS440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.
If three-phase sensing is required with the PMG system the MX321 AVR must be used.
We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th …) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation.
Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

DE RATES

All values tabulated on page 8 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.
Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

UCI274E

STAMFORD

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER CONCENTRIC							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	12							
STATOR WDG. RESISTANCE	0.0317 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.34 Ohms at 22°C							
EXCITER STATOR RESISTANCE	20 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6315-2RS (ISO)							
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	492 kg				511 kg			
WEIGHT WOUND STATOR	180 kg				180 kg			
WEIGHT WOUND ROTOR	167.51 kg				156.55 kg			
WR² INERTIA	1.3271 kgm^2				1.2765 kgm^2			
SHIPPING WEIGHTS in a crate	525 kg				539 kg			
PACKING CRATE SIZE	123 x 67 x 103(cm)				123 x 67 x 103(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	140	140	140	N/A	160	167.5	167.5	178.8
Xd DIR. AXIS SYNCHRONOUS	2.34	2.11	1.96	-	2.68	2.51	2.29	2.25
X'd DIR. AXIS TRANSIENT	0.21	0.19	0.18	-	0.25	0.23	0.21	0.21
X"d DIR. AXIS SUBTRANSIENT	0.14	0.13	0.12	-	0.17	0.16	0.15	0.14
Xq QUAD. AXIS REACTANCE	1.53	1.38	1.28	-	1.74	1.63	1.49	1.46
X"q QUAD. AXIS SUBTRANSIENT	0.18	0.16	0.15	-	0.22	0.21	0.19	0.18
X_L LEAKAGE REACTANCE	0.08	0.08	0.07	-	0.09	0.08	0.08	0.08
X_2 NEGATIVE SEQUENCE	0.16	0.14	0.13	-	0.19	0.18	0.16	0.16
X_0 ZERO SEQUENCE	0.10	0.09	0.08	-	0.11	0.10	0.09	0.09
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.032 s							
T"d SUB-TRANSTIME CONST.	0.01 s							
T'do O.C. FIELD TIME CONST.	0.85 s							
Ta ARMATURE TIME CONST.	0.007 s							
SHORT CIRCUIT RATIO	1/Xd							

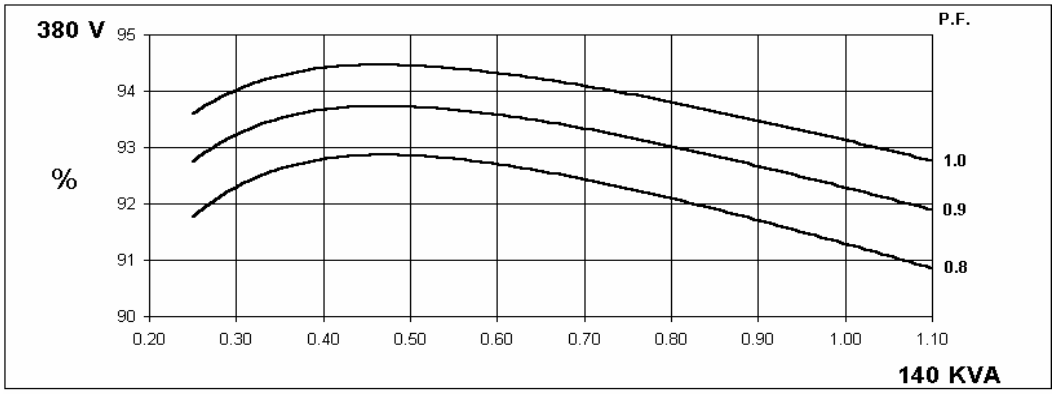
50 Hz

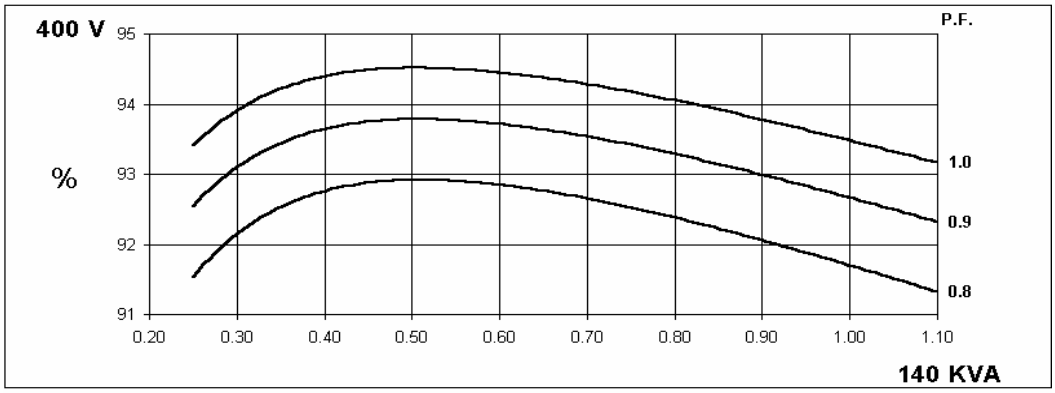
UCI274E

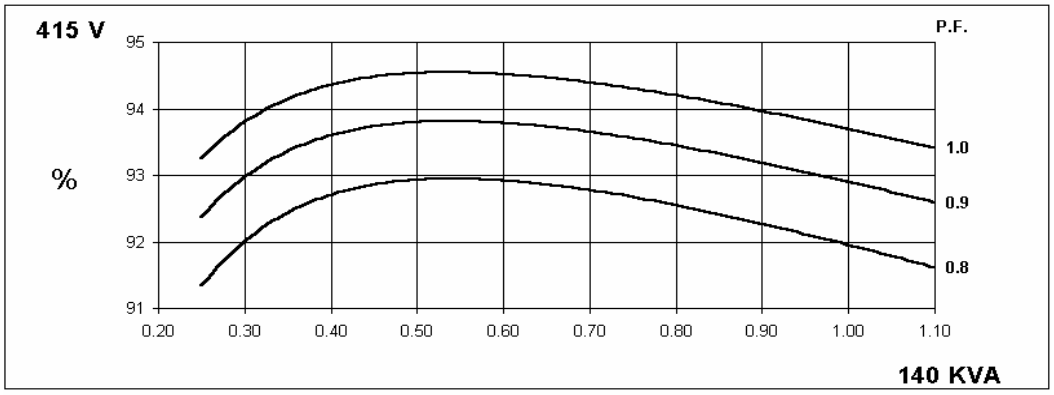
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES







60 Hz

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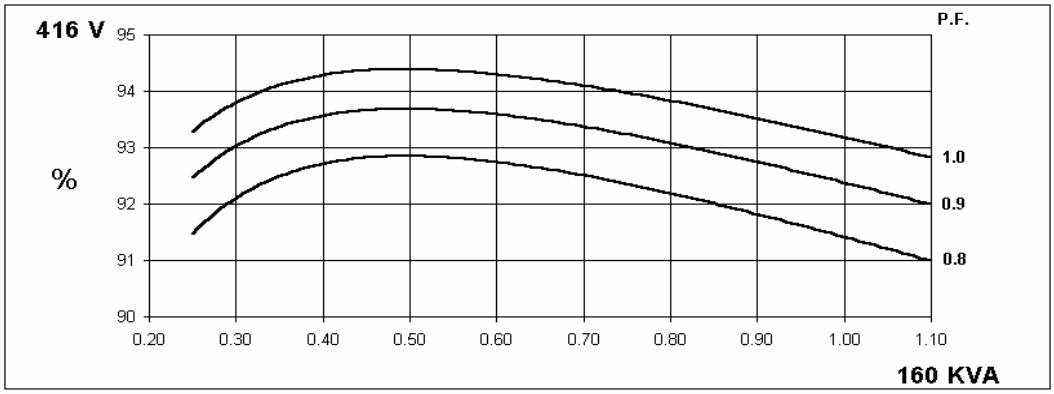
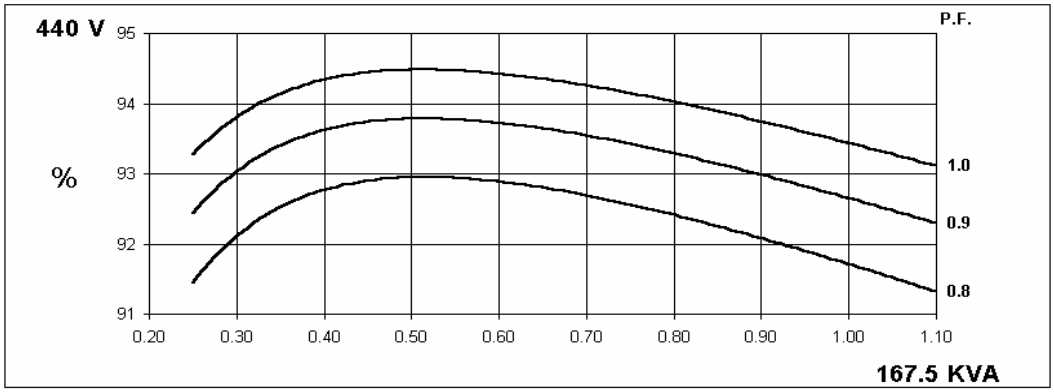
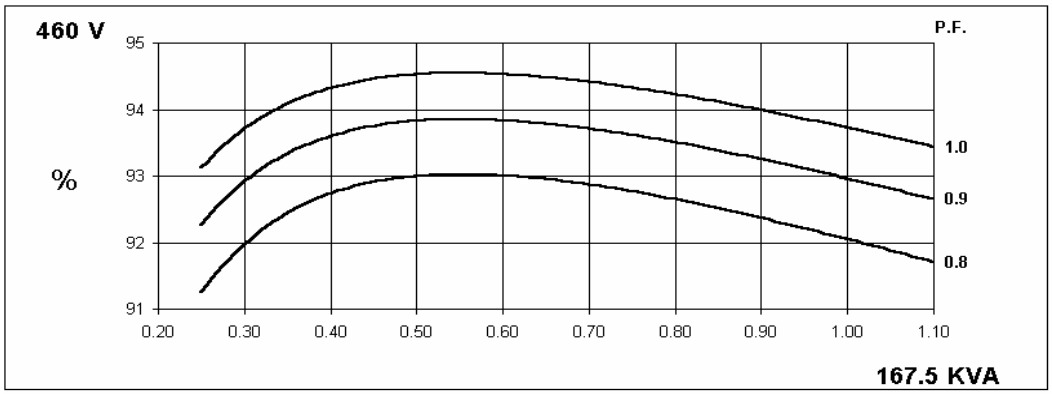
Winding 311

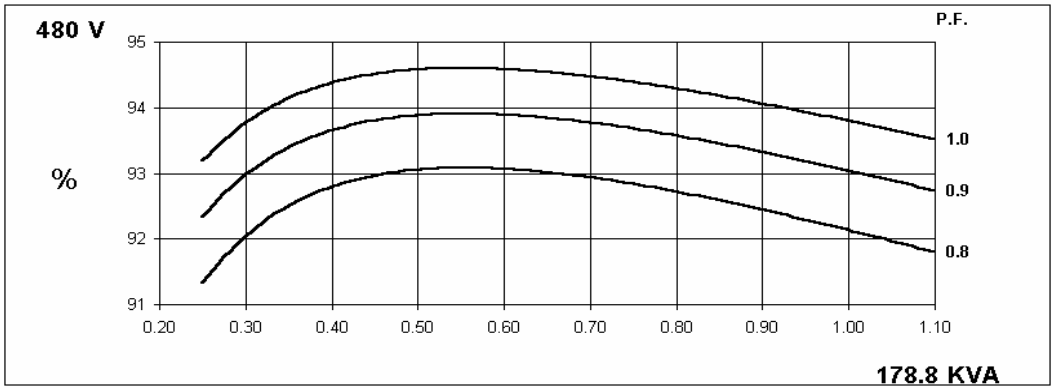
STAMFORD

THREE PHASE EFFICIENCY CURVES









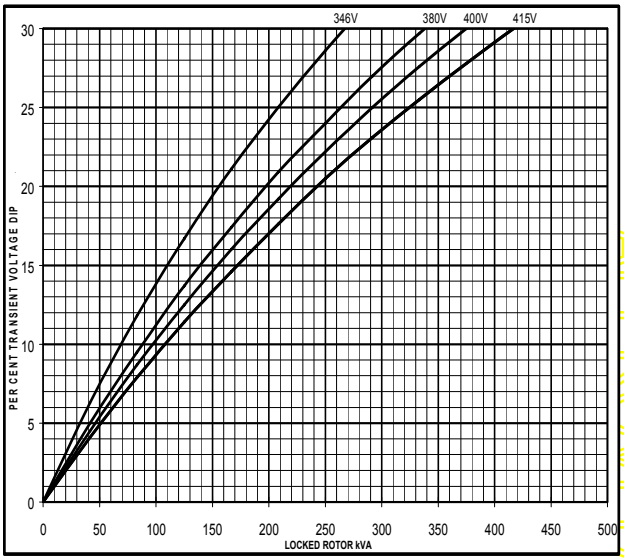
UCI274E

Winding 311

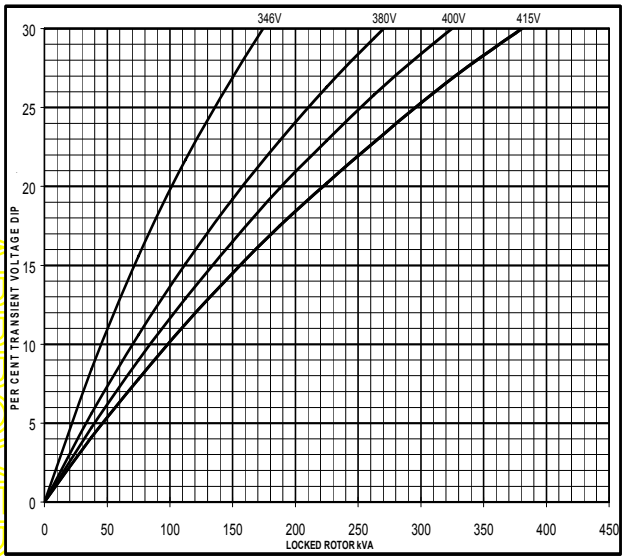
Locked Rotor Motor Starting Curve

50 Hz

MX

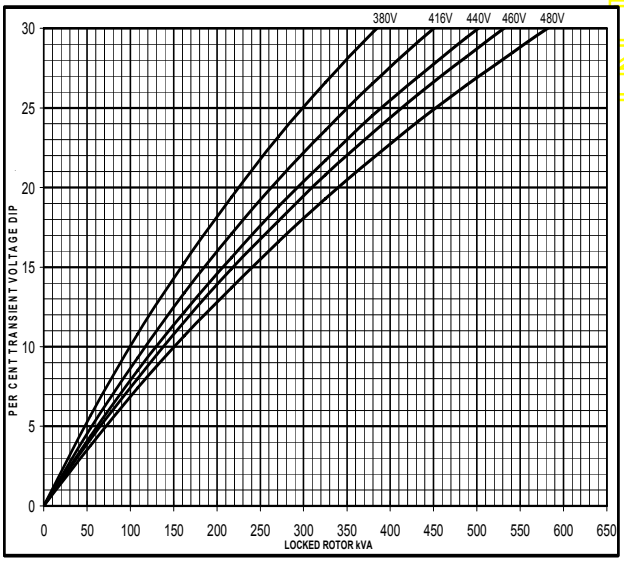


SX

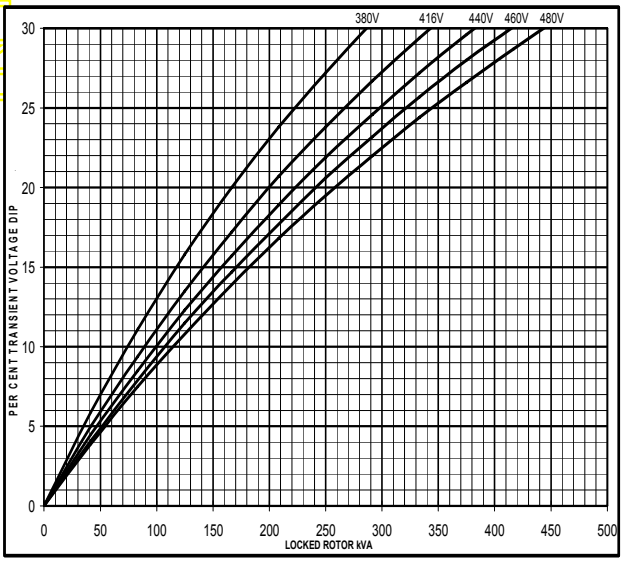


60 Hz

MX

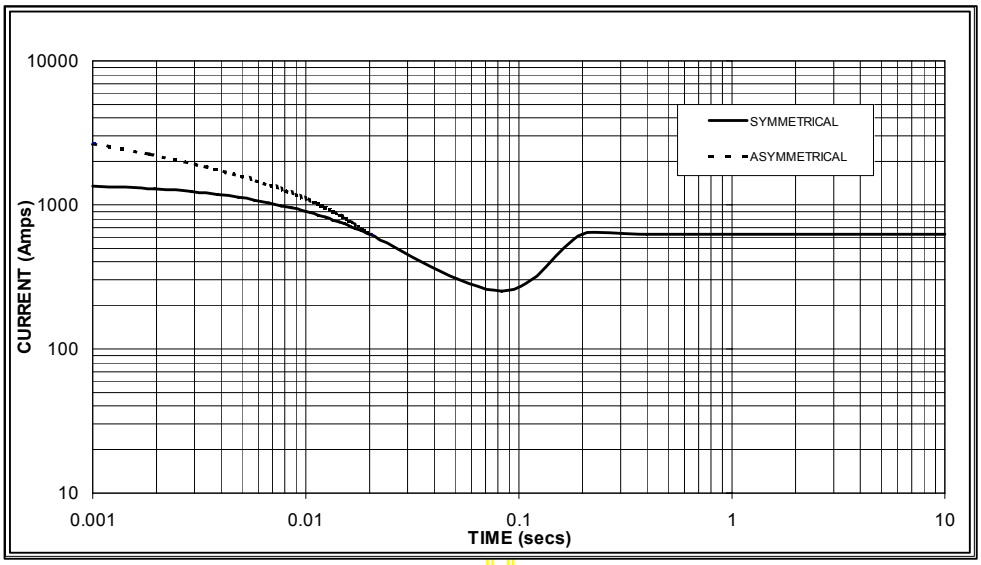


SX



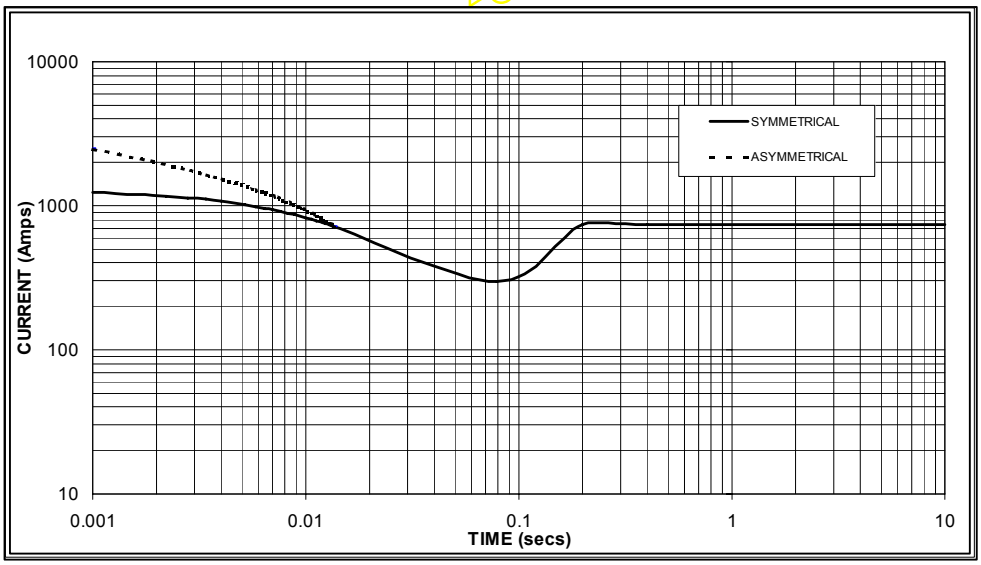
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 630 Amps

60 Hz



Sustained Short Circuit = 740 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.07	440v	X 1.06
415v	X 1.12	460v	X 1.12
		480v	X 1.17

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

UCI274E

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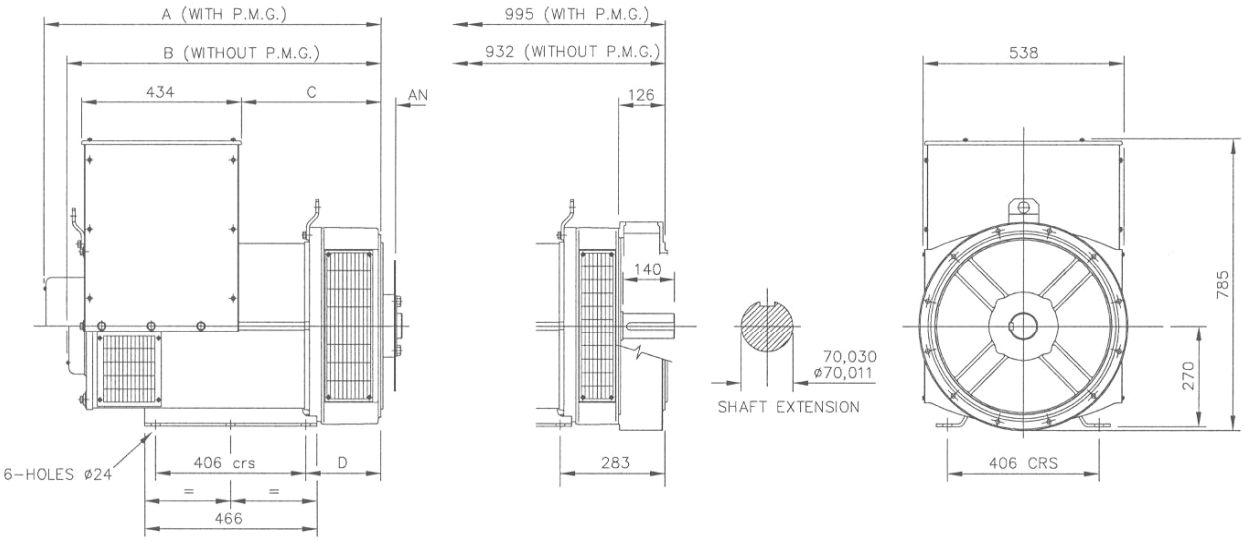
Winding 311 / 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	125.0	125.0	125.0	N/A	140.0	140.0	140.0	N/A	145.0	145.0	145.0	N/A	150.0	150.0	150.0	N/A
	kW	100.0	100.0	100.0	N/A	112.0	112.0	112.0	N/A	116.0	116.0	116.0	N/A	120.0	120.0	120.0	N/A
	Efficiency (%)	91.7	92.1	92.3	N/A	91.3	91.7	92.0	N/A	91.1	91.6	91.8	N/A	91.0	91.4	91.7	N/A
	kW Input	109.1	108.6	108.3	N/A	122.7	122.1	121.7	N/A	127.3	126.6	126.4	N/A	131.9	131.3	130.9	N/A
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	140.0	143.8	143.8	160.0	160.0	167.5	167.5	178.8	170.0	175.0	175.0	187.5	175.0	181.3	181.3	193.8
	kW	112.0	115.0	115.0	128.0	128.0	134.0	134.0	143.0	136.0	140.0	140.0	150.0	140.0	145.0	145.0	155.0
	Efficiency (%)	91.9	92.2	92.5	92.5	91.4	91.7	92.1	92.1	91.2	91.5	91.9	92.0	91.0	91.4	91.8	91.9
	kW Input	121.9	124.8	124.4	138.4	140.0	146.1	145.5	155.3	149.1	153.0	152.3	163.0	153.8	158.7	158.0	168.7

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	928,3	865,3	389,3	216,3
SAE 2	914	851	375	202
SAE 3	914	851	375	202

COUPLING DISCS	
DISC	AN
SAE 10	53,98
SAE 11,5	39,68
SAE 14	25,40

2 Specification

2.1 MX341 Technical Specification

- **Sensing Input**
  - Voltage: 190 VAC to 264 VAC 1 phase, 2 wire
  - Frequency: 50 Hz to 60 Hz nominal
- **Power Input**
  - Voltage: 140 VAC to 220 VAC 3 phase, 3 wire
  - Current: 3 A per phase
  - Frequency: 100 Hz to 120 Hz nominal
- **Power Output**
  - Voltage: maximum 120 VDC
  - Current
    - continuous 2.7 A
    - transient 6 A for 10 seconds
  - Resistance: 15 Ω minimum
- **Regulation**
  - +/- 1.0% RMS[1]
- **Thermal Drift**
  - 0.03% per 1 °C change in AVR ambient temperature[2]
- **Typical Response**
  - AVR response in 10 ms
  - Field current to 90% in 80 ms
  - Machine Volts to 97% in 300 ms
- **External Voltage Adjustment**
  - +/-10% with 1 kΩ, 1 W trimmer[3]
- **Under-Frequency Protection**
  - Set point 95% Hz [4]
  - Slope 170% down to 30 Hz
- **Unit Power Dissipation**
  - 12 W maximum
- **Analogue Input**
  - Maximum input: +/- 5 VDC[5]
  - Sensitivity: 1V for 5% Alternator Volts (adjustable)

[1] With 4% engine governing
[2] After 10 minutes
[3] Applies to Mod status D onwards. Alternator de-rate may apply. Check with factory
[4] Factory set, semi-sealed, jumper selectable.
[5] Any device connected to the analogue input must be fully floating (galvanically isolated from ground), with an insulation strength of 500 VAC

-

- Input resistance 1 kΩ

- **Quadrature Droop Input**
  - 10 Ω burden
  - Maximum sensitivity: 0.07 A for 5% droop, zero power factor
  - Maximum input: 0.33 A
- **Over-Voltage Detection**
  - Set point: 75 VDC
  - Time delay: 10 s (fixed)
- **Environmental**
  - Vibration
    - 20 Hz to 100 Hz: 50 mm/sec
    - 100 Hz to 2 kHz: 3.3 g
  - Operating temperature: -40 °C to +70 °C
  - Relative Humidity 0 °C to 70 °C: 95%[6]
  - Storage temperature: -55 °C to +80 °C

[6] Non condensing.

DSEGenset

DSE

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES

The DSE7410 is an Auto Start Control Module and the DSE7420 is an Auto Mains (Utility) Failure Control Module suitable for a wide variety of single, diesel or gas, gen-set applications.

A sophisticated module monitoring an extensive number of engine parameters, the DSE74xx will annunciate warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LED, remote PC, audible alarm and via SMS text alerts. The module includes RS232, RS485 & Ethernet ports as well as dedicated terminals for system expansion.

The DSE7400 Series modules are compatible with electronic (CAN) and non-electronic (magnetic pick-up/alternator sensing) engines and offer a comprehensive number of flexible inputs, outputs and extensive engine protections so the system can be easily adapted to meet the most demanding industry paralleling requirements.

The modules can be easily configured using the DSE Configuration Suite Software. Selected front panel editing is also available.

ENVIRONMENTAL TESTING STANDARDS

ELECTRO-MAGNETIC COMPATIBILITY
BS EN 61000-6-2
EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4
EMC Generic Emission Standard for the Industrial Environment

ELECTRICAL SAFETY
BS EN 60950
Safety of Information Technology Equipment, including Electrical Business Equipment

TEMPERATURE
BS EN 60068-2-1
Ab/Ae Cold Test -30 °C
BS EN 60068-2-2
Bb/Be Dry Heat +70 °C

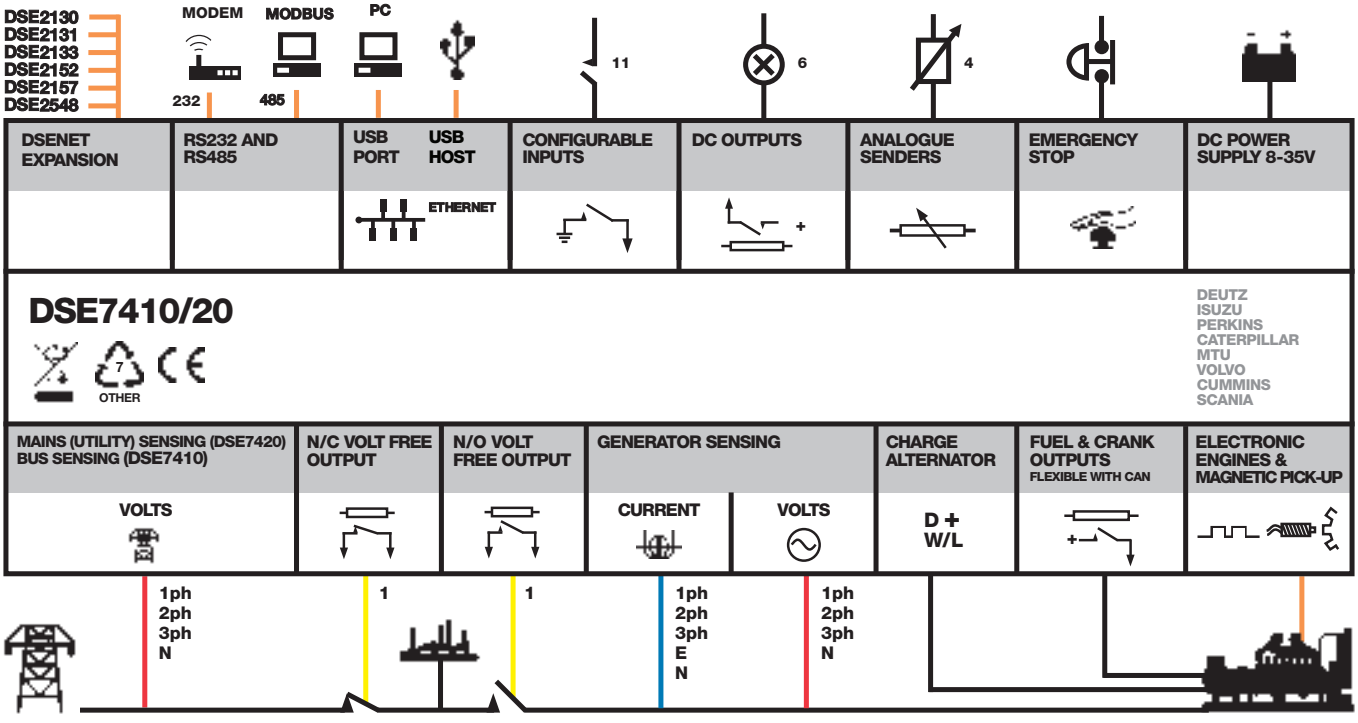
VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

HUMIDITY
BS EN 60068-2-30
Db Damp Heat Cyclic 20/55 °C
@ 95% RH 48 Hours
BS EN 60068-2-78
Cab Damp Heat Static 40 °C
@ 93% RH 48 Hours

SHOCK
BS EN 60068-2-27
Three shocks in each of three major axes
15 gn in 11 mS

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES
BS EN 60529
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

COMPREHENSIVE FEATURE LIST TO SUIT A WIDE VARIETY OF GEN-SET APPLICATIONS



ISSUE 1

DSEGenset

DSE

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES

DSE7420

DSE7410

KEY FEATURES

- Configurable inputs (11)
- Configurable outputs (8)
- Voltage measurement
- Mains (utility) failure detection
- Dedicated load test button
- kW overload alarms
- Comprehensive electrical protection
- RS232, RS485 & Ethernet remote communications
- Modbus RTU/TCP
- PLC functionality
- Multi event exercise timer
- Back-lit LCD 4-line text display
- Multiple display languages
- Automatic start/Manual start
- Audible alarm
- Fixed and flexible LED indicators
- Event log (250)
- Engine protection
- Fault condition notification to a designated PC
- Front panel mounting
- Protected front panel programming
- Configurable alarms and timers
- Configurable start and stop timers
- Five key menu navigation
- Front panel editing with PIN protection
- 3 configurable maintenance alarms
- CAN and magnetic pick-up/Alt. sensing
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Manual speed control (on compatible CAN engines)
- Manual fuel pump control
- "Protections disabled" feature
- Reverse power protection
- Power monitoring (kW h, kV Ar, kV A h, kV Ar h)
- Load switching (load shedding and dummy load outputs)
- Automatic load transfer (DSE7420)
- Unbalanced load protection
- Independent earth fault trip
- Fully configurable via DSE Configuration Suite PC software
- Configurable display languages
- Remote SCADA monitoring via DSE Configuration Suite PC software
- Advanced SMS messaging (additional external modem required)
- Start & stop capability via SMS messaging
- Additional display screens to help with modem diagnostics
- DSENet® expansion
- Integral PLC editor

KEY BENEFITS

- RS232, RS485 & Ethernet can be used at the same time
- DSENet® connection for system expansion
- PLC functionality
- Five step dummy load support
- Five step load shedding support
- High number of inputs and outputs
- Worldwide language support
- Direct USB connection to PC
- Ethernet monitoring
- USB host
- Data logging & trending

RELATED MATERIALS

TITLE	PART NO'S
DSE7410 Installation Instructions	053-085
DSE7420 Installation Instructions	053-088
DSE74xx Quick Start Guide	057-162
DSE74xx Operator Manual	057-161
DSE74xx PC Configuration Suite Manual	057-160

SPECIFICATION

DC SUPPLY
CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous

CRANKING DROPOUTS
Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries

MAXIMUM OPERATING CURRENT
260 mA at 12 V, 130 mA at 24 V

MAXIMUM STANDBY CURRENT
120 mA at 12 V, 65 mA at 24 V

CHARGE FAIL/EXCITATION RANGE
0 V to 35 V

OUTPUTS
OUTPUT A (FUEL)
15 A DC at supply voltage

OUTPUT B (START)
15 A DC at supply voltage

OUTPUTS C & D
8 A AC at 250 V AC (Volt free)

AUXILIARY OUTPUTS E,F,G,H,I & J
2 A DC at supply voltage

GENERATOR
VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAINS (UTILITY) (DSE7420)
VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

BUS (DSE7410)
VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAGNETIC PICK UP
VOLTAGE RANGE
+/- 0.5 V to 70 V

FREQUENCY RANGE
10,000 Hz (max)

DIMENSIONS
OVERALL
240 mm x 172 mm x 57 mm
9.4" x 6.8" x 2.2"

PANEL CUTOUT
220 mm x 160 mm
8.7" x 6.3"

MAXIMUM PANEL THICKNESS
8 mm
0.3"

STORAGE TEMPERATURE RANGE
-40 °C to +85 °C

DEEP SEA ELECTRONICS PLC UK
Highfield House, Hunmanby Industrial Estate, Hunmanby YO14 0PH
TELEPHONE +44 (0) 1723 890099 **FACSIMILE** +44 (0) 1723 893303
EMAIL sales@deepseaplc.com **WEBSITE** www.deepseaplc.com

DEEP SEA ELECTRONICS INC USA
3230 Williams Avenue, Rockford, IL 61101-2668 USA
TELEPHONE +1 (815) 316 8706 **FACSIMILE** +1 (815) 316 8708
EMAIL sales@deepseausa.com **WEBSITE** www.deepseausa.com

Registered in England & Wales No.01319649
VAT No.316923457

055-108/01/12 (1)

120 OHM COMM CABLE BELDON TYPE #9841 (8760-060250) 18GA 2 WIRE SHLD

SINGLE PANEL ANNUNCIATOR INSTALLATION

B A SCR
27 28 29

CLEAR
SHIELD
BLACK

7420 MK-II

TRANSFER SWITCH
INTERFACE WIRING

S-19A

CAN BUS CABLE
SHIELD
BLACK
CLEAR

RED
GREEN

REAR VIEW

RED

DSE-2548
MODULE (1)

SET TO (2)

DSE LOGICAL PORT SELECT (0-10)

SD
ER
OC
NIA
LO
HWT
OS
US

8-LAMP

GREEN
RED

DC SUPPLY -12 VDC
DC SUPPLY +12 VDC

12 VDC POWER PACK TRANSFOMER
500MA MIN RATING ON 120VAC SOURCE
RADIO SHACK OR EQIVALENT

CUSTOMER SUPPLIED
POWER SOURCE

+ 12VDC -
BATTERY

POWER LIGHT ON
POWER ON

POWER LIGHT BLINKING
LINK LOST

SD	START DETECT
ER	ENGINE RUNNING
OC	OVER CRANK
NIA	NOT IN AUTO
LO	LOW OIL
HWT	HIGH WATER TEMP
OS	OVER SPEED
US	UNDER SPEED

B

GENERIC 8-LAMP ANNUNCIATOR CONFIGURATION

GILLETTE GENERATORS, INC. 2921 THORNE DR., ELKHART, IN 46514 (574) 264-9639

DESCRIPTION:	DEEPSEA 7420-MK2 8 LAMP ANNUNCIATOR INTERCONNECT (S-19A) SINGLE PANEL ANNUNCIATOR INSTALLATION CONNECTION DETAIL 12VDC	REV 0
DATE: 6/16/2020	PT. NO: N/A	SCALE: N/A
DR.BY: TEDD	ENG. TEDD	PG.NO. 1 OF 1
CAD_NO.: 20200616.12:00:00	DRAWING NO.: DSE-2548-8-LAMP-ANNUNC	

Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG23G0200TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 13/11/2019

PRODUCT VIEW *(Use Mouse to Rotate and Zoom)*

Eaton's Power Defense™ molded case circuit breakers, a globally rated platform designed to help keep your power system safe with latest protection technology. Engineered for the future: IoT and Industry 4.0 features such as built-in communications, advanced energy metering, and algorithms that signal breaker maintenance; zone selective interlock technology that clears faults quickly and locally; ArcFlash reduction options that help protect your people, and not to mention Eaton's best-inclass support and service.

Tech Data for Configured Product

Power Defense Catalog Number	PDG23G0200TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	200A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
Indicating Accessories	None
Indicating Accessories Terminal	None
Tripping Accessories	None
Tripping Accessory Terminal	None
Tripping Accessory Voltage	None
Line Type Description	Option 1 - Standard Terminal
Line Conductor Options	(1) 4 - 4/0
Line Terminal Type	Aluminum
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 4 - 4/0
Load Terminal Type	Aluminum
Special Options - Type of Modification	None
Details	None
Additional Description	None

Molded Case Circuit Breakers

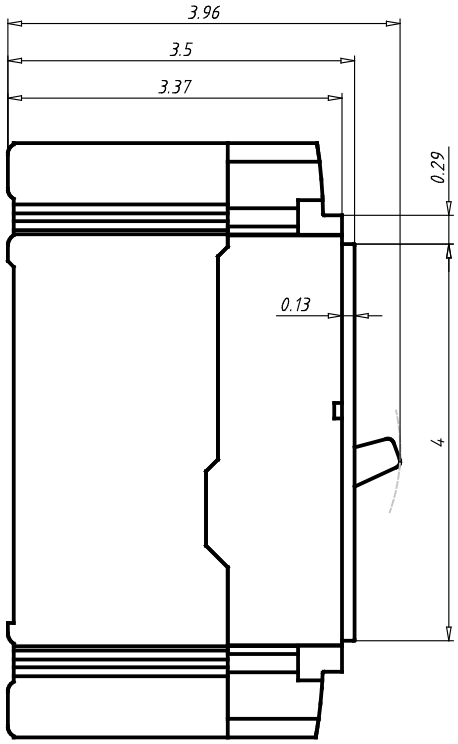
Power Defense ™ UL Global Series

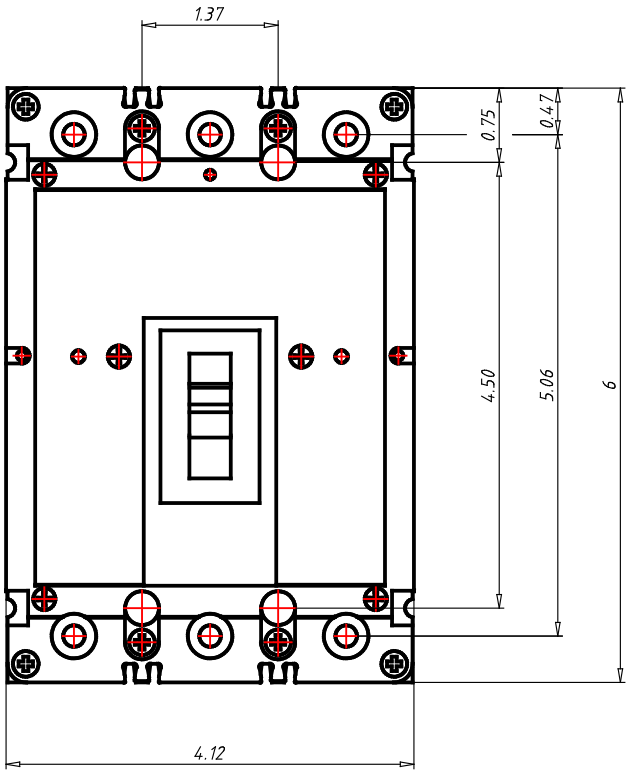
Part Number: PDG23G0200TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 13/11/2019

Technical drawings





Molded Case Circuit Breakers
Power Defense ™ UL Global Series
Part Number: PDG23G0200TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 13/11/2019

General Technical Data

Frame Rating (In)	200A
Reference Standard	UL489, CSA 22.2, IEC 60947-2 & GB
Number of poles	3
Neutral rating	-
Interruption Rating Designator	F / G / K / M / N / P
UL Interruption Rating to UL 489 (240Vac)	35 / 65 / 85 / 100 / 150 / 200kA
UL Interruption Rating to UL 489 (480Vac)	25 / 35 / 50 / 65(a) / 85 / 100kA
UL Interruption Rating to UL 489 (600Vac)	14 / 18 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / Y / Y / Y
Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)	35 / 55 / 85 / 100 / 150 / 200kA
Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)	35 / 55 / 85 / 100 / 100 / 150kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)	25 / 36 / 50 / 70 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)	25 / 36 / 50 / 53 / 70 / 70kA
Rated breaking capacity to IEC 60947-2 (440 Vac Icu)	25 / 30 / 35 / 50 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (440 Vac Ics)	20 / 22.5 / 35 / 40 / 50 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics)	10 / 10 / 10 / 22 / 22 / 22kA
Frequency	50/60Hz
Trip Unit Type	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	2000A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

1. 480Vac corresponds to 277Vac for 1P
2. 600Vac corresponds to 347Vac for 1P

GUEST
Genset Chargers

2610A

2608A-B-01

2602A-12

Guest chargers are proven performers in genset applications. For specific application information, or if you are developing a new product, be sure to consult with the Guest applications engineering team to ensure the correct charger is specified.

Genset Chargers

MODEL	TOTAL AMPS	OUT-PUTS	AMPS PER OUTPUT	BATTERY SYSTEM	INPUT VOLTAGE	AC	DC	DIMENSIONS	WT. (LBS)	AGENCY LISTING
2602A-12 **2602A-12-B** (bulk)	2	1	2	12V	100 - 130 50/60Hz	6' w/ Connect-Charge plug	4' w/ ring terminals	2.9" x 5.1" x 1.5"	2	UL
2605A-1-24RT-01 (bulk pack only) (1)	5	1	5	24V	100 - 130 50/60Hz	6' SJT 18-3 w/ Connect-Charge plug	6' SJT 18-3 w/ ring terminals	7.4" x 6.3" x 2.4"	4.5	UL
2608A-B-01 (bulk pack only) (1)	6	1	6	12V	100 - 130 50/60Hz	6' cable w/ molded plug rated -40 to 105C	4' w/ ring terminals rated -40 to 105C	3.5" x 6.4" x 2.3"	4	UL
2610A **2610A-B** (bulk)	10	2	5/5	12V+12V	100 - 130 50/60Hz	Studs	Studs	5.5" x 7.8" x 2.4"	5.6	– UL (bulk only)

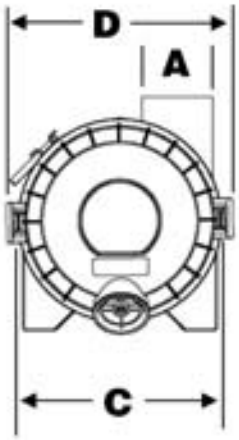
(1) 2-stage charging

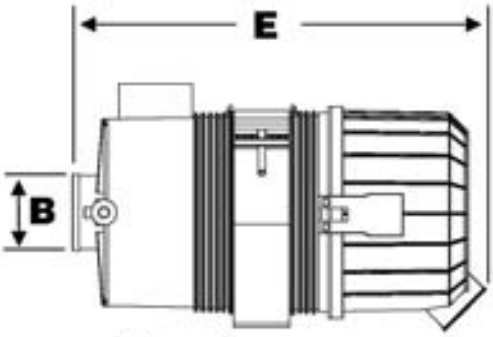
c UL Individual agency listings as shown in product chart.

Phone: 800-767-8541 • Fax: 707-226-9670 • www.guestindustrial.com

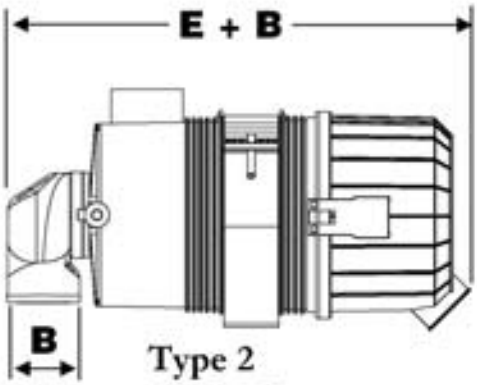
Plastic Magna Seal Air Cleaners

Internal or External Evacuator Valve
High Strength Polymer
Working Temp –40c to +80c (-40F to 176F)
Design Compatibility with other Manufacturers
Industry Standard elements
Can be Mounted Vertical or Horizontal





Type 1
Straight Outlet



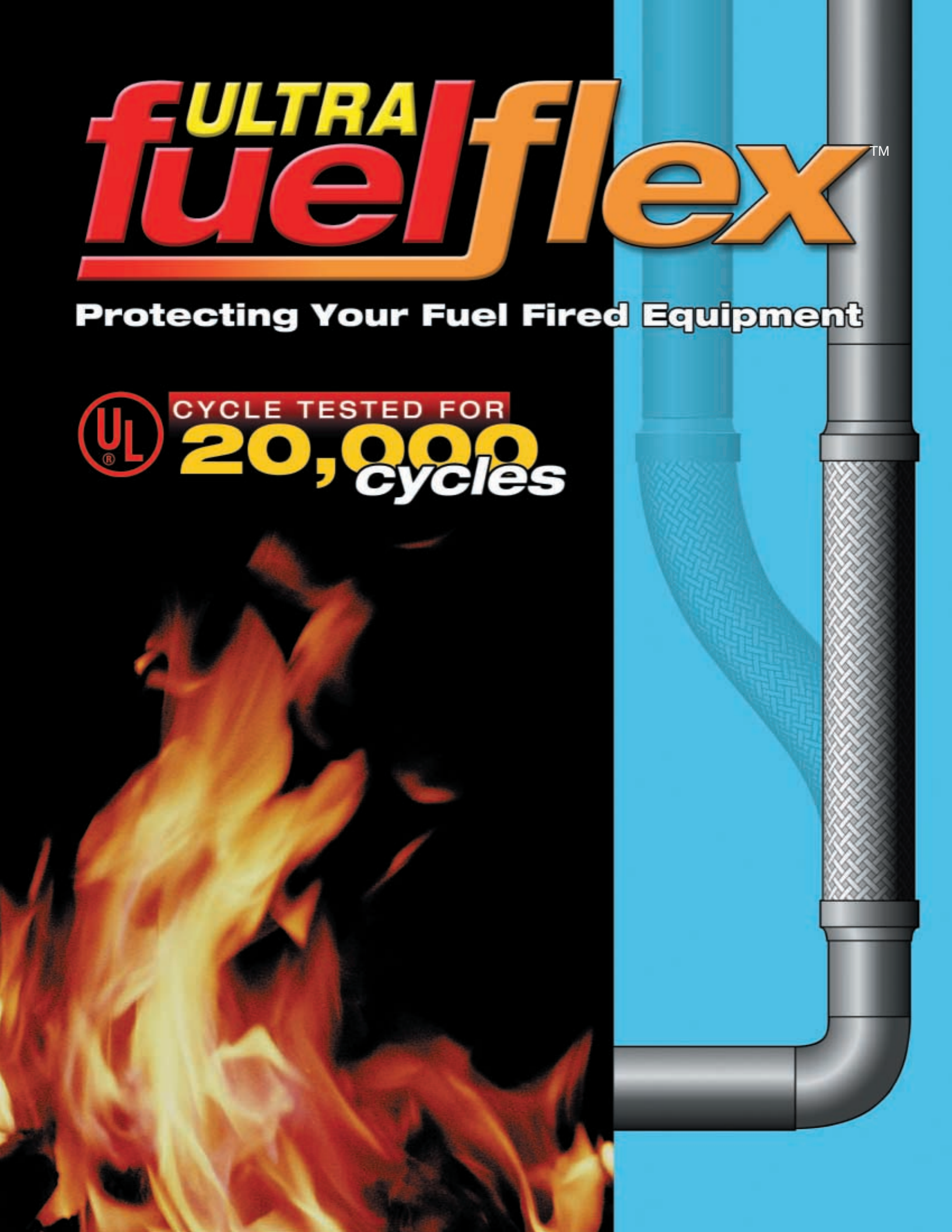
Type 2
90⁰ Outlet

Air Cleaner Assembly																			
			Initial Restriction						A		B		C		D		E	
Model Number	Part Number	Type	6" H2O CFM	6" H2O M3m	8" H2O CFM	8" H2O M3m	10" H20 CFM	10" H20 M3m	OD Inlet inch	OD Inlet mm	OD Outlet inch	OD Outlet mm	inch	mm	inch	mm	inch	mm
2s-FW-E1	68110	1	75	2.1	90	2.5	105	3.0	2.00	51	1.75	45	4.8	122	6.14	156	8.98	228
2s-FW-E2	68111	1	65	1.8	75	2.1	85	2.4	2.00	51	1.75	45	4.80	122	6.14	156	8.98	228
2s-FW-E1-90	68103	2	63	1.7	73	2.0	82	2.3	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2s-FW-E2-90	68107	2	53	1.5	63	1.8	71	2.0	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2-FW-E1	68120	1	100	2.8	115	3.3	130	3.7	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E2	68130	1	90	2.5	105	3.0	115	3.3	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E1-90	68116	2	88	2.4	102	2.9	113	3.2	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2-FW-E2-90	68127	2	77	2.2	92	2.6	103	2.9	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2.5-FW-E1	68132	1	150	4.2	175	5.0	195	5.5	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E2	68133	1	145	4.1	165	4.7	185	5.2	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E1-90	68131	2	134	3.8	156	4.4	175	5.0	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
2.5-FW-E2-90	68134	2	127	3.6	148	4.2	168	4.7	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
3-FW-E1	68140	1	160	4.5	190	5.4	210	5.9	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E2	68150	1	150	4.2	170	4.8	190	5.4	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E1-90	68140-2	2	154	4.4	181	5.1	196	5.6	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3-FW-E2-90	68150-2	2	138	4.0	162	4.6	182	5.2	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3.75-FW-E1	68160	1	250	7.1	290	5.4	325	9.2	3.75	95	3.50	89	8.35	212	9.72	247	15.63	397
3.75-FW-E2	68170	1	225	6.4	260	7.4	280	7.9	3.75	95	3.50	89	8.35	212	9.72	247	15.63	397
3.75-FW-E1-90	68157	2	212	6.0	250	7.1	277	7.8	3.75	95	3.50	89	8.35	212	9.72	247	18.5	470
3.75-FW-E2-90	68167	2	188	5.3	220	6.2	250	7.1	3.75	95	3.50	89	8.35	212	9.72	247	18.5	470
4.5-FW-E1	68175	1	375	10.6	425	12.0	475	13.5	4.50	114	4.00	102	10.60	268	11.9	302	19.13	486
4.5-FW-E2	68175-1	1	325	9.2	375	10.6	425	12.0	4.50	114	4.00	102	10.60	268	11.9	302	19.13	486
6-FW-E1	68178	1	600	17.0	685	19.4	770	21.8	6.00	152	5.00	127	12.20	309	13.54	344	22.00	560
6-FW-E2	68179	1	500	14.2	565	16.0	630	17.8	6.00	152	5.00	127	12.20	309	13.54	344	22.00	560
7-FW-E1	68182	1	800	22.7	910	25.8	1060	30.0	7.00	178	6.00	152	15.50	394	16.80	427	21.50	545
7-FW-E2	68185	1	710	20.1	830	23.5	960	27.2	7.00	178	6.00	152	15.50	394	16.80	427	21.50	545

ULTRA fuelflex™

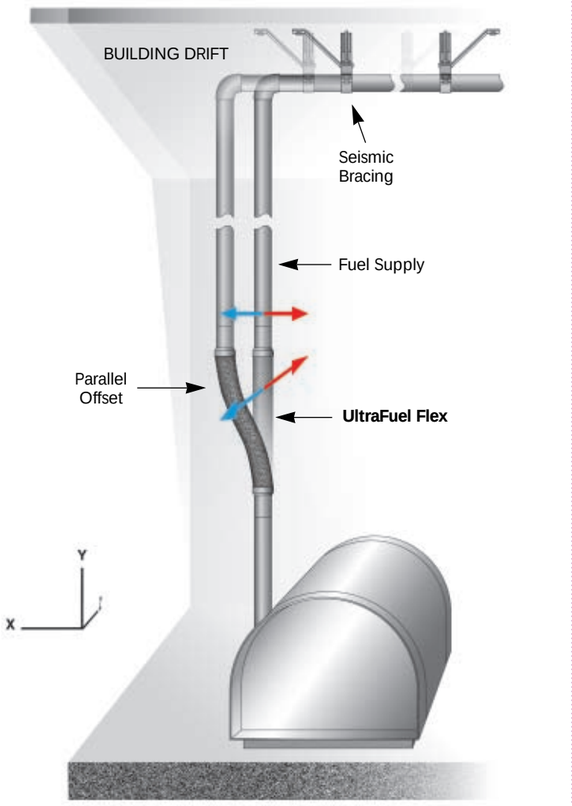
Protecting Your Fuel Fired Equipment

CYCLE TESTED FOR **20,000 cycles**

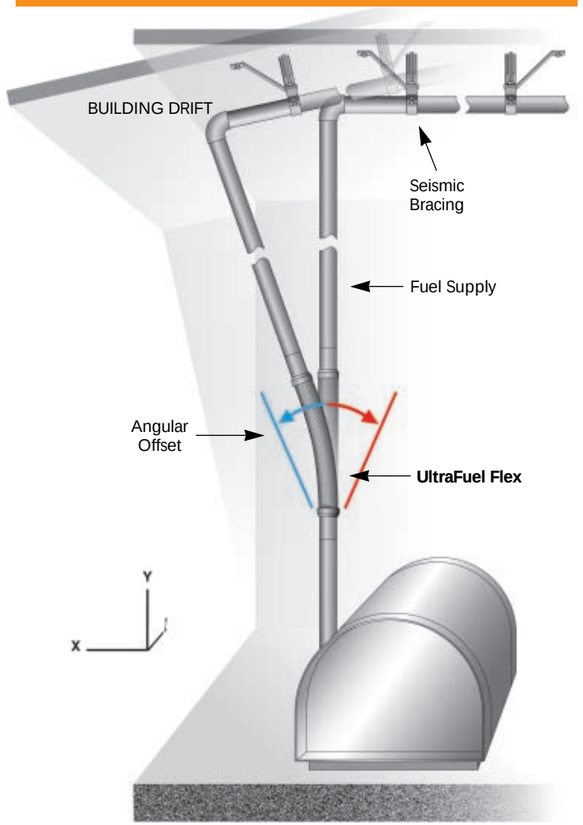


Building Drift: Why Isolate Gas/Fuel Fired Equipment?

Parallel Offset



Angular Offset



Almost all inhabited areas of the world are susceptible to the damaging effects of seismic activity.

All current building codes for seismic and wind restraint design have the primary objectives: reduce the possibility of injury and threat to life, reduce long term cost due to equipment damage and resultant downtime.

FEMA (Federal Emergency Management Act) has identified one of the primary causes of property damage from earthquakes as the mechanical failure of gas and water lines contributing to fires.
The majority of U.S. jurisdictions have adopted the new international codes to insure financial backing from FEMA following an earthquake. All current building codes require seismic bracing of certain pipes. Damage occurs when pipes move independently of the building. The ultimate goal of seismic bracing is to prevent damage to the pipe system by forcing it to move with the building. Other potential problems that occur are the incompatibility of piping sytems with differential movement of the structure (drift) and bracing of piping with short/stiff service connections to equipment.

Fitting failures generally occur at or near equipment connections. The HVAC industry suggests the following should be considered when installing seismic restraints:
• Flexible connections should be provided between equipment that is braced and piping that need not be braced.

• Flexible connections should be provided between isolated equipment and braced piping.

Current International Codes realizes the critical importance of protecting piping systems conveying flammable and combustible gases. Flex-Hose Co. UltraFuel Flex UL536 Listed connectors are approved for flammable and combustible gases and liquids. They are the ultimate protection for isolating critical gas/fuel fired equipment.

ULTRA fuelflex™

Passing the Test

LISTED
UltraFuel Flex®
for combustible gases and flammable liquids
33NB

CYCLE TESTED FOR 20,000 cycles

Quality Assurance

Safety and performance has always been the heart and soul of the UltraFuel Flex product's design. They have been tested, listed, labeled, and regularly inspected by Underwriters Laboratory to ensure they meet or exceed industry performance standards.

UltraFuel Flex is manufactured with 321(ASTM A240) grade stainless steel closed pitch metal flexible hose, making it an extraordinarily flexible connection. One of the rigorous testing requirements of UL536 testing is flexure cycle testing. UltraFuel Flex was flexure tested for 20,000 cycles while maintaining a working pressure of 175 psig. Upon successful completion of 20,000 cycles, UltraFuel Flex was pressurized to 875 psig (5:1 safety factor) and maintained pressure integrity... **Passing the test!**

Applications

Flex-Hose Co. UltraFuel Flex UL536 Listed connectors are approved for flammable and combustible gases and liquids. They are used to prevent damage to critical gas/fuel fired equipment caused by piping stress where rigidly supported pipes connect to equipment. UltraFuel Flex are easily installed and reduce the possibility of equipment connection failure. Common applications include gas connections on boilers, water heaters, and unit heaters and fuel connections on emergency generators and gas turbine engine installations.

Pressures

UltraFuel Flex are designed for a maximum working pressure of 175 psi at 70°F and are capable of system test to 262 psig. Manufactured with 5:1 safety factor.

All UltraFuel Flex are 100% hydrostatic tested at the factory to 262 psig to insure trouble free installation and years of quality service.

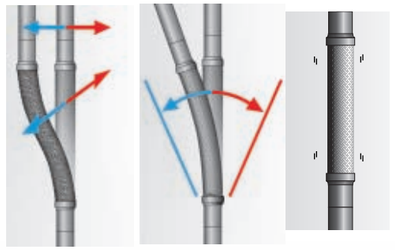
UL536 Requirements

UltraFuel Flex connectors have a UL536 listing having a nominal inside diameter from 1 to 4 inches intended for use if piping systems carrying flammable and combustible gases and liquids, at pressures not exceeding 175 psi at ambient temperature.

Note: The terms flammable and combustible gases and liquids, as used herein, mean gases and liquids such as alcohol, fuel oil, gasoline, kerosene, liquefied petroleum gases and manufactured and natural fuel gases. A combustible liquid has a flash point at or above 100°F or 38°C. A flammable liquid has a flash point below 100°F and a vapor pressure not exceeding 40 PSIG (276 kPa) at 100°F.

Motion Classifications

Flex-Hose Co.'s UltraFuel Flex UL536 listed connectors are capable of handling the following movements:



PARALLEL ANGULAR VIBRATION

Parallel Offset:
Motion that occurs when one end of the hose assembly is deflected in a plane perpendicular to the longitudinal axis with the ends remaining parallel. Offset is measured as displacement of the free end centerline from the fixed end centerline.

Angular Offset:
Angular movement is defined as the bending of the hose so that the ends are no longer parallel. Amount of movement is measured in degrees from centerline of the hose if were installed straight.

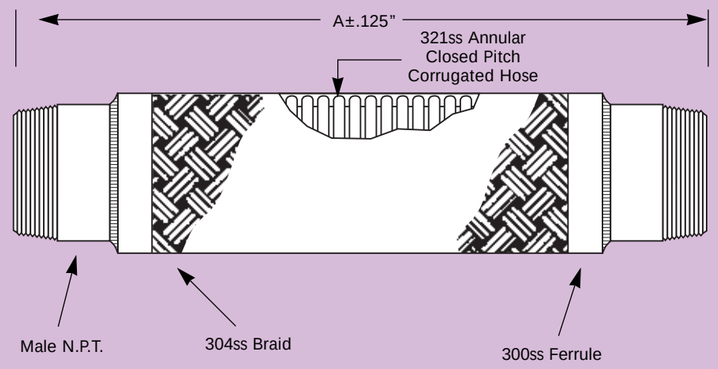
Motion Frequency:
Permanent Offset - The maximum fixed parallel offset to which the UltrFuel Flex assembly may be bent without damage to the convolutions. No further motion is to be imposed other than normal vibration.

Intermittent Offset is motion that occurs on a regular or irregular cyclic basis. It is normally the result of seismic motion, or other non-continuous actions such as thermal expansion and contraction.

LISTED
UltraFuel Flex®
for combustible gases
and flammable liquids
33NB

Note: The terms flammable and combustible gases and liquids, as used herein, mean gases and liquids such as alcohol, fuel oil, gasoline, kerosene, liquefied petroleum gases and manufactured and natural fuel gases. A combustible liquid has a flash point at or above 100°F or 38°C.
A flammable liquid has a flash point below 100°F and a vapor pressure not exceeding 40 PSIG (276 kPa) at 100°F.

UltraFuel Flex UFFMN-UL (Threaded Ends)

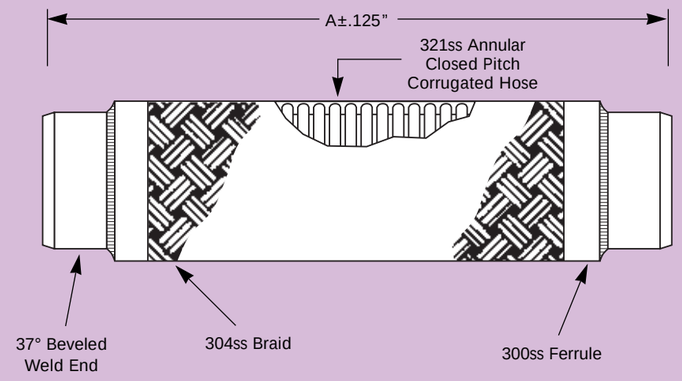


UFFMN-UL 1"-4" I.D. (Threaded Ends)

I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Angular Deflection (Deg.)	Weight (Lb.)
1.00	16.00	175	1.75	1.12	80°	1.40
1.25	16.00	175	1.75	1.00	50°	1.78
1.50	16.00	175	1.75	.75	50°	2.20
2.00	21.00	175	2.75	1.12	60°	3.76
2.50	22.00	175	2.50	.75	60°	5.60
3.00	22.00	175	1.75	.62	50°	7.68
4.00	25.00	175	2.00	.75	40°	10.70

NOTE: Assembly lengths are the minimum required to achieve movements noted on charts. Movements can increase by adding to the overall length. Please consult factory. Maunufactured with 5:1 safety factor.

UltraFuel Flex UFFWN-UL (Weld Ends)

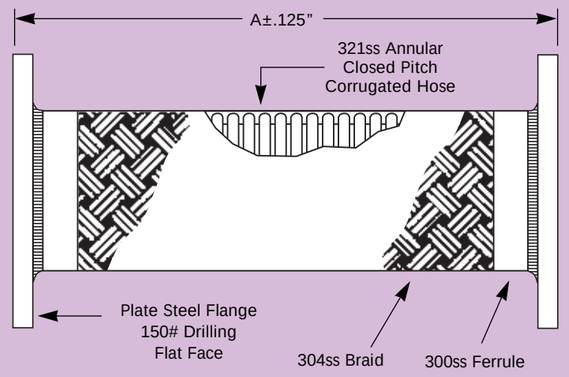


UFFWN-UL 1"-4" I.D. (Weld Ends)

I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Angular Deflection (Deg.)	Weight (Lb.)
1.00	18.00	175	1.75	1.12	80°	1.68
1.25	18.00	175	1.75	1.00	50°	2.16
1.50	19.00	175	1.75	.75	50°	2.89
2.00	22.00	175	2.75	1.12	60°	4.07
2.50	23.00	175	2.50	.75	60°	6.08
3.00	24.00	175	1.75	.62	50°	8.94
4.00	27.00	175	2.00	.75	40°	13.50

NOTE: Assembly lengths are the minimum required to achieve movements noted on charts. Movements can increase by adding to the overall length. Please consult factory. Maunufactured with 5:1 safety factor.

UltraFuel Flex UFFMP-UL (Flanged Ends)



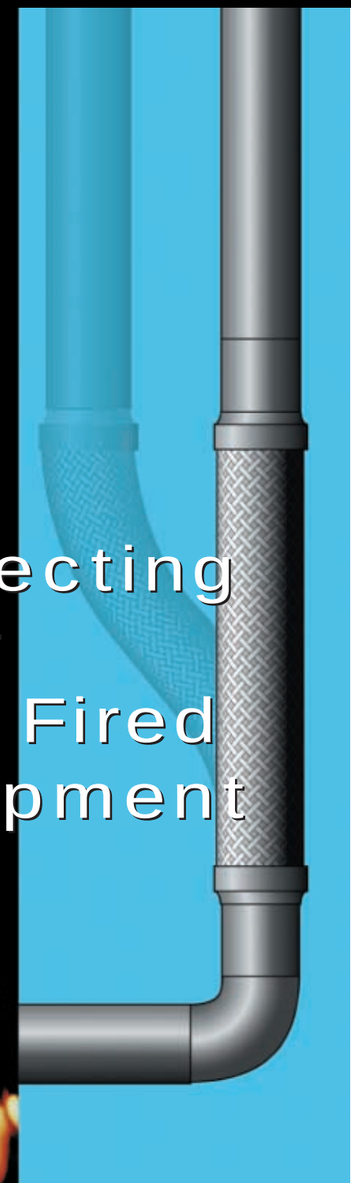
UFFMP-UL 1"-4" I.D. (Flanged Ends)

I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Angular Deflection (Deg.)	Weight (Lb.)
1.00	14.00	175	1.75	1.12	80°	5.00
1.25	14.00	175	1.75	1.00	50°	6.00
1.50	14.00	175	1.75	.75	50°	7.00
2.00	17.00	175	2.75	1.12	60°	11.00
2.50	17.00	175	2.50	.75	60°	14.00
3.00	17.00	175	1.75	.62	50°	16.00
4.00	20.00	175	2.00	.75	40°	23.00

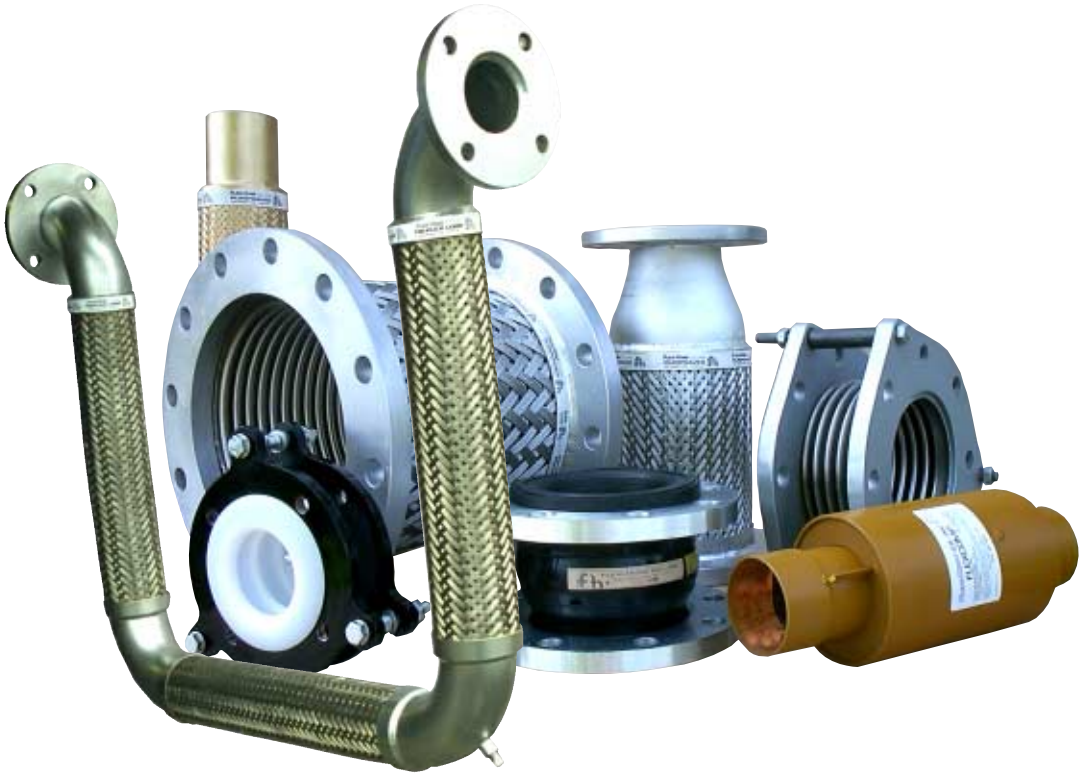
NOTE: Assembly lengths are the minimum required to achieve movements noted on charts. Movements can increase by adding to the overall length. Please consult factory. Maunufactured with 5:1 safety factor.

ULTRA fuelflex

CYCLE TESTED FOR 20,000 cycles



Make the Right Connection with our Representative:



FLEX-HOSE CO., INC.

6801 Crossbow Drive • East Syracuse, New York 13057-1026
Telephone 315.437.1611 • Fax 315.437.1903
Toll Free 1-877-Tri-Flex (874-3539)
email:flexhose@flexhose.com

Visit us on the web — **www.flexhose.com**

CIRCULATION TANK HEATER

Circulation tank heaters provide dependable pre-heating for engine starts in all temperatures by circulating warmed coolant throughout the engine.

BENEFITS

- Provides engine warming for quick, clean starts
- Reduces time to reach operating temperature
- Enhances immediate full-load acceptance
- Durable aluminum housing is corrosion and impact resistant
- Controls temperature by using a regulating thermostat
- UL Listed, UL Recognized, CSA, and CE Certified

  *UL Recognized (models without plugs) for OEM use only

  *CSA models with plugs only

WHERE TO USE

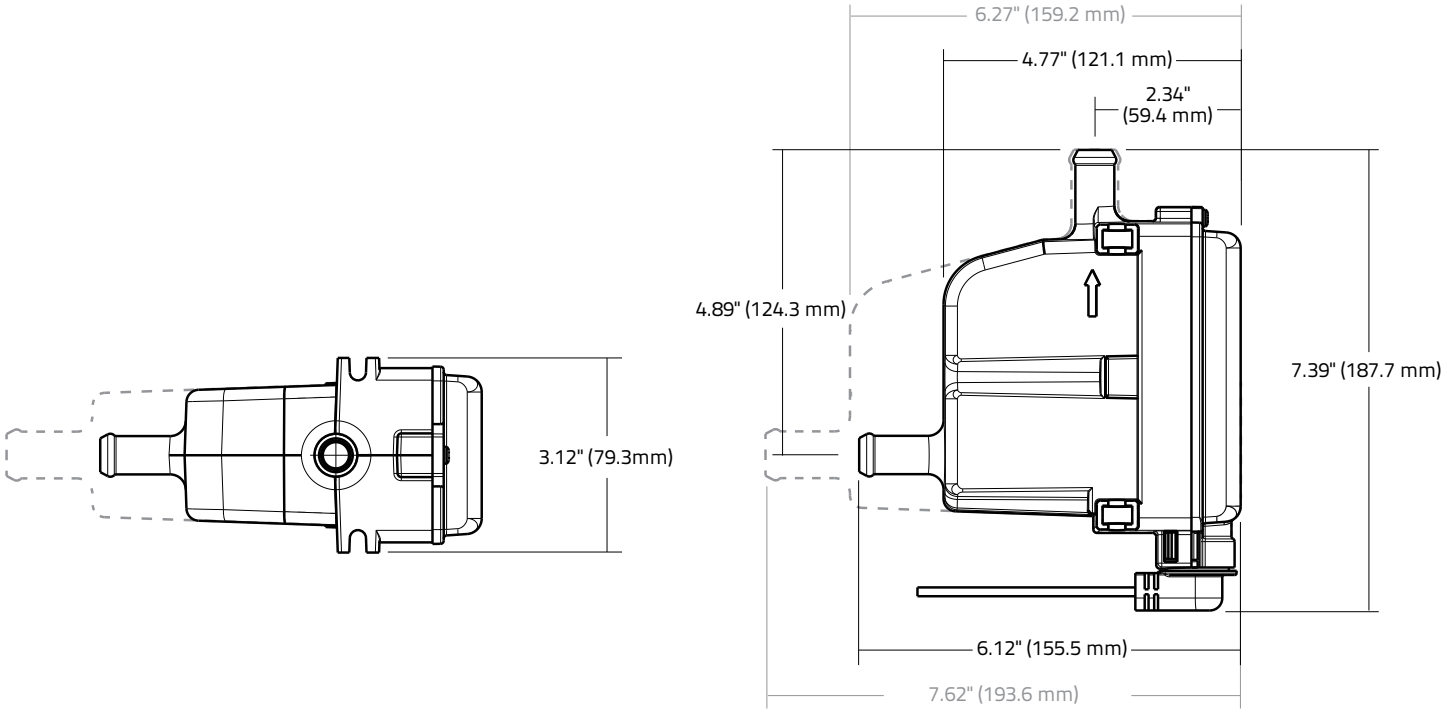
- Diesel & Gas Gensets
- Compressors
- Agriculture

FEATURES

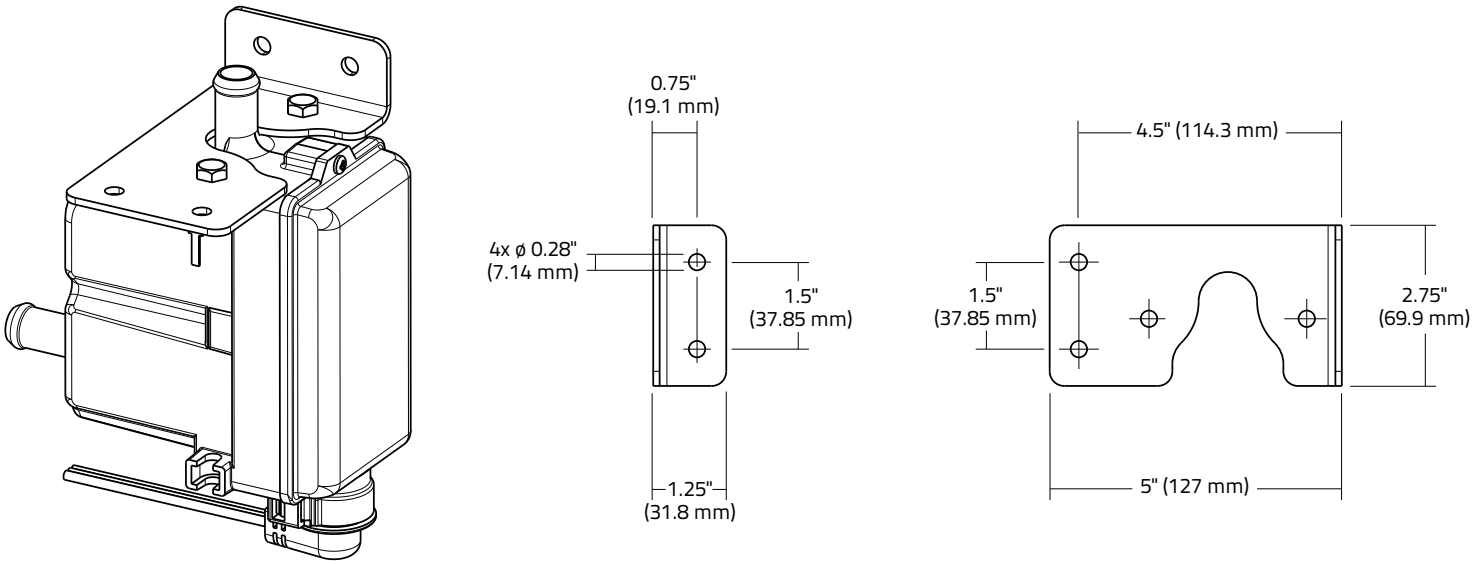
- Rugged die cast, one-piece, aluminum construction
- Regulating thermostat with automatic reset
- Safety overheat thermostat with automatic reset
- 5 ft. (1.52 m) or 12 ft. (3.65 m) power cords available
- Available in 120, 230, 240 volt versions
- **Thermostat Ranges:**
  60°-80°F (16°-27°C)
  80°-100°F (27°-38°C)
  100°-120°F (38°-49°C)
- 750 W-1500 W using 5/8" (16 mm) hose connections and 1500 W – 2250 W using 3/4" (19 mm) hose connections
- Available with or without electrical plugs

CIRCULATION TANK HEATER

HEATER DIMENSIONS



TYPICAL MOUNTING BRACKET INSTALLATION AND DIMENSIONS (4 Possible Orientations)



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CIRCULATION TANK HEATER

PARTS LIST: UL LISTED AND/OR CSA CERTIFIED

Part Number	Volts	Watts	Inlet/Outlet Size	Power Cord Length	Tank Size	Plug Type	UL Listed	CSA
Regulating Thermostat: On 60°F (16°C) / Off 80°F (27°C)								
3305028	120	750	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3305040	120	1000	5/8" (19 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3305052	120	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 5-15	-	✓
3305004	120	2250	3/4" (19 mm)	7' (2 m)	Large	NEMA 5-20	-	✓
Regulating Thermostat: On 80°F (27°C) / Off 100°F (38°C)								
3305032	120	750	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3305044*	120	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3309040	120	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	✓	✓
3309043	120	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 5-20	✓	✓
3305056	120	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 5-15	-	✓
3309048	240	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 6-15	✓	✓
3309052	240	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 6-15	✓	✓
3309055	240	2250	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 6-15	✓	✓
3309056	240	2250	3/4" (19 mm)	12' (3.6 m)	Large	NEMA 6-15	✓	✓
Regulating Thermostat: On 100°F (38°C) / Off 120°F (49°C)								
3305036	120	750	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3305048*	120	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	-	✓
3309041	120	1000	5/8" (15.8 mm)	12' (3.6 m)	Small	NEMA 5-15	✓	✓

CIRCULATION TANK HEATER

Part Number	Volts	Watts	Inlet/Outlet Size	Power Cord Length	Tank Size	Plug Type	UL Listed	CSA
3309042	120	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 5-15	✓	✓
3305060	120	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 5-15	-	✓
3309047	120	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 5-20	✓	✓
3309046	120	1500	3/4" (19 mm)	12' (3.6 m)	Large	NEMA 5-20	✓	✓
3309049	240	1000	5/8" (15.8 mm)	5' (1.5 m)	Small	NEMA 6-15	✓	✓
3309050	240	1000	5/8" (15.8 mm)	12' (3.6 m)	Small	NEMA 6-15	✓	✓
3309053	240	1500	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 6-15	✓	✓
3309054	240	1500	3/4" (19 mm)	12' (3.6 m)	Large	NEMA 6-15	✓	✓
3309057	240	2250	3/4" (19 mm)	5' (1.5 m)	Large	NEMA 6-15	✓	✓
3309058	240	2250	3/4" (19 mm)	12' (3.6 m)	Large	NEMA 6-15	✓	✓

*3305044 will be replaced with 3309040
*3305048 will be replaced with 3309042

CIRCULATION TANK HEATER

PARTS LIST: CE CERTIFIED

Part Number	Volts	Watts	Inlet/Outlet Size	Power Cord Length	Tank Size	Regulating Thermostat	Plug Type	Certifications
33E0012	230	750	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	Hard wire	CE
33E5020	230	750	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	CEE7/7 PLUG	CE
33E5018	230	1000	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	Hard wire	CE
33E5021	230	1000	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	CEE7/7 PLUG	CE
33E5019	230	1500	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	Hard wire	CE
33E5022	230	1500	15.8 mm (5/8")	1.5 m (5')	Small	On 38°C (100°F) / Off 49°C (120°F)	CEE7/7 PLUG	CE
33E5001	230	1500	19 mm	1.5 m (5')	Large	On 38°C (100°F) / Off 49°C (120°F)	Hard wire	CE
33E5003	230	1500	19 mm	1.5 m (5')	Large	On 38°C (100°F) / Off 49°C (120°F)	CEE7/7 PLUG	CE
33E5002	230	2250	19 mm	1.5 m (5')	Large	On 38°C (100°F) / Off 49°C (120°F)	Hard wire	CE
33E5004	230	2250	19 mm	1.5 m (5')	Large	On 38°C (100°F) / Off 49°C (120°F)	CEE7/7 PLUG	CE

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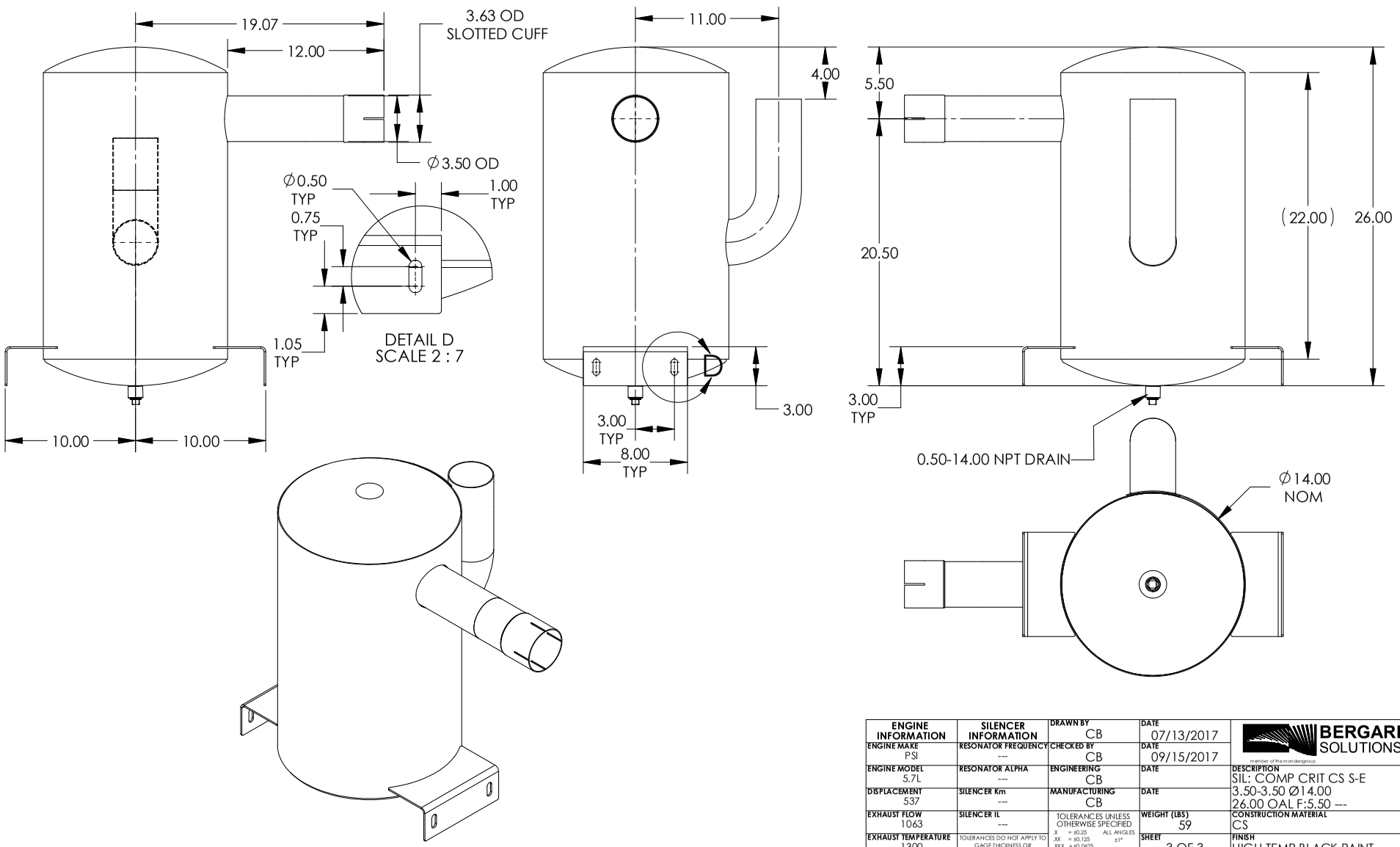


ENGINE INFORMATION	SILENCER INFORMATION	DRAWN BY	DATE
ENGINE MAKE: PSI	RESONATOR FREQUENCY: ---	CB	07/13/2017
ENGINE MODEL: 5.7L	RESONATOR ALPHA: ---	CHECKED BY: CB	DATE: 09/15/2017
DISPLACEMENT: 537	SILENCER Km: ---	ENGINEERING: CB	DATE:
EXHAUST FLOW: 1063	SILENCER IL: ---	MANUFACTURING: CB	DATE:
EXHAUST TEMPERATURE: 1300	TOLERANCES DO NOT APPLY TO GAGE THICKNESS OR COMMERCIAL FEATURES	TOLERANCES UNLESS OTHERWISE SPECIFIED: X ±0.25, XX ±0.125, XXX ±0.0625, XXXX ±0.03125, ALL ANGLES ±1°	WEIGHT (LBS): 59
MAX BACK PRESSURE: 40	THIRD ANGLE PROJECTION		SHEET: 3 OF 3
RAW SOUND PRESSURE: ---			

BERGARI SOLUTIONS
member of the mandengroup

DESCRIPTION: SIL: COMP CRIT CS S-E
3.50-3.50 Ø14.00
26.00 OAL F:5.50 ---

CONSTRUCTION MATERIAL: CS

FINISH: HIGH TEMP BLACK PAINT

PART NUMBER: 500-008346 REV: 02

SCALE (DO NOT SCALE): 1:7 SHEET SIZE: B

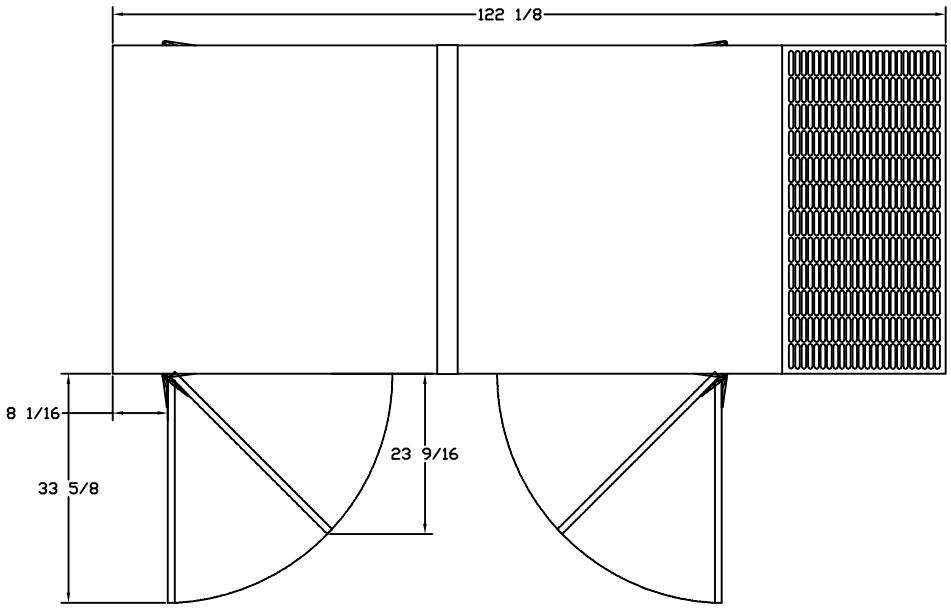
REV.	BY	DATE	DESCRIPTION	ECO
02	CB	09/15/2017	OVERALL HEIGHT CHANGE	---

CUSTOMER: ---
CUSTOMER P/N: ---

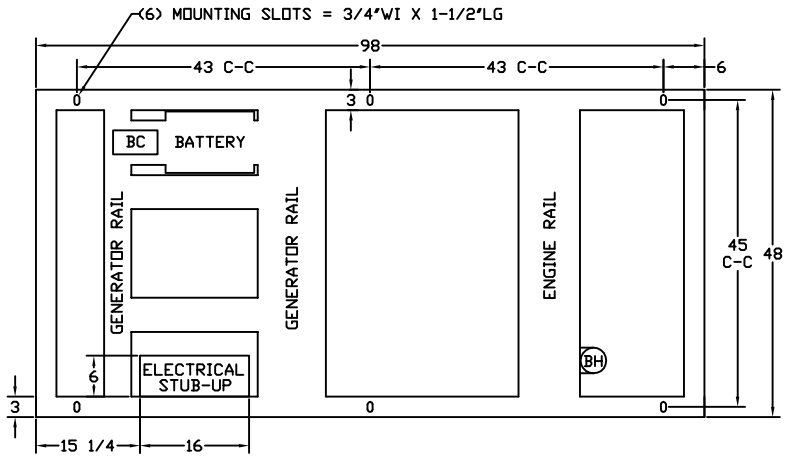
OUTLINE DIMENSIONS FOR 80 - 120 KW LEVEL 2 ENCLOSURE
(HINGED DOORS)

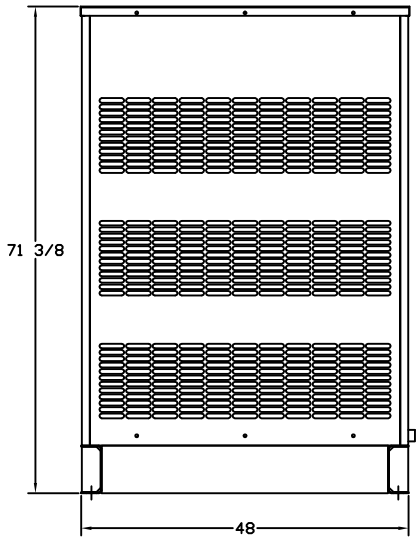
TOP VIEW

(GEN-SET HAS (4) DOORS, (2) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)

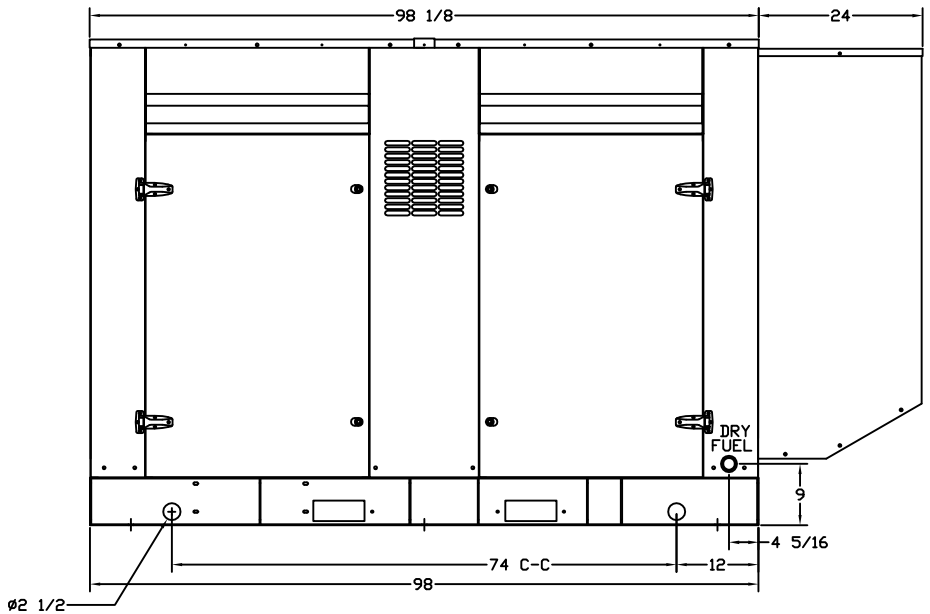


BASE VIEW

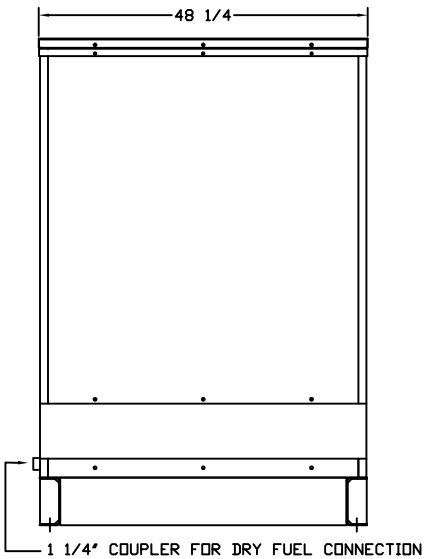




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW

APPENDIX E. REDLINED PERMIT

F. Particulate Matter Requirements

1. Monitoring Requirements

a. *The Permittee shall install,* operate, *calibrate,* and maintain *instruments for continuously measuring and recording the stack gas flow rate for Kiln 4 stack S-401, ~~clinker cooler stack S-402~~ and coal mill stack S-453 in accordance with the requirements in Condition III.D.2.c of this Attachment to allow determination of the PM mass emission rate to the atmosphere in pounds per ton of clinker.*

[40 CFR 63.1350(n), A.A.C. R18-2-331.A.3.c]
[Material permit conditions are indicated by underline and italics]

b. *Instead of installing* and operating s*tack gas flow rate on measurement instrument on coal mill stack, the Permittee may use the maximum design exhaust gas flow rate.* For purposes of determining the combined emissions from kilns that exhaust kiln gases to a coal mill that exhausts through a separate stack, the Permittee shall use the results of the initial and subsequent performance test to demonstrate compliance with the emissions limit.

[40 CFR 63.1349(a), A.A.C. R18-2-331.A.3.c]
[Material permit conditions are indicated by underline and italics]

c. *The Permittee shall install,* operate, *calibrate,* and maintain *PM CPMS on the Kiln 4 stack S-401 and clinker cooler stack S-402 to demonstrate continuous compliance with the established operating limit corresponding to the results of the performance test demonstrating compliance with the PM limit.*

[40 CFR 63.1349(b)(1)(i), 40 CFR 63.1350(b)(1)(i), A.A.C. R18-2-331.A.3.c]
[Material permit conditions are indicated by underline and italics]

(1) The PM CPMS shall provide a 4-20 milliamp or digital signal output and the establishment of its relationship to manual reference method measurements must be determined in units of milliamps or the monitors digital equivalent.

(2) The PM CPMS operating range must be capable of reading PM concentrations from zero to a level equivalent to three times your allowable emission limit. If the PM CPMS is an auto-ranging instrument capable of multiple scales, the primary range of the instrument must be capable of reading PM concentration from zero to a level equivalent to three times the allowable emission limit.

(3) During the initial performance test or any such subsequent performance test that demonstrates compliance with the PM limit, record and average all milliamp or digital output values from the PM CPMS for the periods corresponding to the compliance test runs (e.g., average all the PM CPMS output values for three corresponding Method 5I test runs).

d. To determine continuous operating compliance, the Permittee shall record the PM CPMS output data for all periods when the process is operating, and use all the PM CPMS data for calculations when the source is not out-