

ATTACHMENT XIV.C3

INCINERATION OR THERMAL TREATMENT

R 299.9508(1)/R 299.9504

40 CFR 270.14(b)

R 299.9623

Detailed Engineering & Process Information

R 299.9508(1)/R 299.9504/40 CFR 270.14(b)

R 299.9623

The following description covers the current 32 Incinerator Complex in detail. The 32 Incinerator has a thermal output capacity of 130 MM Btu/hr and is operated under Permit Number MI-ROP-A4033-2011b (ROP, effective date April 11, 2011). The incinerator is regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAPs) from Hazardous Waste Combustors [Title 40 of the Code of Federal Regulations, Part 63 (40 CFR Part 63), Subpart EEE], commonly referred to as the HWC MACT. The initial comprehensive performance test (CPT), required by the HWC MACT, was performed on the 32 Incinerator in November 2003. The results were reported to Michigan Department of Environmental Quality (MDEQ) on June 10, 2004. At that time, the incinerator was subject to the interim standards of 40 CFR Part 63 Subpart EEE as a new source [40 CFR 63.1203(b)]. On October 12, 2005, the HWC MACT rule was amended to include the permanent replacement standards for incinerators. The 32 Incinerator is subject to the permanent replacement standards of 40 CFR 63.1219 as an existing source. In September 2009, the initial CPT for the permanent replacement standards was conducted on the 32 Incinerator. The results were reported to MDEQ on December 14, 2009. The 32 Incinerator Complex currently operates in accordance with a Notification of Compliance (NOC) that was prepared and submitted following the successful demonstration of the permanent replacement standards in 2009. A Confirmatory Performance Test for polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) required by the HWC MACT Rule was conducted in August 2011. The results of the test were submitted to the MDEQ on November 7, 2011.

The HWC MACT requires that 61 months after commencing the initial CPT, a subsequent CPT must be commenced. On June 24, 2013, Dow submitted a Comprehensive Performance Test Plan (CPTP) to the Air Quality Division of the MDEQ that presented Dow's plan for the subsequent comprehensive performance test on the 32 Incinerator to re-demonstrate compliance with the permanent replacement standards. In August 2014, the subsequent CPT for the permanent replacement standards was conducted on the 32 Incinerator. The results were reported to MDEQ on December 11, 2014.

Pursuant to R 299.9623(3)(a), the 32 Incinerator Complex complies with R 299.9605 to R 299.9610, R 299.9612, R 299.9613, R 299.9630, R 299.9631, and the Part 7 rules, which the MACT standards do not supersede.

Since Dow has not elected to comply with the alternative to the particulate standard of 40 C.F.R.

§§63.1206(b)(14) and 63.1219(e), the HWC MACT standard supersedes the particulate matter standard of 40 C.F.R. §264.343(c) {R 299.9623(3)(b)}.

Dow follows, for the 32 Incinerator, the startup, shutdown, and malfunction plan as required by the ROP {R 299.9623(3)(c)}.

32 Incinerator Complex

The following description covers the 32 Incinerator Complex. Pursuant to R 299.9504(1)(g), pertinent engineering plans and a complete set of process flow diagrams (PFDs) are provided following the text in this Section of the application. Engineering Plans and PFDs included are listed below:

DRAWING NUMBER	DESCRIPTION
B2-1000-960530	Incinerator Upgrade Plot Plan
B4-1-960530	Over-All Iso Cover Sheet
B4-1001-960530	Equipment Key Plot Plan
B4-1200-960530	Pipe Rack North End Equipment Location Plan
B4-2200-960530	C/T Pumps Equipment Location Plan
B4-2300-960530	C/T & IWS Tran I Equipment Location Plan
B4-2400-960530	SK-3300 Platform Equipment Location Plan
B4-3100-960530	Building 34 Equipment Location Plan
B4-3200-960530	Building 33 & Tank Area Equipment Location Plan
B4-3300-960530	IWS Train 2 & 3, SCC Equipment Location Plan
B4-3400-960530	Building 36 Equipment Location Plan
B4-4100-960530	Building 34 Equipment Location Plan
B4-4200-960530	Truck Unloading Equipment Location Plan
B4-4300-960530	Building 32 Equipment Location Plan
B4-4400-960530	Bulk Solids Ramp Equipment Location Plan
B4-4334-960530	Kiln/Front Face & Building 32 Area Piping Elevation Looking East
B4-3331-960530	SCC/Quench Area Piping Elevation Iso View
B4-3333-960530	SCC/Quench Area Piping Elevation Looking East
B4-2335-960530	Condenser/Scrubber Area Piping Elevation Iso View
B4-2337-960530	Condenser/Scrubber Area Piping Elevation Looking East
B4-3335-960530	IWS Area Piping Elevation Iso View
B4-3338-960530	IWS Area Piping Elevation Looking East

CE219-0010	Upper Liquid Cooled Feed Chute Assembly
CE219-0002	Lower Liquid Cooled Feed Chute Assembly
000-0001	Rotary Kiln 04, 4x12m Assembly Drawing
GD001341-1	Rotary Kiln Incinerator KL-2400
R-D-60235-14-2	Sectional Elevation SCC Hot Duct DU-2600 & R-2700
R-D-60235-16-2	Emergency Vent Lid Details SCC Hot Duct DU-2600 & R-2700
R-D-60235-06-2	Sectional Elevation Secondary Combustion Chamber IN-2600
R-D-60235-17-2	Sectional Elevation Quench Spray Chamber T-2800
R-D-60235-100-2	Process General Arrangement
CR-95231-2, SH.1	GA-Submerged Drag Conveyors Tag No. CV-2500 & CV-2510
E2-84401	B-3000 Induced Draft Fan #1
E2-84403	B-3200 Induced Draft Fan #2
B01-001-32PERMIT	Index Cover & Legend Process Flow Sheet
B01-002-32PERMIT	Index Flow Sheet
B01-003-32PERMIT	Bulk Liquid Waste Unloading Spots LS-2010, 2020, 2030, 2040
B01-004-32PERMIT	Bulk Liquid Waste Unloading Spots LS-2050, 2060
B01-005-32PERMIT	Bulk Liquid Waste Unloading Spots LS-2070, 2080, 2090
B01-006-32PERMIT	Bulk Liquid Waste Unloading Spots LS-1202, 1203, 101
B01-007-32PERMIT	Hot Tar Feed Tanks
B01-008-32PERMIT	Cold Tar Feed Tanks
B01-009-32PERMIT	Rail Car Unloading Spots LS-1215, 1216
B01-010-32PERMIT	Water Containment Tanks
B01-011-32PERMIT	Tank Farm Vent System
B01-013-32PERMIT	Wastewater Treatment Solids Handling and Feed
B01-014-32PERMIT	Packaged Solids Handling and Feed
B01-015-32PERMIT	Bulk Solids Handling and Feed
B01-020-32PERMIT	Kiln Burners – Auxiliary Fuel and Atomization
B01-021-32PERMIT	Kiln Liquid Fuel Distribution
B01-022-32PERMIT	Incineration – Kiln
B01-023-32PERMIT	Secondary Combustion Chamber (SCC) – Auxiliary Fuel and Atomization
B01-024-32PERMIT	SCC Liquid Fuel Distribution
B01-025-32PERMIT	Incineration – SCC and Ash System
B01-035-32PERMIT	Nitrogen Oxide Reagent/Sodium Bisulfite Receiving and Storage
B01-036-32PERMIT	Nitrogen Oxide Reagent Distribution
B01-040-32PERMIT	Quench and Condenser

B01-041-32PERMIT	Venturi Scrubber, Demister/Chlorine Scrubber, & First I.D. Fan
B01-043-32PERMIT	Ionizing Wet Scrubber (IWS) Pumps
B01-044-32PERMIT	Ionizing Wet Scrubber Train 1
B01-045-32PERMIT	Ionizing Wet Scrubber Train 2
B01-046-32PERMIT	Ionizing Wet Scrubber Train 3
B01-048-32PERMIT	Second I.D. Fan and Stack
B01-050-32PERMIT	Wastewater Collection
B01-066-32PERMIT	Fuel Oil Storage (LS -1213, LS – 1214)

The 32 Incinerator consists of a rotary kiln, secondary combustion chamber (SCC), air pollution control (APC) train, induced draft (I.D.) fans and a stack. The general arrangement is shown on drawing B01-002-32PERMIT. Waste is fed to the Incinerator as bulk liquids, fed directly from the transport container; as liquids from the waste storage tanks; as bulk solids; as wastewater treatment solids; and as containerized solids. Liquid, solid, and gaseous wastes are all fed to the rotary kiln; liquid waste and gaseous vent wastes can also be fed to the secondary combustion chamber. The vent from 1005 building is also sent to the incinerator but is fed as part of the combustion air. Solid residue from the rotary kiln is sent to a hazardous waste landfill. The APC train consists of a nitrogen oxides abatement reactor, rapid quench, packed tower, high energy venturi scrubber, demister/chlorine scrubber, and multi-stage ionizing wet scrubber. For more information on the Tank Systems and the Use and Management of Containers, see Attachments XIV.C2 and Attachment XIV.C1 respectively.

Monitoring

Operation is controlled and monitored by a Process Control Computer (PCC). This computer monitors the process for proper temperatures, pressures, flows, carbon monoxide and oxygen. The locations of the process monitors are schematically shown on the Process Flow Diagrams (PFDs). A list of the process monitors is presented in Table T-1. A description of each of these monitors is given in Table T-2.

Continuous Process Monitoring System (CMS)

The continuous monitors meet the HWC MACT Rule definition of a CMS which requires that the monitor sample the regulated parameter without interruption, evaluate the detector response at least once each 15 seconds, and compute and record the average values at least once every 60 seconds. In the event that the span of any CMS is exceeded, and is not exempted in the Malfunction Abatement Plan, an automatic waste feed cutoff (AWFCO) will occur.

Continuous Emissions Monitoring System (CEMS)

The CEMS for the Incinerator consists of monitors for oxygen, carbon monoxide, sulfur dioxide, and nitrogen oxides. These devices are described in Table 1. The CEMS monitors are calibrated, maintained, and continuously operated in compliance with the quality assurance procedures for CEMS in the appendix of 40 CFR 63 Subpart EEE and performance specification 4B of 40 CFR 60 Appendix B.

Safety and Automatic Waste Feed Cutoffs

A number of monitors also serve as "Automatic Waste Feed Cutoff (AWFCO) Devices." Instrumentation is used to monitor process conditions to: provide data for assuring compliance with regulatory requirements, assure appropriate process response and control, to provide operational flexibility, provide safety interlocking, and provide various safe shutdown scenarios. Safety and AWFCO shutdown responses are relayed to various equipment items when process limits are not met so that the equipment will go to a fail-safe mode. In general, the process parameters that alert and initiate AWFCO responses to alarm conditions are shown in Table T-3.

Waste Feed Systems

The kiln is equipped with two tri-fuel burners, four liquid injection lances, a vent nozzle, a Wastewater Treatment Plant dried solids feed point, a pack conveyor, and a solid waste feed chute. These feed systems are described in this section.

Packaged and Bulk Solids

Packaged wastes are received at the 32 Pack Room where they are unloaded and accumulated for placement on the pack conveyor system (Refer to drawing B01-014-32PERMIT). Containers are typically 5 gallon to 55 gallon capacity having a maximum heat release rate of 1.5 MM Btu per container. The container feed rate can be adjusted on the process control computer. The typical range of introduction of packaged waste is one container every three to six minutes.

Bulk solid wastes, such as absorbents, cellulosic polymers, latex polymers, wastewater treatment plant solids, activated carbon, soils, and similar solids, are received in a ten cubic yard hopper at the 32 Incinerator. At the bottom of the hopper there is a volumetric feeder that allows varying amounts of material to be transferred to the elevating conveyor which transfers the material into the feed chute. The individual openings for containers and bulk solids have respective air locks for minimizing the air leakage into the kiln. The feed chute is sloped at approximately 55° downward so as to prevent the accumulation of material in the chute. The chute is cooled with a heat transfer media. The chute extends through the front face where the containers and solids enter the kiln (Refer to drawing B01-015-32PERMIT).

Wastewater Treatment Plant Dried Solids Feed

The front face of the kiln is equipped with a system to meter a controlled rate of wastewater treatment plant dried solids from a solids hopper, H-2170, using a series of screw feeders. This system can feed up to 8,000 lb/hr (Refer to drawing B01-013-32PERMIT). Wastewater Treatment Plant dried solids may also be fed to the kiln through the bulk solids feed system.

Kiln Tri-Fuel Burners – BU-2310 and BU-2320

These two burners are equipped with two (2) lances with the capability of firing liquid wastes and supplemental fuel. The burners are rated at 35 MM Btu/hr each. Liquid wastes are atomized with either air or steam. The burners are equipped with flame detectors for burner management control. Each burner has a maximum air flow capacity of 7,000 cubic feet per minute. The turndown ratio of each burner is approximately 6:1. Refer to drawings B01-020-32PERMIT, B01-021-32PERMIT, and B01-022-32PERMIT.

Kiln Lances

Four lances allow for feed of pumpable liquid waste to the kiln. These lances may be fed without atomization, or atomized with air or steam. The typical firing rate to each lance is 10 - 40 lb/min. Refer to drawings B01-021-32PERMIT and B01-022-32PERMIT.

Secondary Combustion Chamber (SCC)

The SCC is equipped with three dual-fuel burners, four vent nozzles, one aqueous waste lance, and a kiln deslagging lance. These systems are described below.

Secondary Combustion Chamber Burners - BU-2610, BU-2620, and BU-2630

The secondary combustion chamber (SCC) is equipped with three dual-fuel burners BU-2610, BU-2620, and BU-2630 each capable of firing one liquid waste stream and natural gas. These burners are rated at 30 MM Btu/hr each. The burners are equipped with flame scanners for burner management control. Each burner has a maximum air flow capacity of 6,000 cubic feet per minute. The burners are mounted in the side wall of the SCC above the inlet to the chamber. The lower section of the SCC serves as the vestibule for the kiln entrance and as an ash drop to the ash removal system. The turndown ratio for each burner is approximately 6:1. (Refer to drawing B01-023-32PERMIT)

Kiln Deslagging Lance

A fuel oil lance with external atomization is available at the discharge end of the kiln for deslagging purposes. The lance is movable to allow deslagging from four locations.

SCC Aqueous Lance

A steam-atomized aqueous waste feed lance for introduction of wastewater or service water is located near the bottom of the SCC.

SCC Vent Gas Burners

Two vent-gas burners for injection of "off-gases" from the Incinerator Tank Farm vents and Offload Spots at the Incinerator are located in the SCC. Two additional vent gas nozzles are also located on the SCC to manage vent streams (Refer to drawing B01-025-32PERMIT).

Rotary Kiln

The kiln is comprised of a front face, front seal, refractory lined shell, discharge seal, a kiln drive mechanism and associated burners and lances. The front face is a combination of steel and refractory. The front wall is fitted for the waste feed burners, lances, and solids chute. The kiln is a 12.4 ft. I.D. of the refractory lining by 39.4 ft. long steel cylinder. The kiln diameter is reduced at both the feed and discharge sections to approximately 12.1 ft. I.D. and 11.9 ft. I.D. respectively. The kiln is lined with high-density firebrick. The volume of the kiln is 4,677 cubic feet inside the refractory lining (Refer to drawing B01-022-32PERMIT).

The kiln is driven by a variable-speed main drive motor. An auxiliary drive system provides back up drive capabilities. The kiln rotation is 0.1 to 1.0 rpm. The kiln has a three percent slope to the SCC where the ash is collected and then removed. Typical kiln operating temperature is 900 – 1100 °C.

Secondary Combustion Chamber

The SCC is a refractory-lined vertical cylindrical chamber 23 ft. in diameter by 50 ft. high overall and an 8.5 ft. in diameter by 64.9 ft. long duct. The burners are located midway up the SCC (25 ft. from the exit to the duct section). The residence time of the combustion gases in the chamber from the center-line of the burners to the SCC temperature probes in the duct is in excess of 3.5 seconds. The chamber is operated below atmospheric pressure and is capable of sustained operation greater than 1100 °C. The total residence volume of the SCC is 14,070 cu. ft. (Refer to drawing B01-025-32PERMIT).

Emergency Safety Vent

The combustion system is equipped with an emergency safety vent (ESV). The purpose of the ESV is to protect personnel working at the facility and downstream equipment in the event of certain system failures. The ESV opens under the following conditions:

- Power failure
- ID Fan failure

- High quench chamber temperature
- Low total water flow to the quench

Pneumatically operated cylinders open the counterweighted damper. All waste feeds to the Incinerator are stopped immediately in the event that the damper opens. The system cannot be restarted until the damper is closed.

Ash Removal

Ash that is discharged from the kiln drops into a water bath located below the SCC. The water bath acts as a water seal to allow the removal of ash out of the rotary kiln and SCC without the loss of vacuum on the system. The ash is cooled and solidified in this bath. The ash is then conveyed by two parallel drag-flight conveyors which remove the ash from the water and transport the material into an ash dewatering – staging area (33 Building). The ash is then transported to a licensed hazardous waste landfill. (Refer to drawing B01-025-32PERMIT).

Ash removed from the front seal of the rotary kiln is recycled to the kiln feed through the bulk solids feed system.

Combustion Air

One combustion air blower provides primary combustion air to the kiln tri-fuel burners and to the SCC dual-fuel burners. The combustion air blower is a centrifugal blower sized to provide up to 34,000 acfm of air. The vent stream from 1005 Building is introduced on the discharge of this blower, and used as combustion air in the kiln and SCC burners (See drawing B01-020-32PERMIT). Auxiliary combustion air to the kiln through the feed chute and through the front seal is provided by a second combustion air blower. This combustion air blower is also a centrifugal blower sized to provide up to 28,000 acfm of secondary combustion air to the system.

Air Pollution Control System (APC)

The Air Pollution Control (APC) system provides for removal of particulates and gaseous pollutants. The system is described below:

Recycle Water System

Recycled water is provided to each air pollution control device through the APC system. Recycle water pumps are provided for the quench chamber, packed tower condenser, venturi/demister, and each phase of ionizing wet scrubbers. Fresh makeup water (either service water or Huron water) will be added to each device as needed. Recycle water flow to the packed tower condenser passes through a heat exchanger,

reducing the temperature of the recycled water. Blowdown from the system is treated by Dow's on-site wastewater treatment plant. (Refer to drawings B01-040, 041, 042, and 050-32PERMIT).

Nitrogen Oxide Abatement Reactor

Following the SCC and the ESV an 8.5 ft. diameter by 35 ft. reaction chamber is provided for nitrogen oxide (NO_x) abatement. A NO_x reagent (urea) is stored in a 10,000-gallon tank where the temperature of the reagent is maintained at approximately 70 °F. The stored urea is mixed with Huron water and fed to the reaction chamber through air-atomized nozzles. The system is designed to achieve 10 to 55% removal of NO_x depending upon the NO_x loading to the chamber. Maximum removal is achieved at the highest NO_x loading. (Refer to drawings B01-035-32PERMIT and 036-32PERMIT).

Quench Chamber

Flue gases from the SCC are ducted into a vertical quench tower. The primary purpose of this equipment is to lower the temperature of the gas leaving the afterburner chamber from combustion temperatures to below 100 °C to protect the downstream operating equipment from thermal damage. A secondary purpose of the quench is to contact the gas stream with water to partially remove acid gases, to condense inorganic vapors, and to initiate agglomeration of fine particulate. In addition, employment of a rapid quench provides a reduced potential of dioxin/furan formation by recombination effects.

The 14 ft. inside diameter by 36 ft. high tower is an open chamber lined with a combination of refractory and acid resistant brick. The initial co-current, makeup-water injection near the top of the tower utilizes a system of high-dispersion nozzles. The water is vaporized and reduces the gas temperature to near the adiabatic saturation temperature.

A second, high-volume water stream is injected further down the column to ensure gas saturation and provide some acid gas scrubbing capability. (Refer to drawing B01-040-32PERMIT).

Packed Tower Condenser

The primary purpose of this equipment is to further lower the temperature of the gas stream to reduce its volume, to increase the agglomeration of the fine particulate, and to provide additional scrubbing for acid gases. The condenser is a fiberglass-reinforced plastic (FRP) tower 14 ft. in diameter by 40 ft. high. It is a packed tower with 15 feet of 2-inch packing (Norton Snowflake or equivalent). It normally operates at approximately 2,500 gallons per minute counter-current water flow for cooling and scrubbing. As described above, a portion of the recycled water is pumped from the bottom of the condenser to the second series of

water injection nozzles on the quench tower. Recycled water to the condenser flows through a heat exchanger to provide additional cooling. (Refer to drawing B01-040-32PERMIT).

Venturi Scrubber

The purpose of the high-energy venturi is to remove the majority of the particulate from the gas stream. By agglomerating the very fine particles in the condenser tower, the efficiency of the venturi scrubber is significantly enhanced. It has a secondary purpose of scrubbing halogens and other acid gases from the gas stream. A 20 percent caustic stream is periodically added to the chlorine scrubber/demister tower, which is the source of water for the venturi to insure halogen emissions are minimized. The venturi has an FRP body and a Hastelloy-C restrictor in the throat to provide a variable pressure drop. The venturi operates at up to 60 inches of water pressure drop. (Refer to drawing B01-041-32PERMIT).

Chlorine Scrubber/Demister Tower

The chlorine scrubber/demister tower has two purposes. It separates the entrained water from the gas stream leaving the venturi and provides additional removal of halogen gases on the packed section. The water removed in the chlorine scrubber/demister is recirculated back to the venturi.

The tower is a FRP column 14 ft. in diameter by 70 ft. high. A packed bed section of the column, 28 feet of 2-inch packing (Norton Snowflake or equivalent), removes the fine entrained water droplets and provides the additional acid-gas adsorption. The bed is irrigated with water to prevent plugging with fine particulate. As mentioned above, the water from this tower is then pumped to the venturi scrubber. (Refer to drawing B01-041-32PERMIT).

Ionizing Wet Scrubber

Nine Model 1000 Ceilcote Ionizing Wet Scrubber (IWS) units are installed in three parallel trains each consisting of three stages in series. These units are fabricated from fiberglass-reinforced plastic and contain Hastelloy-C ionizing wire and plates. The purpose of the IWS is to remove the low levels of very fine particulate remaining in the gas stream. Particulate, as it enters the units, passes through fields that are typically 10,000 to 30,000 volts which imparts a slight electrical charge to these sub-micron particles. The charged particulate is then scrubbed out of the system in the 4-ft. thick packed beds by being attracted to the flowing water which is at ground potential. The beds are continuously flushed with water. (Refer to drawings B01-043, 044, 045, 046-32PERMIT).

Induced Draft Fans

Primary I.D. Fan

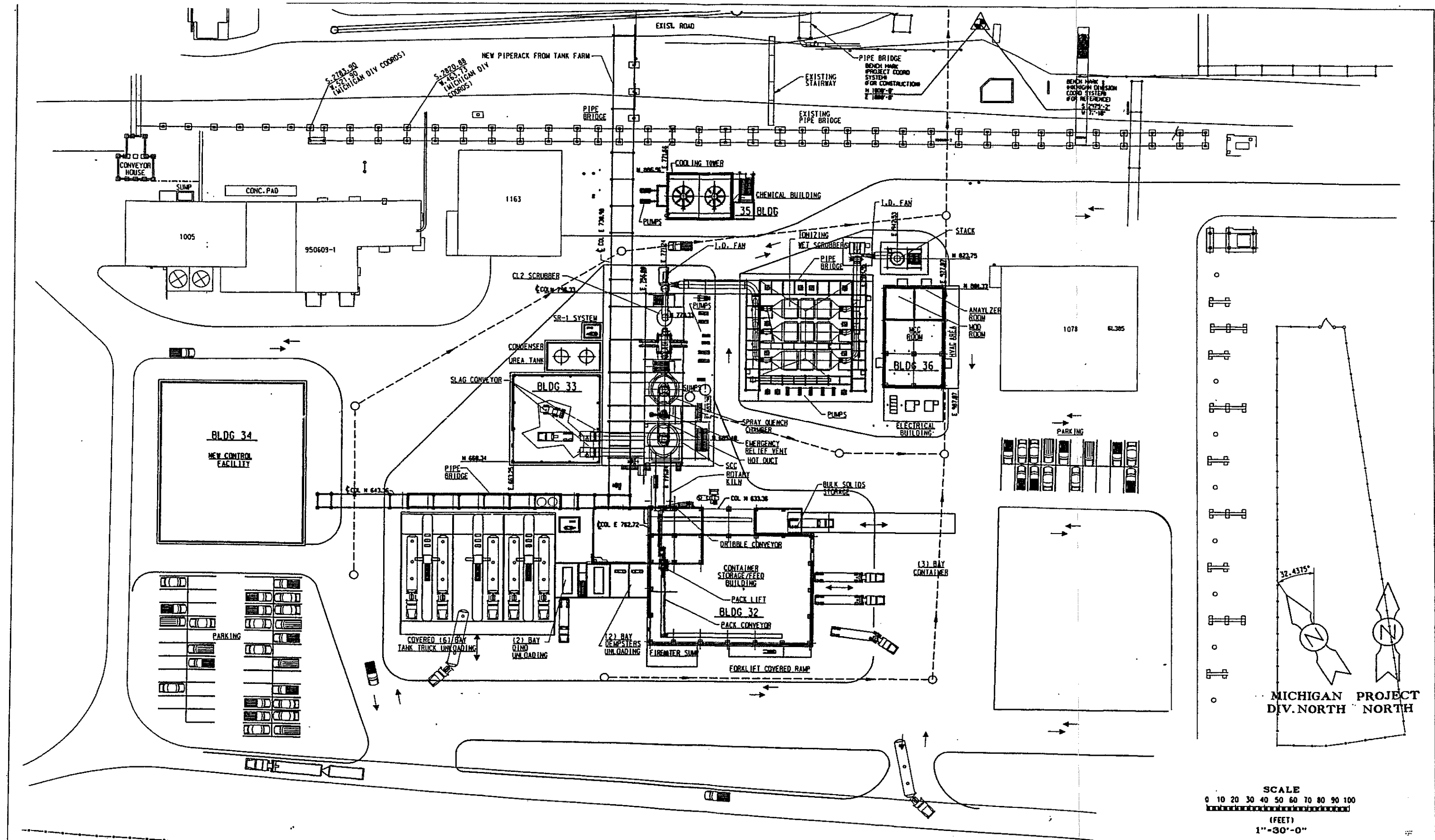
The primary induced draft (I.D.) fan provides the main motive force for pulling the combustion gases from the kiln and SCC through the quench, condenser tower, venturi, and demister tower. The fan wheel is constructed of Hastelloy-C and is sized to provide up to 60 inches of water vacuum. This fan assures a negative pressure on all upstream equipment to minimize fugitive emissions.

Secondary I.D. Fan

The secondary I.D. fan is designed to provide 30 inches of water vacuum. The fan discharges into the base of a 4.5 ft. diameter fiberglass reinforced plastic (FRP) stack.

Stack

The stack for discharging the scrubbed and cleaned gases is a 4.5 ft. diameter by 200 ft. tall FRP stack. Sample ports for particulate testing, continuous emission monitoring and gas analysis are installed in the stack.



1 A FOR DESIGN

H.F. DELGADO
10/25/00
A.J. CROW

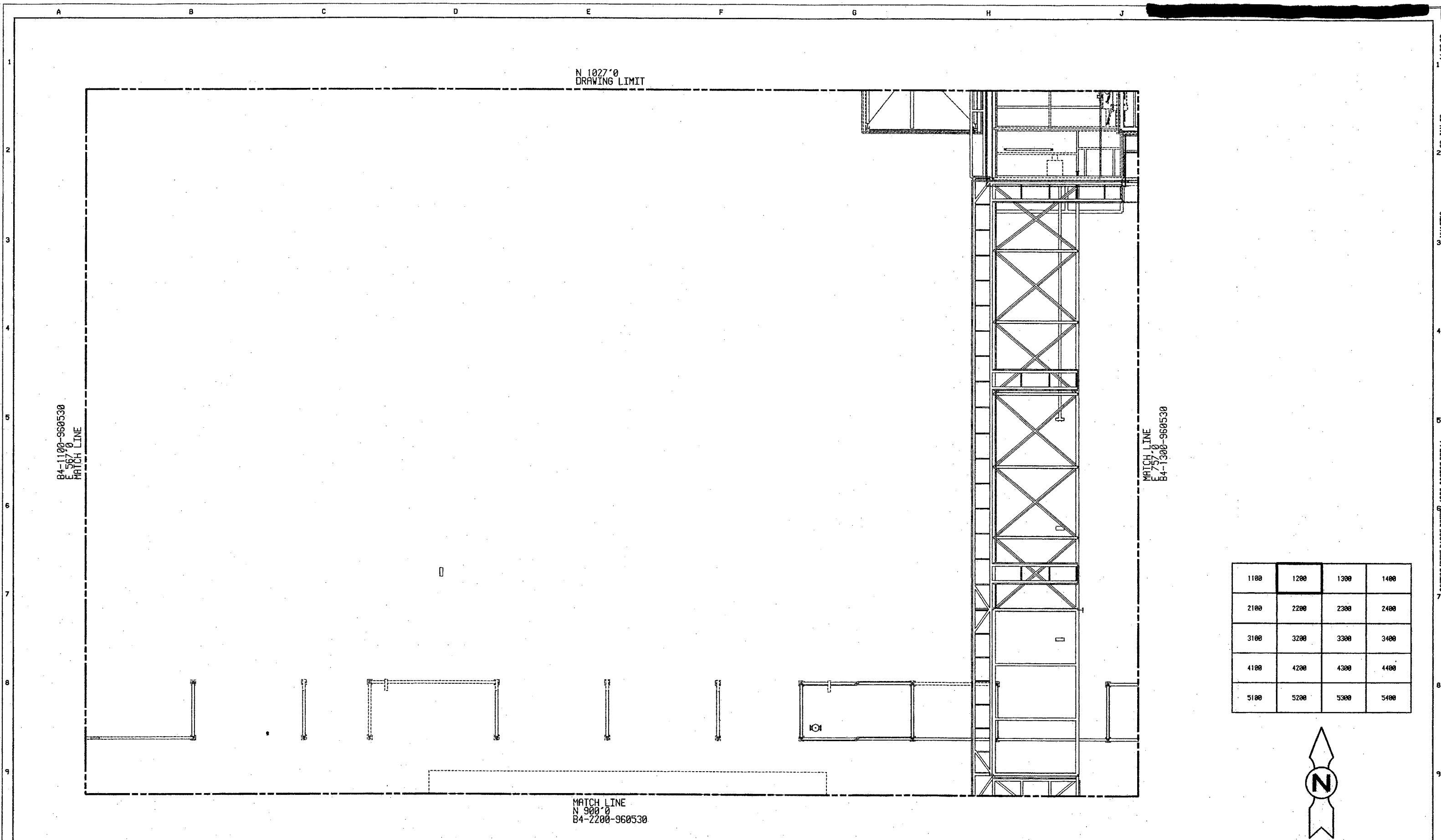
1/2000
2/2000

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
INCINERATOR UPGRADE
MIDLAND, MICHIGAN
FIGURE F-1. INCINERATOR UPGRADE
PLOT PLAN

103070

1"=30' 82-1000-960530

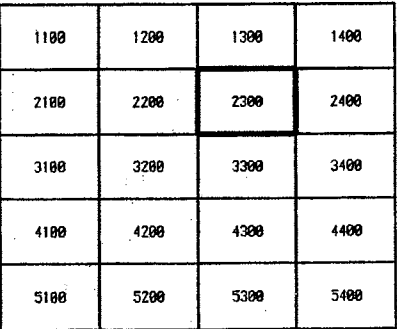
F 2 PLN

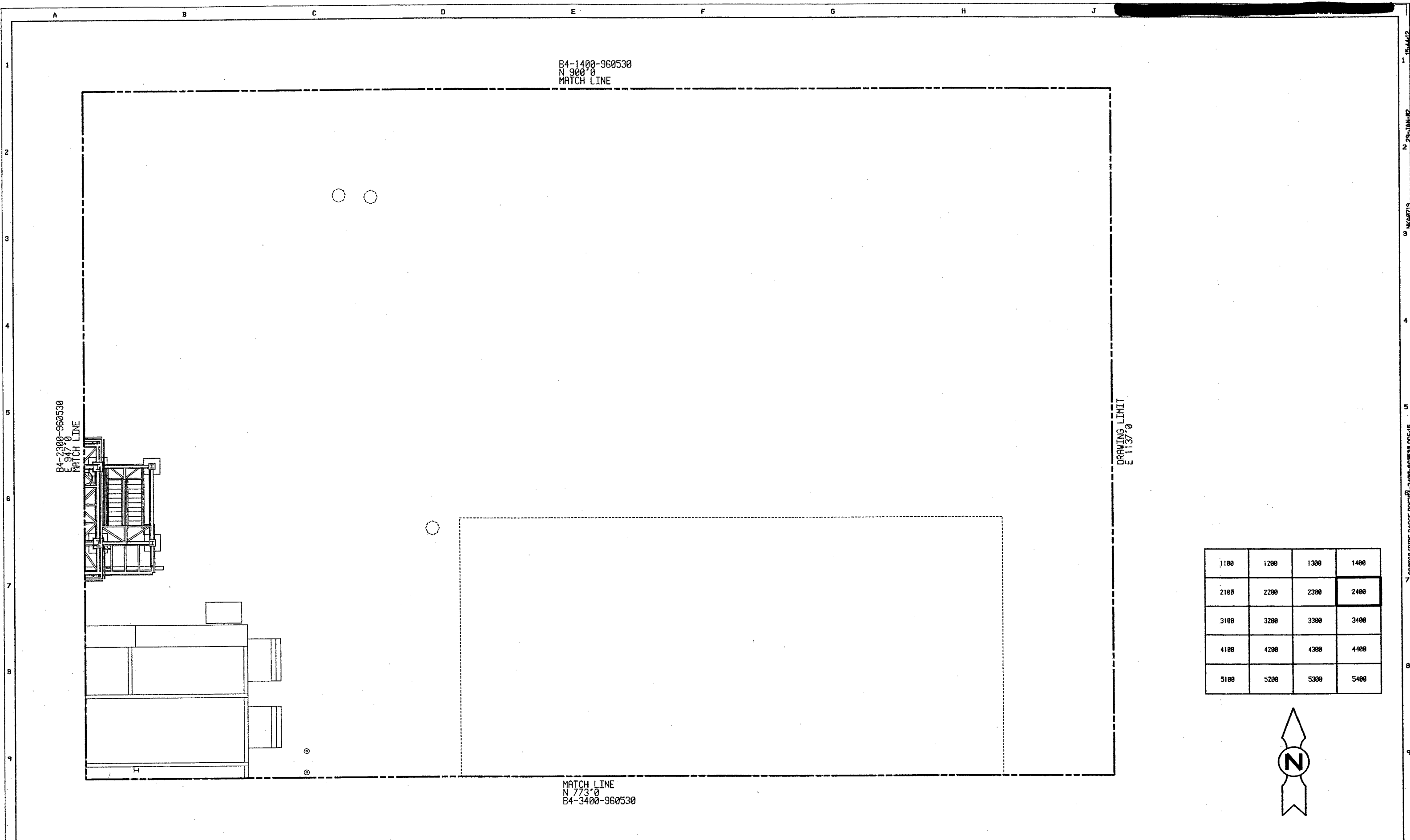


1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



REVISION					REVISION					DRAWING ISSUE RECORD					DESIGNED		STATUS		PLANT NO.		THE DOW CHEMICAL COMPANY			
REV.	BY	CHK	APP	DATE	REV.	BY	CHK	APP	DATE	ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	TEAM	P.E. SEAL	CHARGE NUMBER	SCALE	CHARGE NUMBER	SCALE	CHARGE NUMBER	SCALE
A	JEL	BG	RS	01/04/01						3	A	S1601-960530				01/02	TEAM		960530	1/8" = 1'-0"	960530	1/8" = 1'-0"	960530	1/8" = 1'-0"
										2	A	S1601-960530	01/02				TEAM							
										1		S1601-960530	11/01/01				APPROVED							
																	RAJU SHAH							
																	PROJ. ENGR.							
																	MICHAEL J. VAN HERK							
																	REF. REP.							
																	S. SYLVESTER/A. POTOFF							





1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



REVISION				REVISION				DRAWING ISSUE RECORD				DESIGNED		STATUS		PLANT NO.		THE DOW CHEMICAL COMPANY			
REV.	DATE	BY	CHK	APP	DATE	REV.	DATE	BY	CHK	APP	DATE	TEAM	DATE	DATE	DATE	DATE	DATE	MICHIGAN DIVISION			
A	GENERAL UPDATE	JEL	BG	RS	01/04/01							P.D.S.G.	09/01/01	09/01/01	09/01/01	09/01/01	09/01/01	830 INCINERATOR KILN UPGRADE			
												TEAM	09/01/01	09/01/01	09/01/01	09/01/01	09/01/01	SK-3300 PLATFORM			
												APPROVED	09/14/01	09/14/01	09/14/01	09/14/01	09/14/01	EQUIPMENT LOCATION PLAN			
												PROJ. ENGR.	09/14/01	09/14/01	09/14/01	09/14/01	09/14/01	CHARGE NUMBER			
												MICHAEL J. VAN HERK	09/14/01	09/14/01	09/14/01	09/14/01	09/14/01	960530			
												S. SYLVESTER/A. POTOFF	09/14/01	09/14/01	09/14/01	09/14/01	09/14/01	SCALE			
																		1/8" = 1'-0"			
																		B4-2400-960530			
																		PRINTED			
																		VER.			

Architectural drawing of a site plan showing a large rectangular area with a dashed boundary. The drawing includes a grid system (A-J, 1-9) and various annotations.

Annotations:

- Top center: B4-2100-960530
N 773' 0"
MATCH LINE
- Left side (vertical): E 377' 0"
DRAWING LIMIT
- Right side (vertical): MATCH LINE
E 567' 0"
B4-3200-960530
- Bottom center: MATCH LINE
N 646' 0"
B4-4100-960530

Site Features:

- Internal rectangular structures within the main area.
- Small rectangular structures at the bottom left and bottom right.
- Two circular features (possibly trees or ponds) on the right side.

Legend:

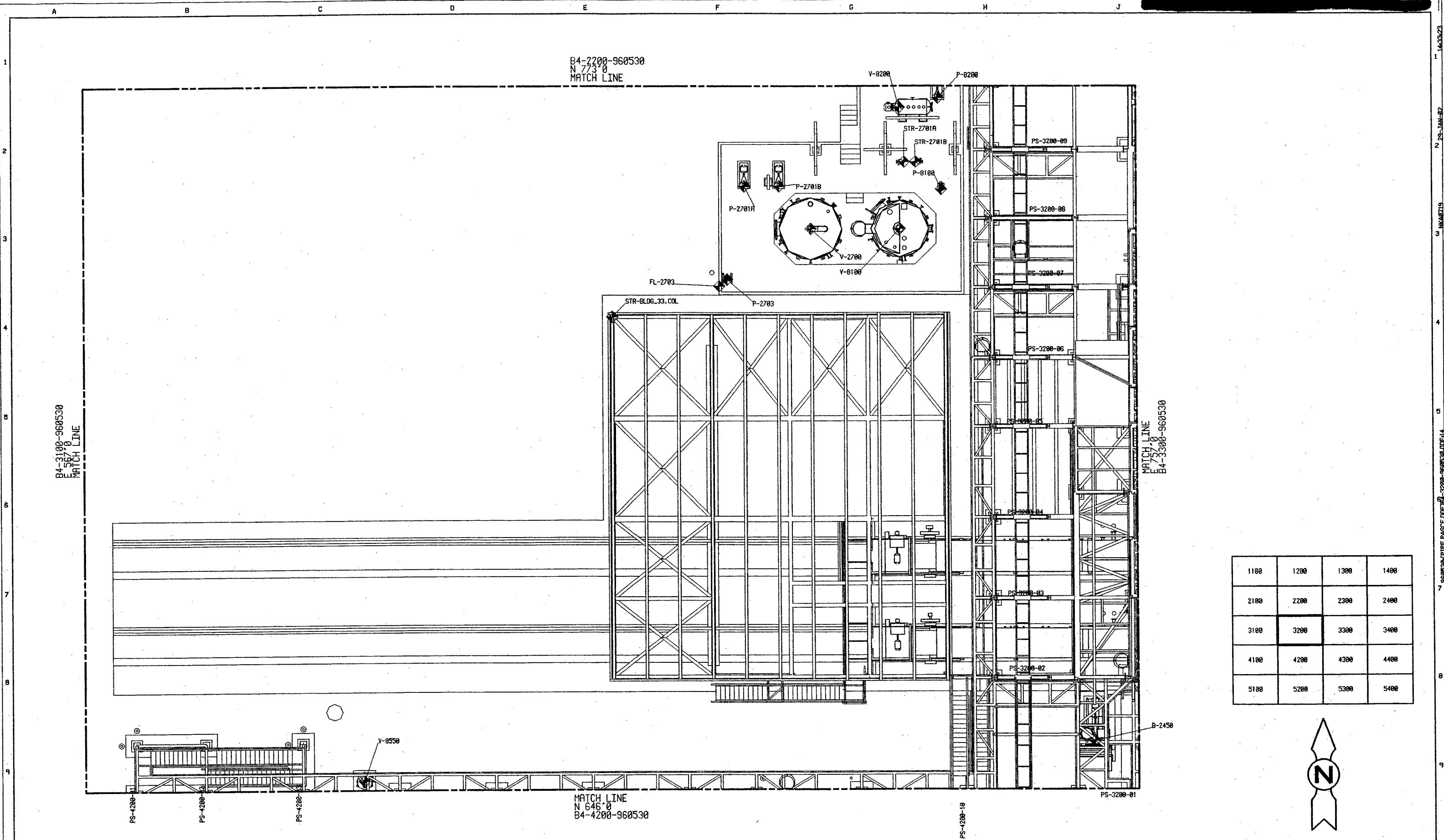
1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400

North Arrow: A stylized arrow pointing upwards, labeled 'N'.

1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



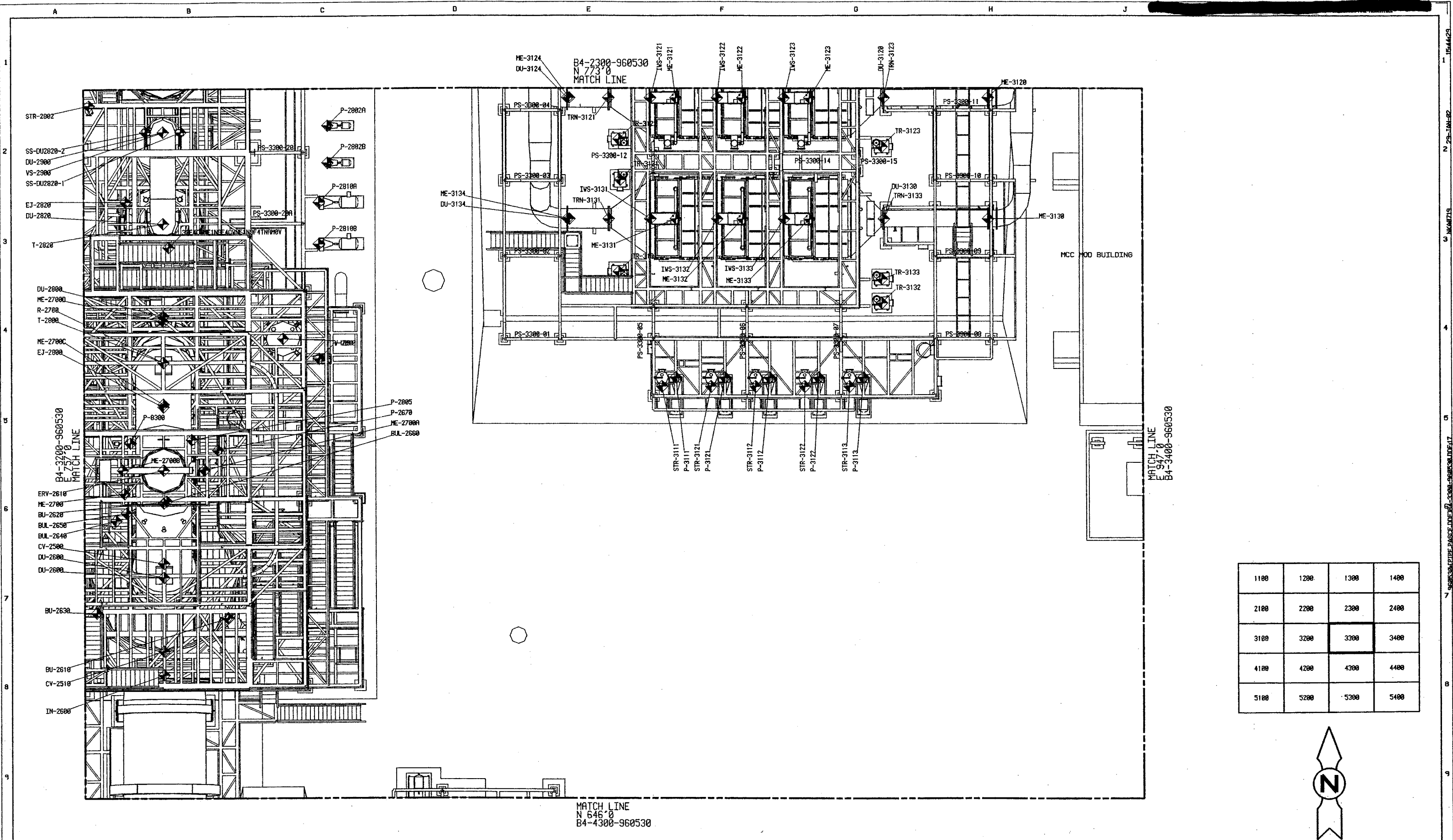
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A	GENERAL UPDATE	JEL	BG	RS	01/04/01											09/01/01	P.E. SEAL			MICHIGAN DIVISION 830 INCINERATOR KILN UPGRADE 32 BLDG			
																09/01/01				BUILDING 34 EQUIPMENT LOCATION PLAN			
																09/14/01				CHARGE NUMBER 960530			
																09/14/01				SCALE 1/8" = 1'-0"			
																09/14/01				B4-3100-960530			
																09/14/01				REV A			



1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



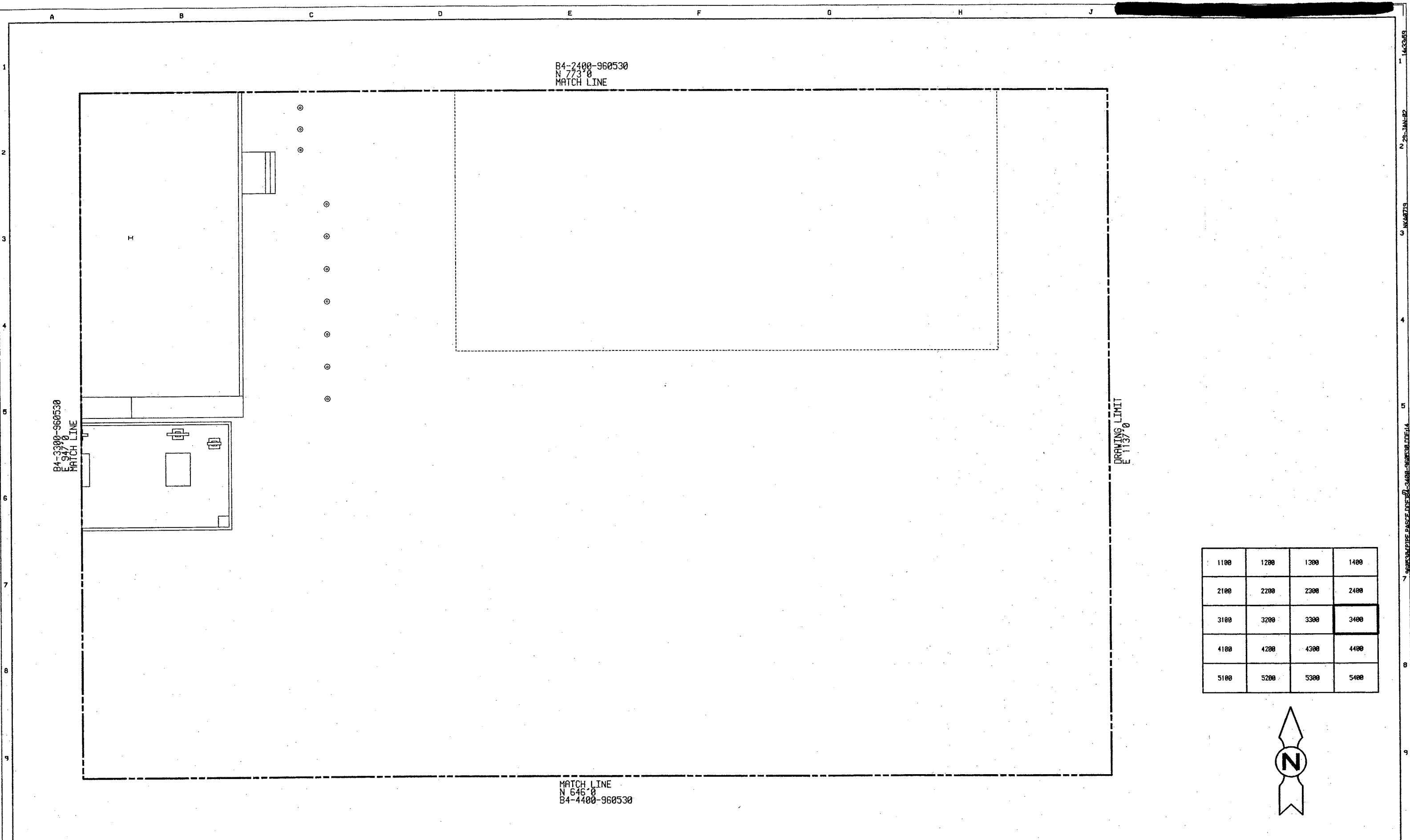
REVISION					REVISION					DRAWING ISSUE RECORD								DESIGNED TEAM		STATUS		PLANT NO.		THE DOW CHEMICAL COMPANY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
REV. MARK	BY	CHK	APP	DATE	REV. MARK	BY	CHK	APP	DATE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</



1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



REV. MARK		REVISION		BY	CHK	APP	DATE	REV. MARK	REVISION		BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED TEAM		09/01/01	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY	
A		GENERAL UPDATE		JEL	BG	RS	01/04/01								3 A S1601-960530				P.D.S.G.		09/01/01	P.E. SEAL		MICHIGAN DIVISION	
															2 A S1601-960530				TEAM		09/01/01			830 INCINERATOR KILN UPGRADE	
															1 S1601-960530				RAJU SHAH		09/14/01			MIDLAND, MICHIGAN	
															ISSUE NO. REV. MATERIAL OR JOB SPEC				MICHAEL J. VAN HERK		09/14/01			IWS TRAIN 2 & 3, SCC	
															DATE ISSUED FOR				S. SYLVESTER/A. POTOFF		09/14/01			EQUIPMENT LOCATION PLAN	
																								213	
																								CHANGE NUMBER	
																								960530	
																								SCALE	
																								1/8" = 1'-0"	
																								B4-3300-960530	
																								PRINTED	
																								VER.	
																								P.D.	



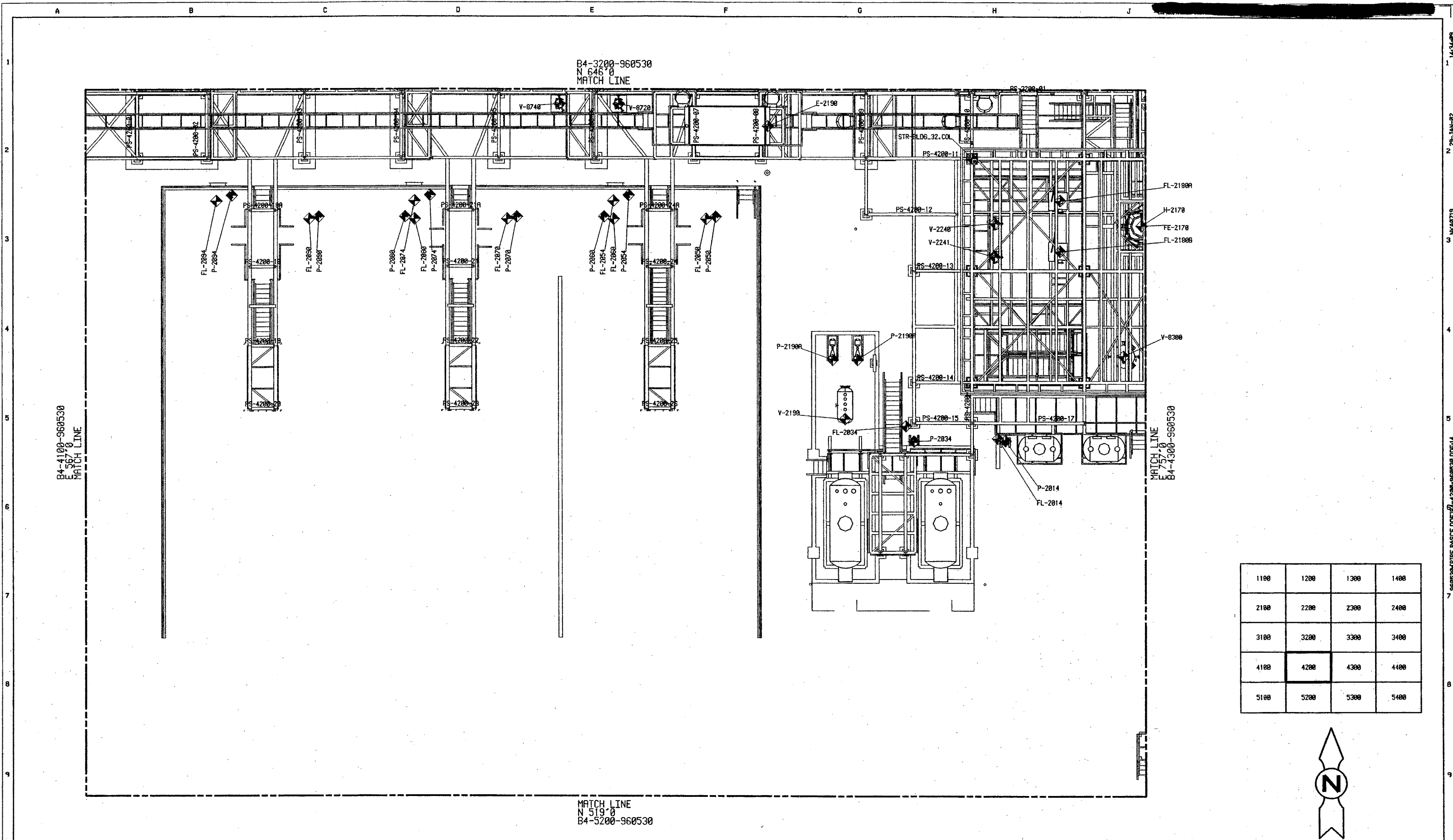
B4-3300-960530
E 947'0
MATCH LINE

DRAWING LIMIT
E 1137'0

1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	09/01/01	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY							
A	GENERAL UPDATE	JEL	BG	RS	01/04/01										TEAM	09/01/01			MICHIGAN DIVISION MIDLAND, MICHIGAN								
															P.D.S.G.	09/01/01			830 INCINERATOR KILN UPGRADE 32 BLDG.								
															TEAM	09/01/01			BUILDING 36								
															RAJU SHAH	09/14/01			EQUIPMENT LOCATION PLAN								
															MICHAEL J. VAN HERK	09/14/01			214								
															S. SYLVESTER/A. POTOFF	09/14/01			A								
												ISSUE NO.	REV	MATERIAL OR JOB SPEC	ISS	FIN	CONST	REF	CHARGE NUMBER		960530	SCALE	1/8" = 1'-0"	B4-3400-960530		REV.	A
												DATE ISSUED FOR				PRINTED		VER.									



1100	1200	1300	1400
2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



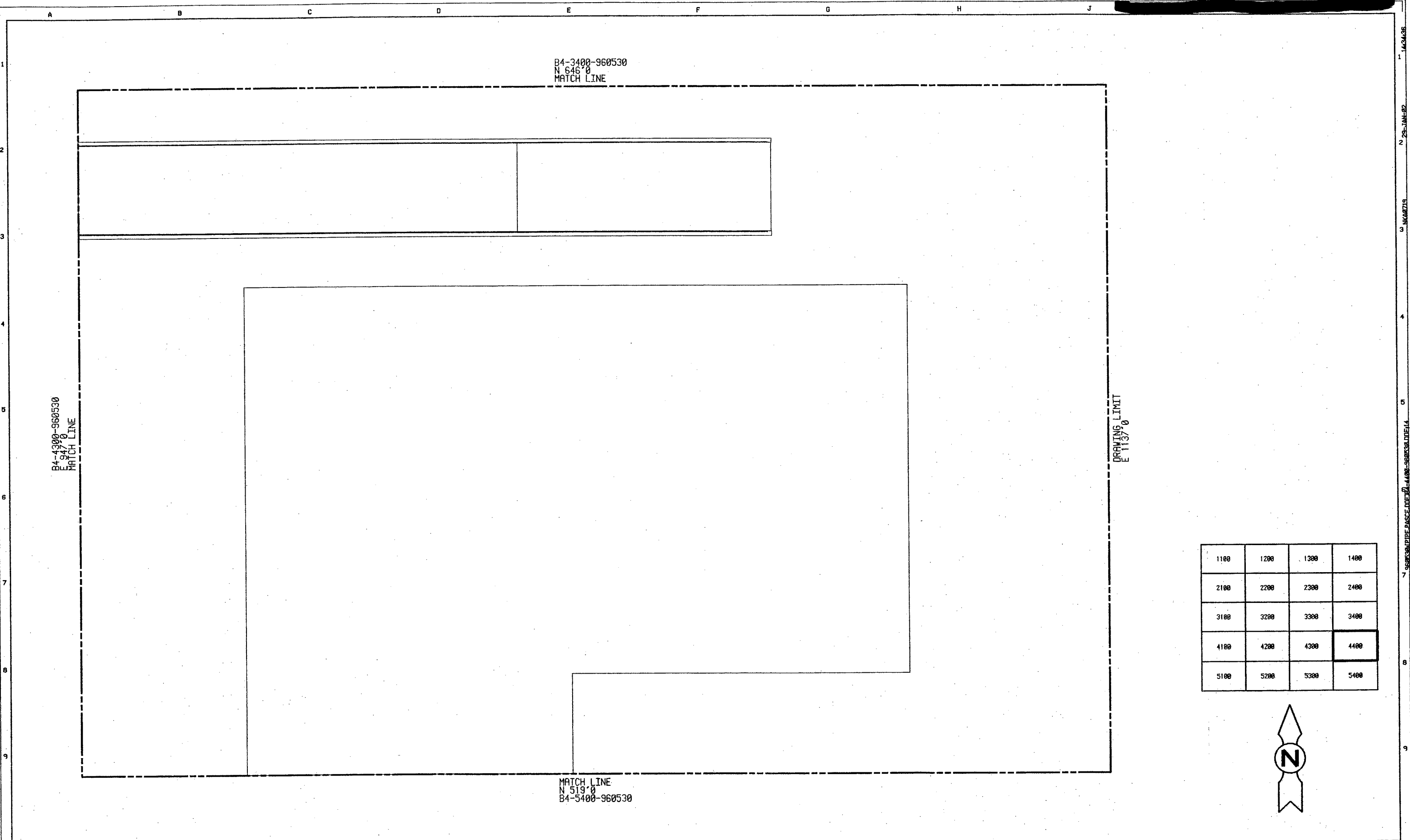
REV.	DATE	BY	CHK	APP	DATE	REV.	DATE	BY	CHK	APP	DATE
A	01/04/01	JEL	BG	RS							

REV.	DATE	BY	CHK	APP	DATE

DRAWING ISSUE RECORD			
3	A	S1601-960530	01/02
2	A	S1601-960530	01/02
1		S1601-960530	01/01/01
1	REV	MATERIAL ON JOB SPEC	
		BID	FAB
		CONST	REF
		DATE ISSUED FOR	

DESIGNED	TEAM	09/01/01
DRAWN	P.D.S.G.	09/01/01
CHECKED	TEAM	09/01/01
APPROVED	RAJUL SHAH	09/14/01
PROJ. ENGR.	MICHAEL J. VAN HERK	09/14/01
WFL. REP.	S. SYLVESTER/A. POTOFF	09/14/01

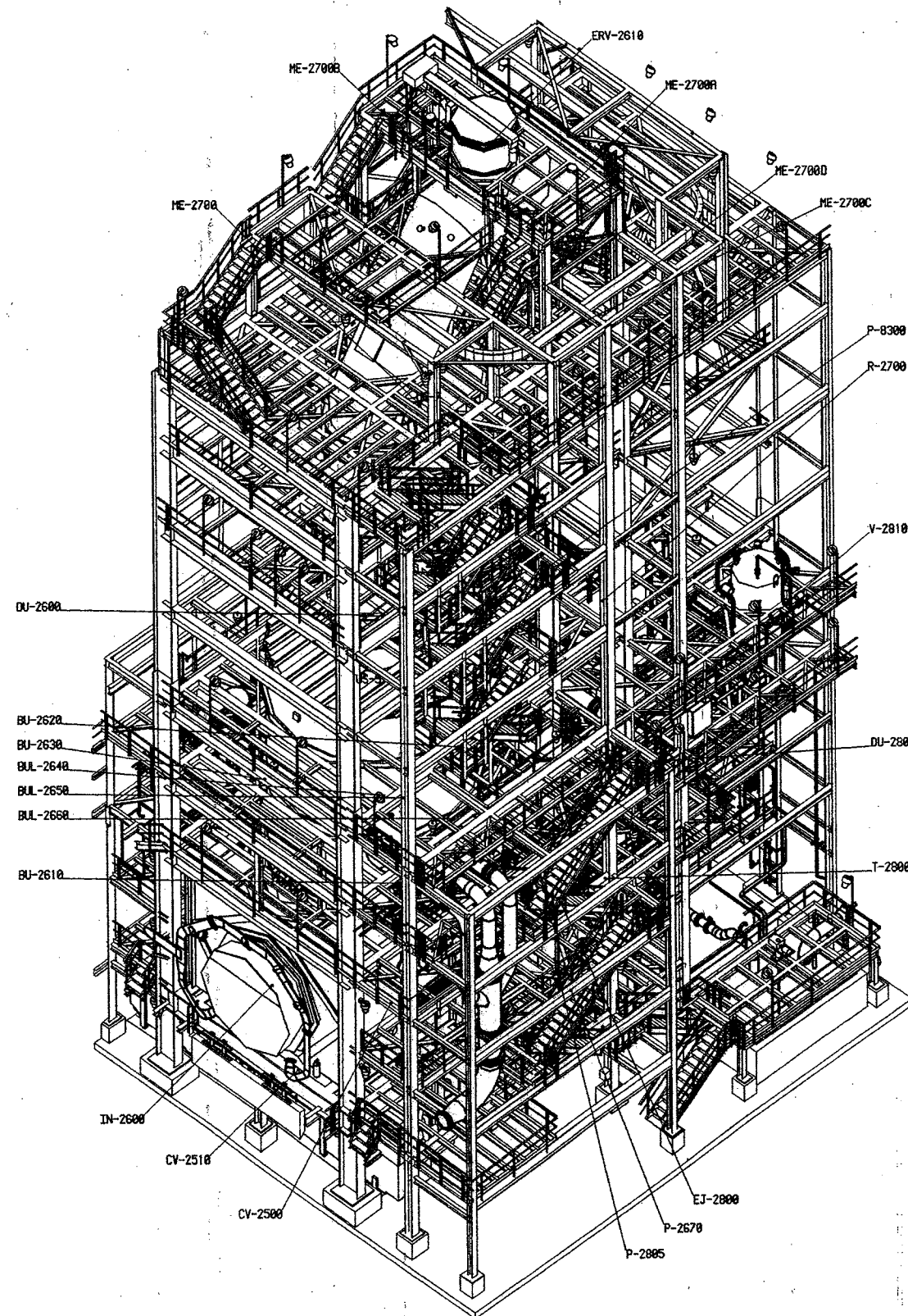
THE DOW CHEMICAL COMPANY	
MICHIGAN DIVISION	MIDLAND, MICHIGAN
830 INCINERATOR KILN UPGRADE 32 BLDG.	
TRUCK UNLOADING EQUIPMENT LOCATION PLAN	
CHARGE NUMBER	960530
SCALE	1/8" = 1'-0"
PRINTED	B4-4200-960530
REV.	A



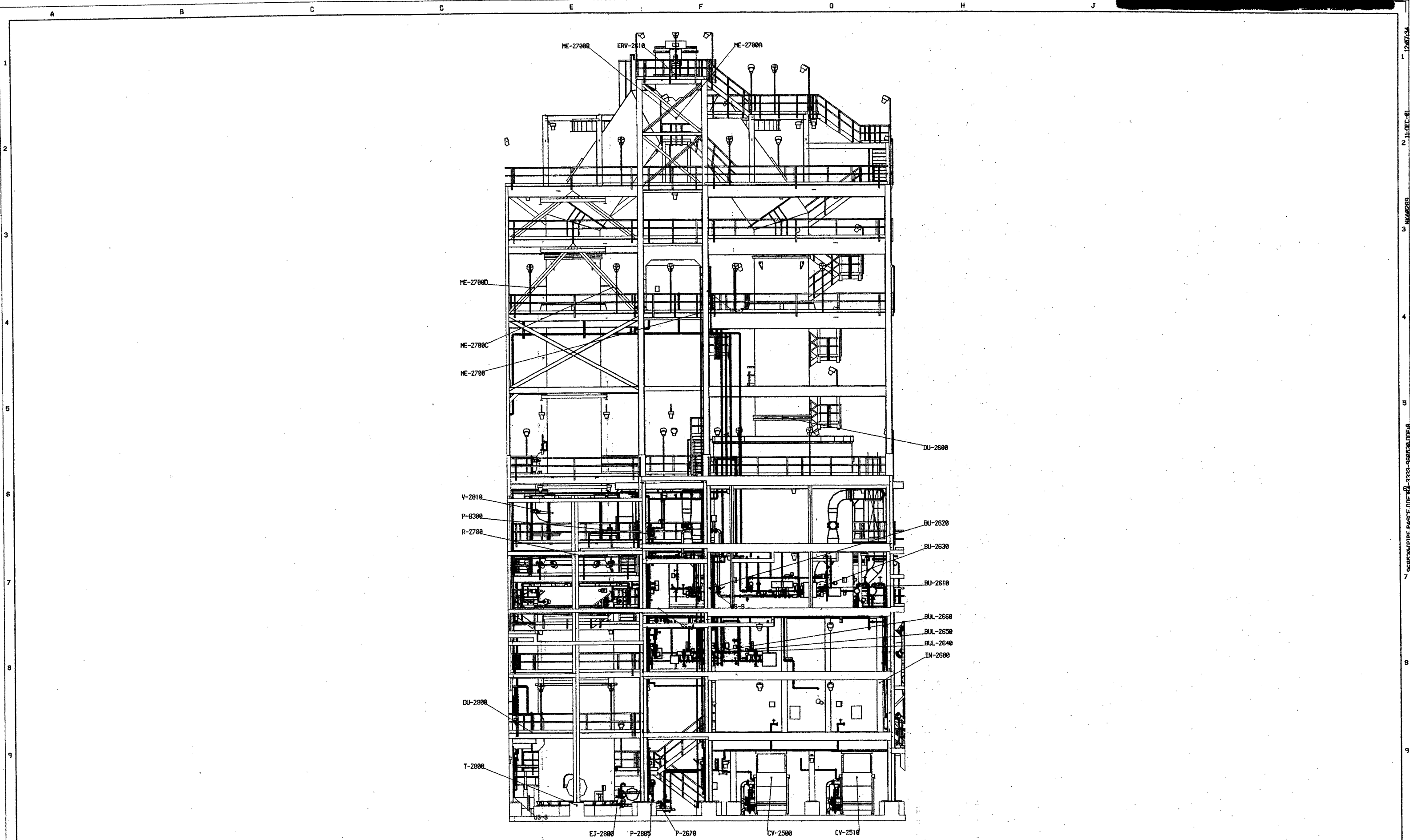
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2100	2200	2300	2400
3100	3200	3300	3400
4100	4200	4300	4400
5100	5200	5300	5400



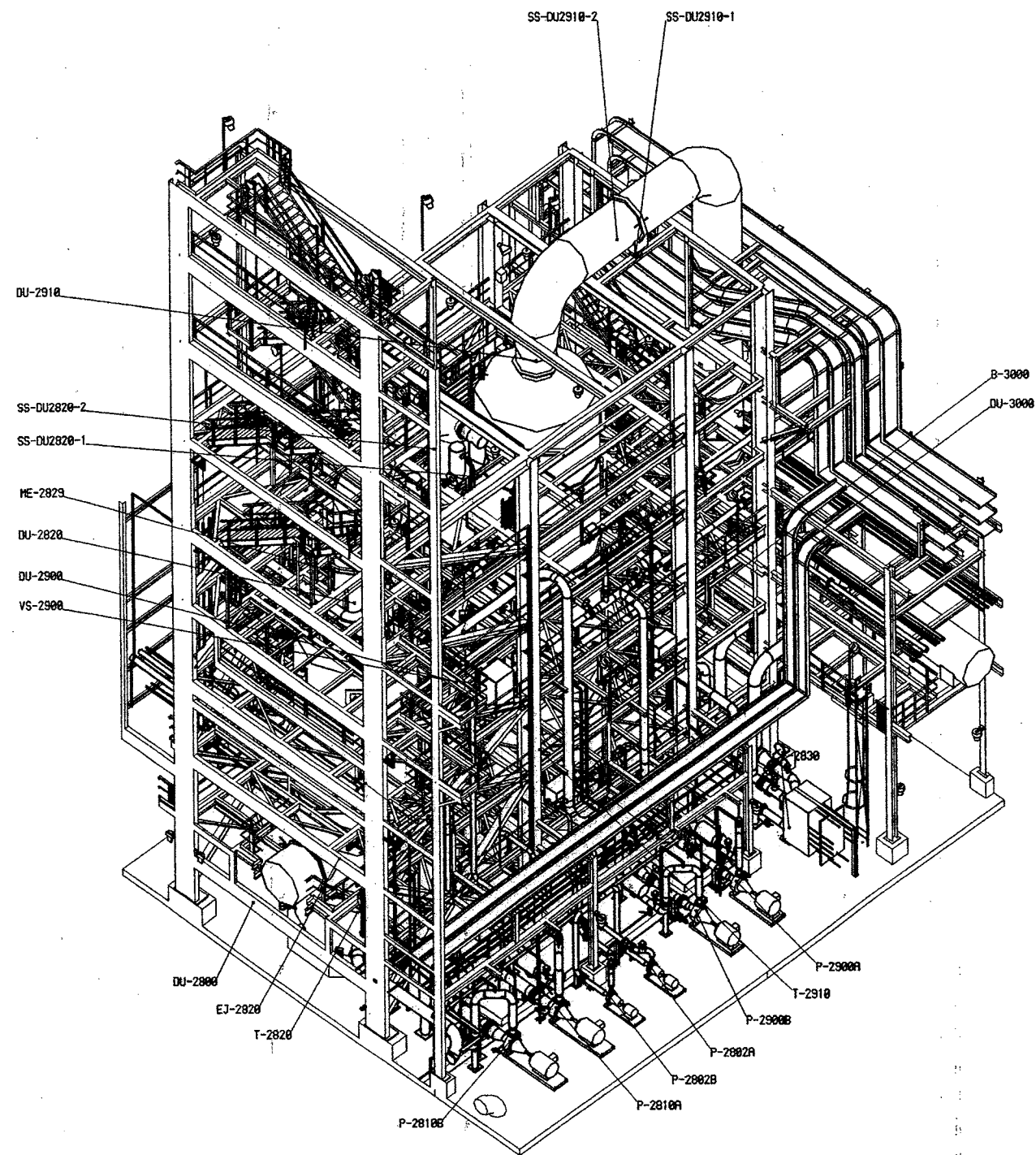
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A		GENERAL UPDATE				JEL	BG	RS	01/04/01													P.D.S.G.		09/01/01	P.E. SEAL								
																							CHECKED TEAM		09/01/01								
																							APPROVED RAJU SHAH		09/14/01								
																							PRD. ENGR. MICHAEL J. VAN HERK		09/14/01								
																							MFG. REP. S. SYLVESTER/A. POTOFF		09/14/01								
ISSUE NO.		REV		MATERIAL OR JOB SPEC		DOW		FAB		CONCT		REF		DATE ISSUED FOR												CHANGE NUMBER 960530		SCALE 1/8" = 1'-0"		B4-4400-960530			



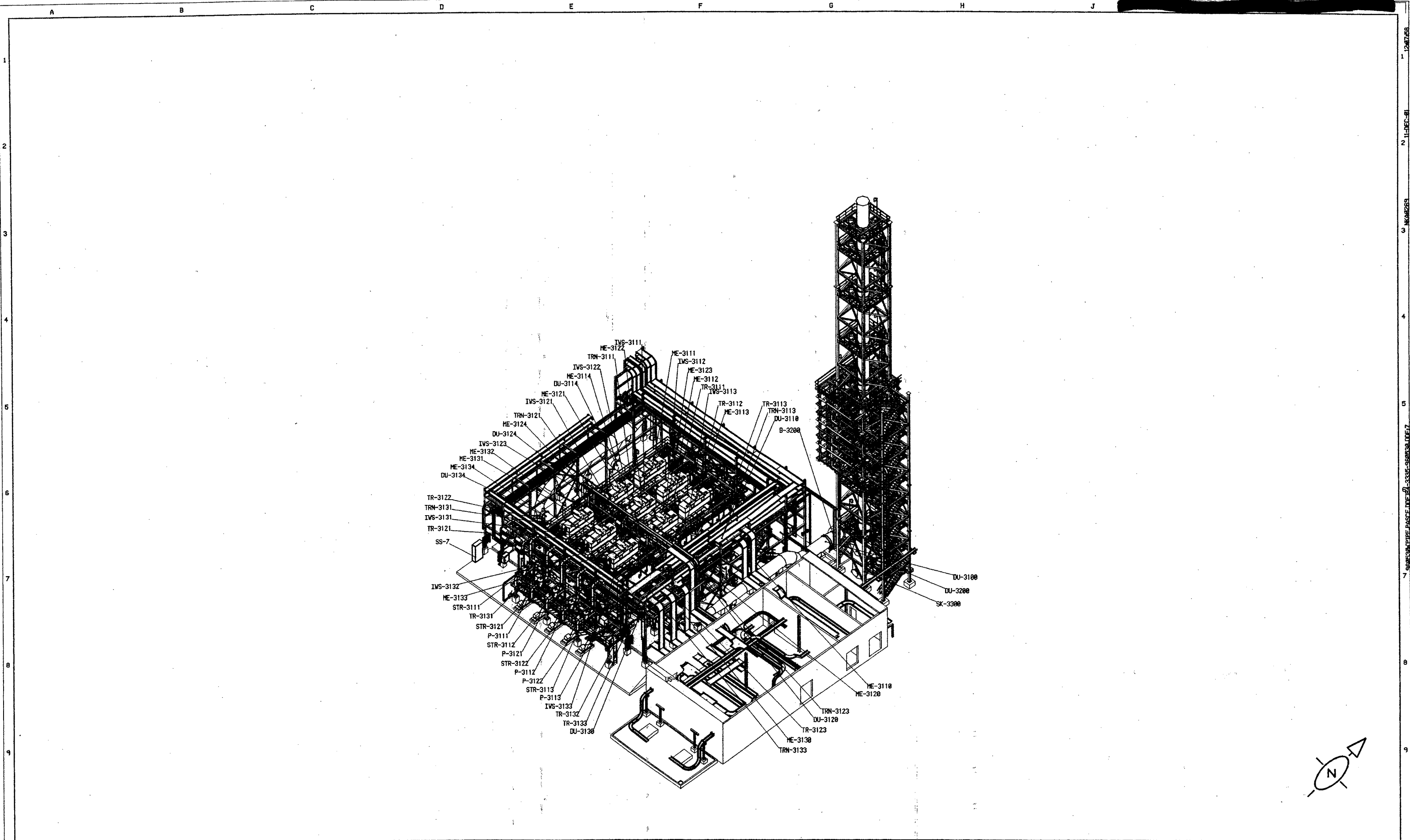
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REV. MARK	BY	CHK	APP	DATE	REV. MARK	BY	CHK	APP	DATE									TEAM	10/01			MICHIGAN DIVISION 830 INCINERATOR UPGRADE 32 BLDG.					
A	JEL	EG	RS	01/01/01														DRWN P.D.S.G.	10/01			MIDLAND, MICHIGAN					
																		CHECKED BOBBY GARCIA	10/01			SCC/QUENCH AREA PIPING ELEVATION ISO VIEW					
																		APPROVED RAJU SHAH	10/01								
																		PROJ. ENGR. MICHAEL J. VAN HERK	10/01								
																		MPR. REP. S.SYLVESTER/A.POTOFF	10/01			960530		SCALE	B4-3331-960530	REV. A	
																		DATE ISSUED FOR						PRINTED		VER.	



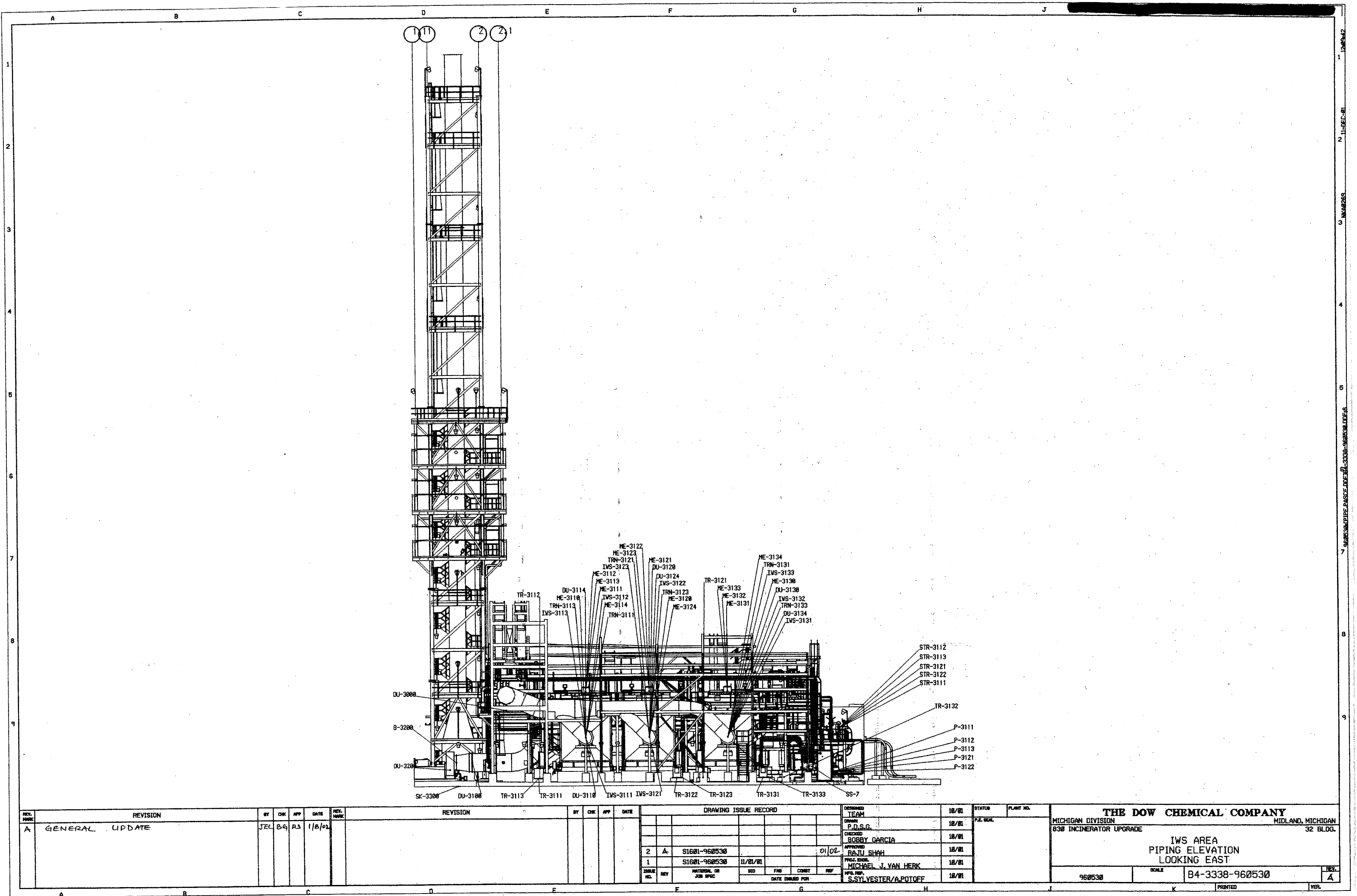
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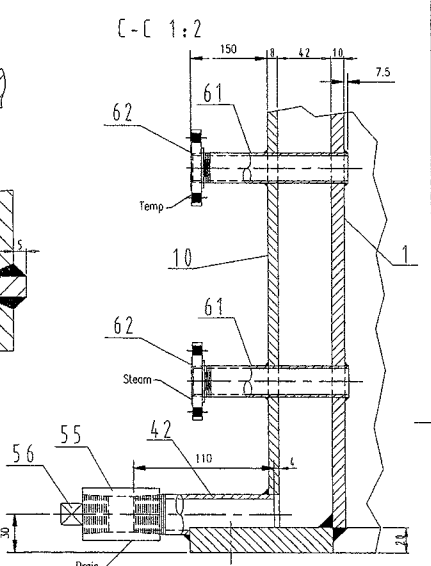
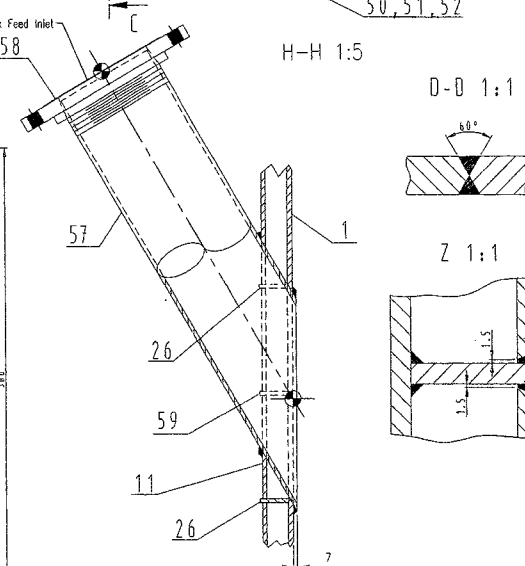
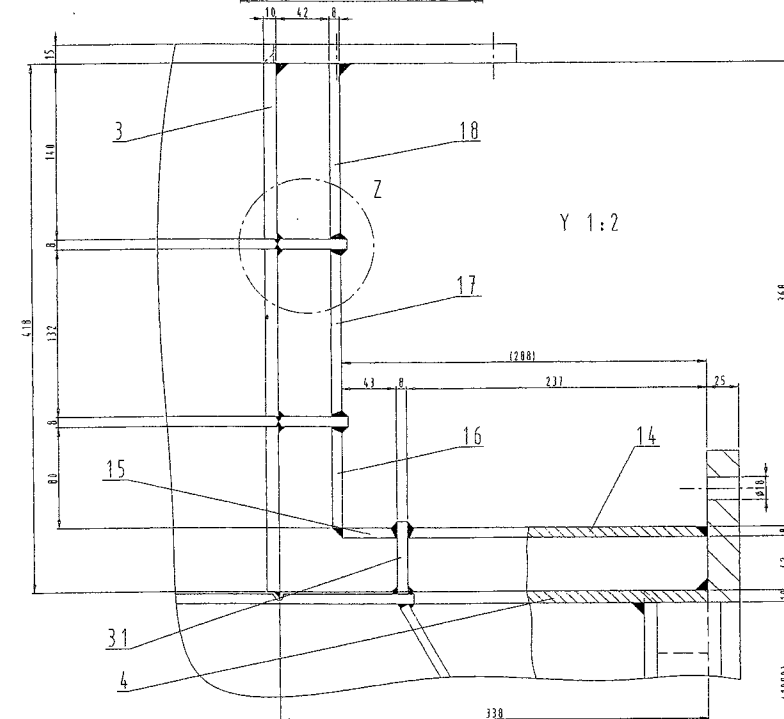
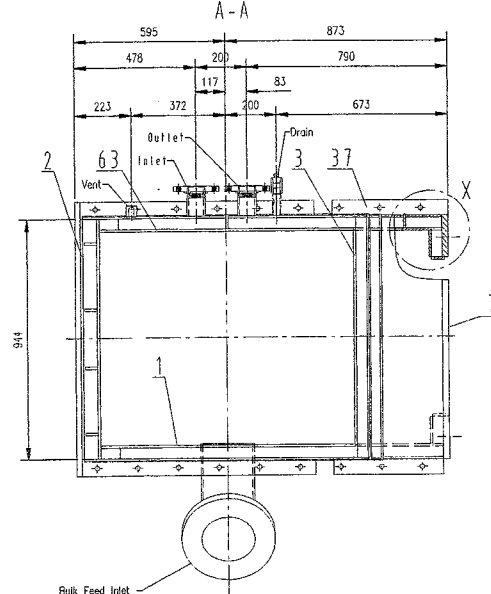
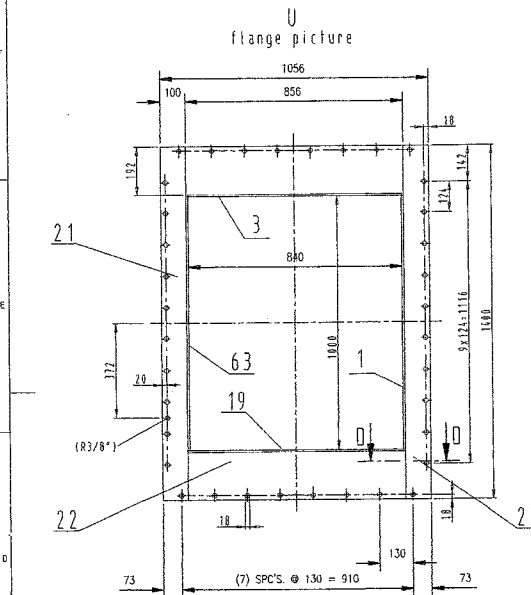
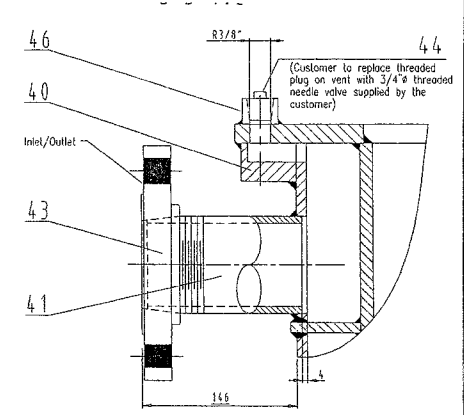
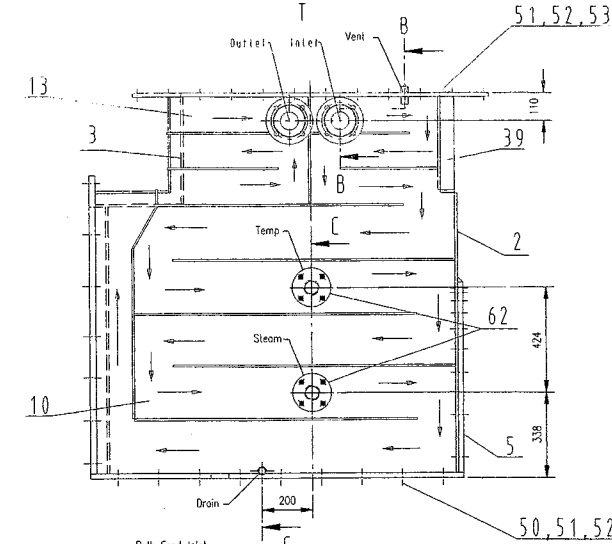
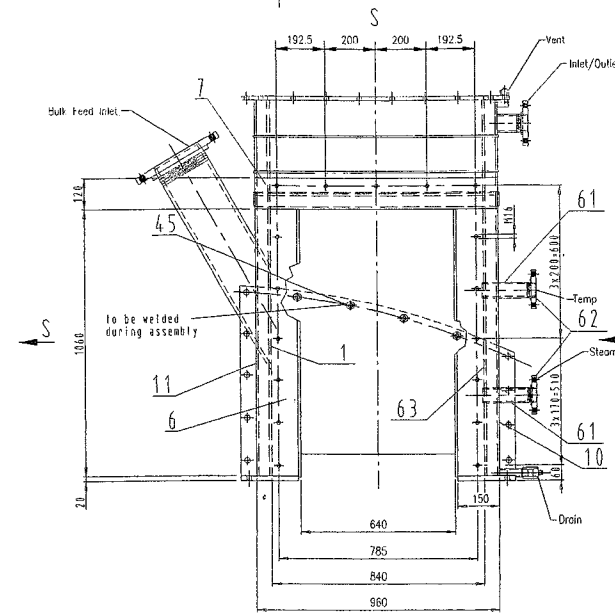
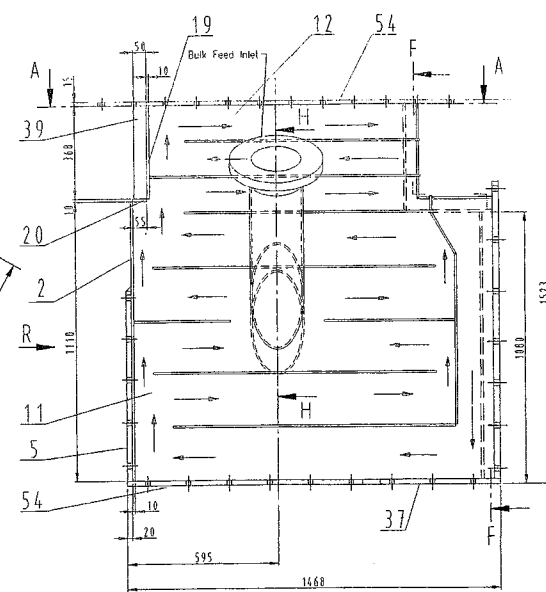
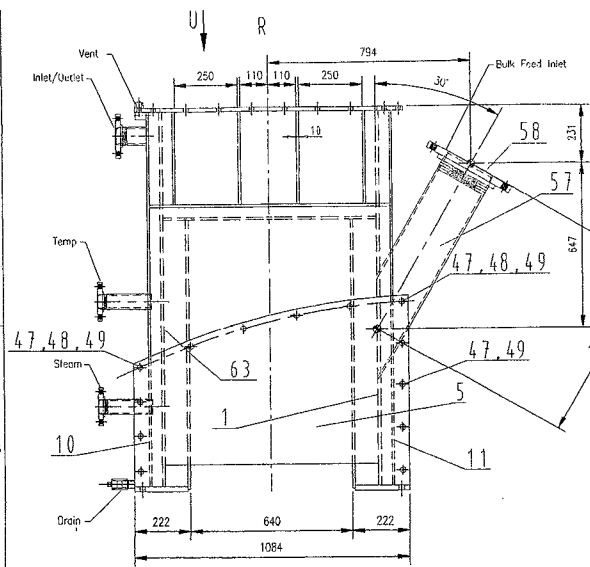
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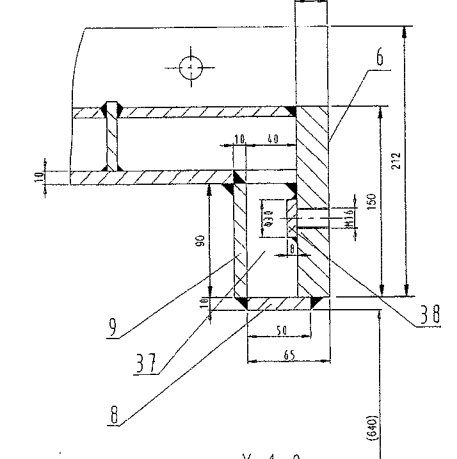
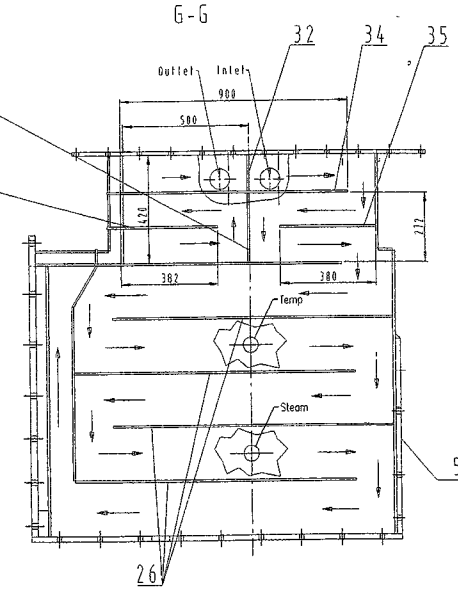
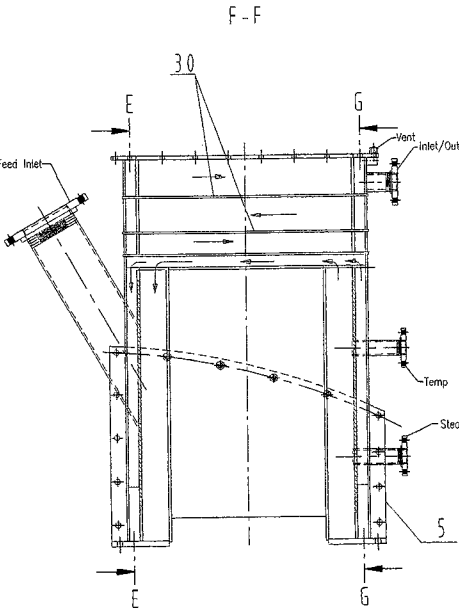
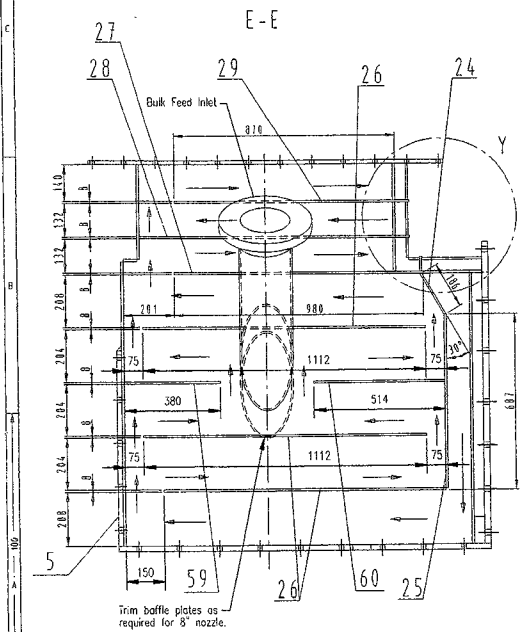
REVISION					REVISION					DRAWING ISSUE RECORD					DESIGNED		STATUS		PLANT NO.		THE DOW CHEMICAL COMPANY			
REV. MARK	BY	CHK	APP	DATE	REV. MARK	BY	CHK	APP	DATE								P.E. SEAL			MICHIGAN DIVISION 830 INCINERATOR UPGRADE IWS AREA PIPING ELEVATION ISO VIEW 32 BLDG.				
A	JEL	BA	RS	01/01/02																MIDLAND, MICHIGAN				
																		</						



REVISION					REVISION					DRAWING ISSUE RECORD					DESIGNED		10/01	STATUS		PLANT NO.		THE DOW CHEMICAL COMPANY		MICHIGAN DIVISION		MIDLAND, MICHIGAN	
BY	CHK	APP	DATE	REV. MARK	BY	CHK	APP	DATE							TEAM			P.E. SEAL				830 INCINERATOR UPGRADE					
A GENERAL UPDATE															P.D.S.G.		10/01					IWS AREA		PIPING ELEVATION		LOOKING EAST	
															BOBBY GARCIA		10/01					960530		SCALE		B4-3338-960530	
															APPROVED		10/01					REV. A		PRINTED		VER.	
															RAJU SHAH		10/01										
															MICHAEL J. VAN HERK		10/01										
															S.SYLVESTER/A.POTOFF		10/01										



system of water passage
(inner shell)



AS.BUILT

CENTRY FILE NAME: CE219-0010-2-B

CENTRY
CONSTRUCTORS & ENGINEERS

Salt Lake City, Utah

1	pl. 10 x 1413 x 1488	219-0011	63	Material	1543	
2	flange 2" 150 lb. screwed, raised face		62	C.S.	ANSI B16.5	
3	pipe 2" sch. 80 (thr'd. one end)		61	Material	ANSI B16.1	
4	1" 11.55 x 8 x 380		60	Material	1017	
5	1" 11.55 x 8 x 380		59	Material	1017	
6	flange 8" 150 lb. screwed, raised face		58	C.S.	ANSI B16.5	
7	1" 11.55 x 8 x 380		57	Material	ANSI B16.1	
8	1" 11.55 x 8 x 380		56	C.S.		
9	1" 11.55 x 8 x 380		55	C.S.		
10	1" 11.55 x 8 x 380		54	C.S.		
11	1" 11.55 x 8 x 380		53	C.S.		
12	1" 11.55 x 8 x 380		52	C.S.		
13	1" 11.55 x 8 x 380		51	C.S.		
14	1" 11.55 x 8 x 380		50	C.S.		
15	1" 11.55 x 8 x 380		49	C.S.		
16	1" 11.55 x 8 x 380		48	C.S.		
17	1" 11.55 x 8 x 380		47	C.S.		
18	1" 11.55 x 8 x 380		46	C.S.		
19	1" 11.55 x 8 x 380		45	C.S.		
20	1" 11.55 x 8 x 380		44	C.S.		
21	1" 11.55 x 8 x 380		43	C.S.		
22	1" 11.55 x 8 x 380		42	C.S.		
23	1" 11.55 x 8 x 380		41	C.S.		
24	1" 11.55 x 8 x 380		40	C.S.		
25	1" 11.55 x 8 x 380		39	C.S.		
26	1" 11.55 x 8 x 380		38	C.S.		
27	1" 11.55 x 8 x 380		37	C.S.		
28	1" 11.55 x 8 x 380		36	C.S.		
29	1" 11.55 x 8 x 380		35	C.S.		
30	1" 11.55 x 8 x 380		34	C.S.		
31	1" 11.55 x 8 x 380		33	C.S.		
32	1" 11.55 x 8 x 380		32	C.S.		
33	1" 11.55 x 8 x 380		31	C.S.		
34	1" 11.55 x 8 x 380		30	C.S.		
35	1" 11.55 x 8 x 380		29	C.S.		
36	1" 11.55 x 8 x 380		28	C.S.		
37	1" 11.55 x 8 x 380		27	C.S.		
38	1" 11.55 x 8 x 380		26	C.S.		
39	1" 11.55 x 8 x 380		25	C.S.		
40	1" 11.55 x 8 x 380		24	C.S.		
41	1" 11.55 x 8 x 380		23	C.S.		
42	1" 11.55 x 8 x 380		22	C.S.		
43	1" 11.55 x 8 x 380		21	C.S.		
44	1" 11.55 x 8 x 380		20	C.S.		
45	1" 11.55 x 8 x 380		19	C.S.		
46	1" 11.55 x 8 x 380		18	C.S.		
47	1" 11.55 x 8 x 380		17	C.S.		
48	1" 11.55 x 8 x 380		16	C.S.		
49	1" 11.55 x 8 x 380		15	C.S.		
50	1" 11.55 x 8 x 380		14	C.S.		
51	1" 11.55 x 8 x 380		13	C.S.		
52	1" 11.55 x 8 x 380		12	C.S.		
53	1" 11.55 x 8 x 380		11	C.S.		
54	1" 11.55 x 8 x 380		10	C.S.		
55	1" 11.55 x 8 x 380		9	C.S.		
56	1" 11.55 x 8 x 380		8	C.S.		
57	1" 11.55 x 8 x 380		7	C.S.		
58	1" 11.55 x 8 x 380		6	C.S.		
59	1" 11.55 x 8 x 380		5	C.S.		
60	1" 11.55 x 8 x 380		4	C.S.		
61	1" 11.55 x 8 x 380		3	C.S.		
62	1" 11.55 x 8 x 380		2	C.S.		
63	1" 11.55 x 8 x 380		1	C.S.		

Waterproof welded!
Test pressure 7 bar min 6 hours
Check the passage!
All non-dimensioned welds a=0,7t
(t=thinner steel plate)

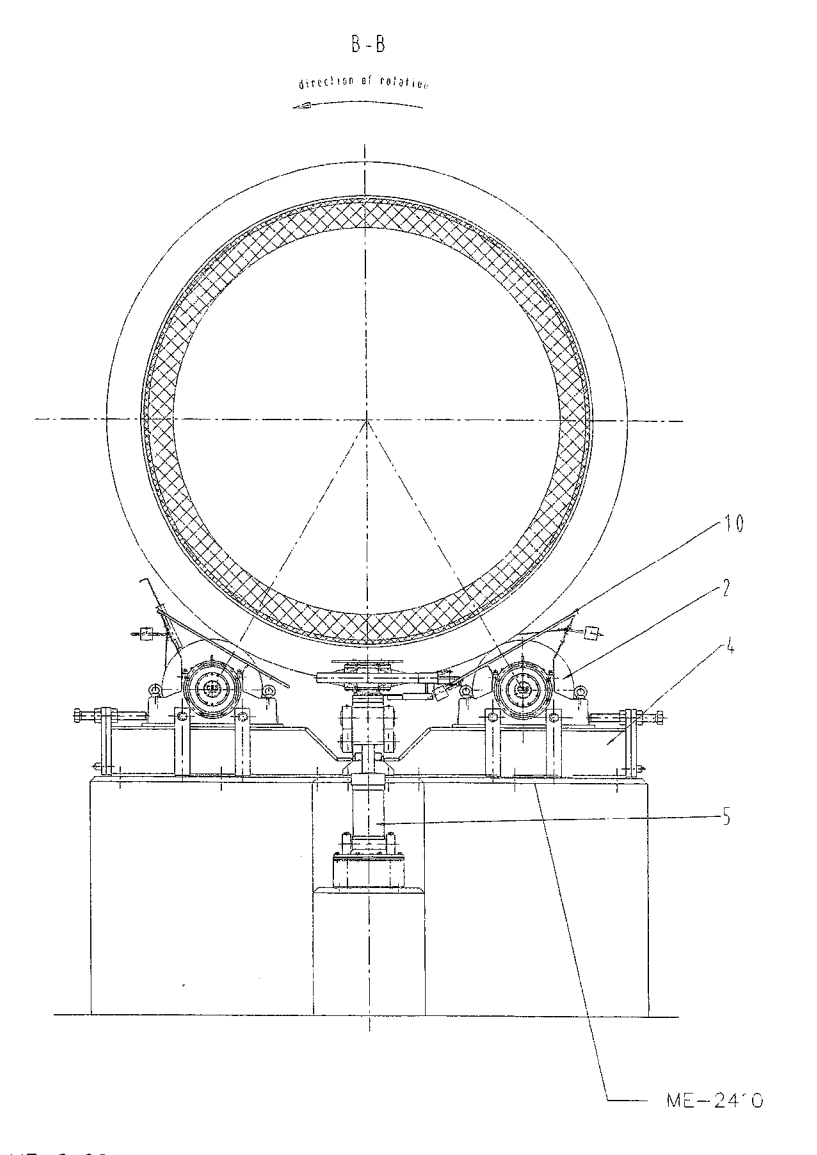
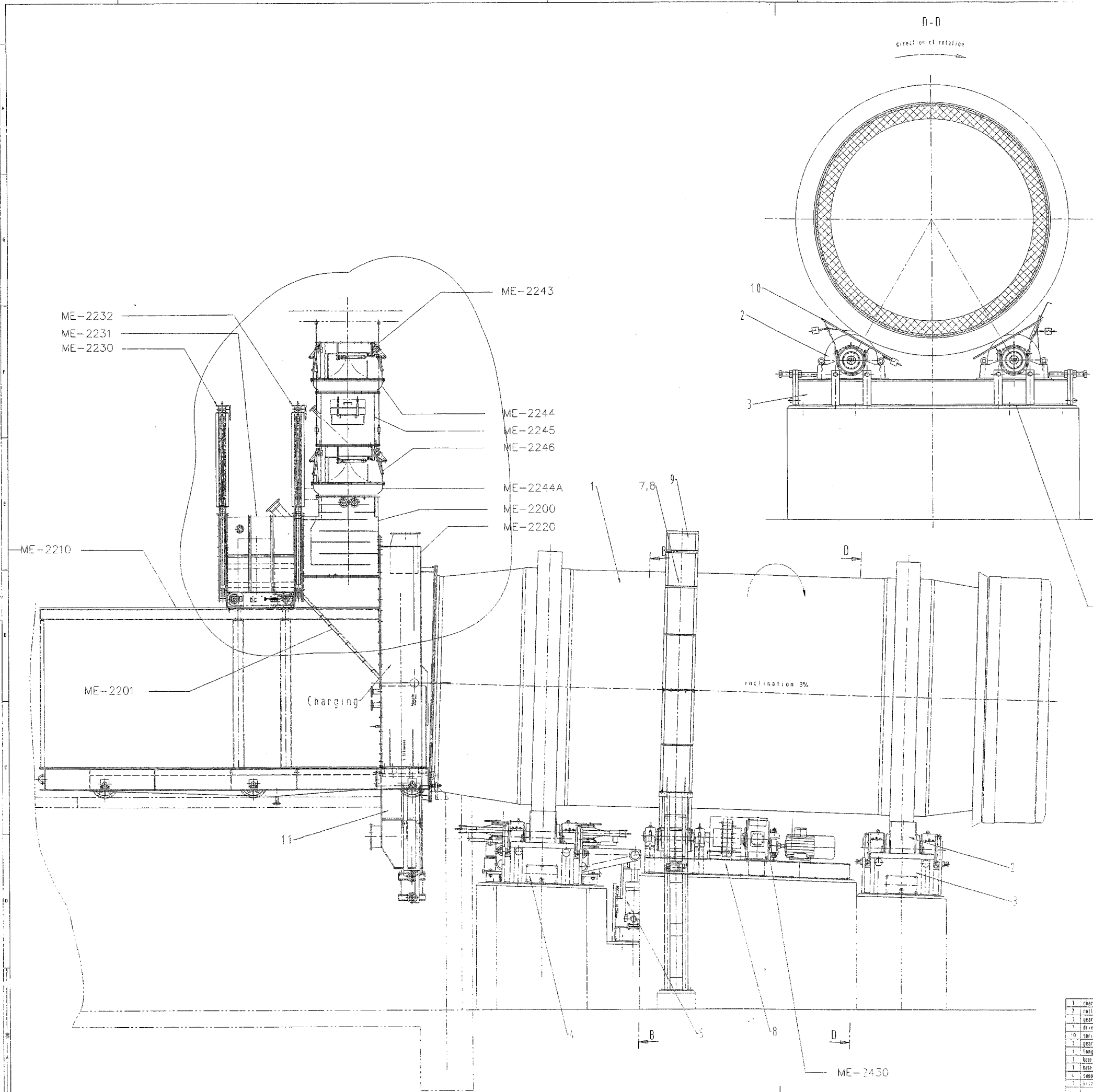
APPROVED
FOR FABRICATION
06-14-2001

06-14-2001

0	ISSUED FOR FABRICATION	EJC	KG	HF	6-14-0
1	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
2	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
3	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
4	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
5	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
6	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
7	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
8	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
9	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
10	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
11	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
12	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
13	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
14	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
15	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
16	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
17	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
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26	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
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32	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
33	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
34	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
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42	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
43	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
44	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
45	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
46	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
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61	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0
62	ISSUED FOR FABRICATION	EJC	KG	HF	5-21-0
63	ISSUED FOR APPROVAL	EJC	KG	HF	5-21-0

UPPER LIQUID COOLED FEED CHUTE
ASSEMBLY

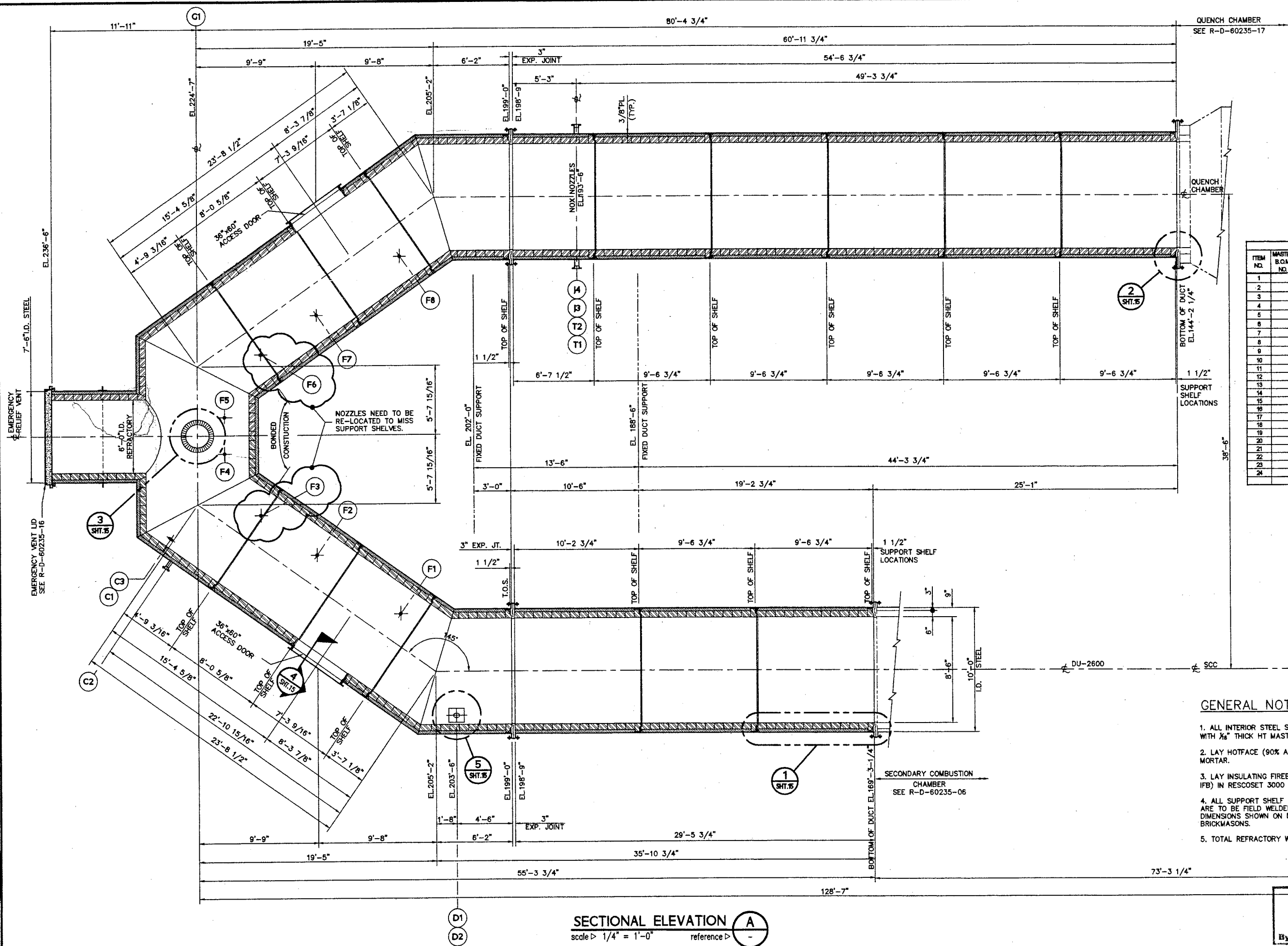
Supersedes:
Superseded by:
DIN A 0



AS.BUILT

1. charging revision		Form 5		07.07
2. drive and charging revision		Form 5		04.05
3. roller guard revision		Form 5		22.04
4. roller guard revision		Form 5		03.02
5. roller guard revision		Form 5		03.02
6. roller guard revision		Form 5		03.02
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97. roller guard revision		Form 5		03.02
98. roller guard revision		Form 5		03.02
99. roller guard revision		Form 5		03.02
100. roller guard revision		Form 5		03.02

TAG NO. ME-2400		DEPARTMENT	KFD
P.O. NO. 6341663		DATE	
DOW Chemicals Michigan		CES ORDER NUMBER	M00333001
830 Incinerator Upgrade		CES DRAWING NUMBER	000-0001
Project		Scale	1:25
Description		Author	W. J. C.
Rotary kiln 84.4x12m		Checker	W. J. C.
assembly drawing		Super	W. J. C.
Total weight 167852.7 kg		Superseded By	



NOZZLE SCHEDULE				
NO.	QTY	NAME	SIZE	REMARKS
T1	1	TEMP	4"	CORE DRILL
T2	1	TEMP	4"	CORE DRILL
J1	1	Nox INJECTOR	1"	CORE DRILL
J2	1	Nox INJECTOR	1"	CORE DRILL
J3	1	Nox INJECTOR	1"	CORE DRILL
J4	1	Nox INJECTOR	1"	CORE DRILL
G1	1	MANWAY	36" OD STL	23" ID BULLSEYE
F1	1	POWER SHOT	?	FUTURE
F2	1	POWER SHOT	?	FUTURE
F3	1	POWER SHOT	?	FUTURE
F4	1	POWER SHOT	?	FUTURE
F5	1	POWER SHOT	?	FUTURE
F6	1	POWER SHOT	?	FUTURE
F7	1	POWER SHOT	?	FUTURE
F8	1	POWER SHOT	?	FUTURE
D1	1	ANALYZER	6"	6" ID BULLSEYE
D2	1	ANALYZER	6"	6" ID BULLSEYE
C1	1	TEMP	3"	CORE DRILL
C2	1	TEMP	3"	CORE DRILL
C3	1	TEMP	3"	CORE DRILL

BILL OF MATERIALS					
ITEM NO.	MASTER B.O.M. NO.	NET QTY.	EXTRAS	TOTAL QUANTITY	DESCRIPTION
1	377	19	386	EA	80% Al ₂ O ₃ Firebrick 13.5x6x3 #1 Arch
2	191	19	210	EA	80% Al ₂ O ₃ Firebrick 13.5x6x3 #2 Arch
3	80	1	81	EA	80% Al ₂ O ₃ Firebrick 9x6x3 Straight
4	15759	198	15914	EA	80% Al ₂ O ₃ Firebrick 9x6x3 #1 Arch
5	6288	94	6382	EA	80% Al ₂ O ₃ Firebrick 9x6x3 #2 Arch
6	0	0	0	EA	80% Al ₂ O ₃ Firebrick 9x4.5x2.5 #3 Arch
7	70	7	77	EA	80% Al ₂ O ₃ Firebrick 9x4.5x2.5 #2 Arch
8	12	1	13	EA	80% Al ₂ O ₃ Firebrick 9x4.5x2.5 #1 Arch
9	2074	41	2115	EA	80% Al ₂ O ₃ Firebrick JTT Special Shape #11 9x6x3
10	1800	35	1835	EA	80% Al ₂ O ₃ Firebrick JTT Special Shape #12 9x6x3
11	17088	171	17257	EA	2300°F IFB 2300°F HD Board 1" Thick
12	284	6	290	SQ FT	2800°F OF Blanket 1" Thick (8 pct)
13	285	143	428	SQ FT	2800°F OF Blanket 2" Thick (8 pct)
14	325	163	488	SQ FT	2800°F OF Blanket 2" Thick (8 pct)
15	62	3	65	LF	CF Rope 1" Dia. (8 pct)
16	505	45	550	GAUS	HT Mastic 500
17	17308	885	18174	LBS	RescoCast 90P Mortar
18	8333	467	9000	LBS	RescoCast 3000 Mortar
19	7819	1381	9000	LBS	Vibrocast 97 Castable
20	986	134	1100	LBS	RescoCast RS-3 Castable
21	46	10	56	EA	310 SS 11" Lg. Focled V-Anchors
22	4	1	5	EA	310 SS 8" Lg. Focled V-Anchors
23	177	35	212	EA	310 SS 9" Lg. Focled V-Anchors
24					AA-22 S Castable

LEGEND	
	2300°F INSULATING FIREBRICK (BNZ PA-23)
	2300°F CERAMIC FIBER BOARD INSULATION
	KORUNDAL XD FIREBRICK (90% Al ₂ O ₃)
	RESCOCAST RS-3
	VIBROCAST 97 (90% Al ₂ O ₃)

- GENERAL NOTES**
- ALL INTERIOR STEEL SURFACES ARE TO BE COATED WITH $\frac{1}{8}$ " THICK HT MASTIC 500.
 - LAY HOTFACE (90% AL₂O₃) BRICK IN RESCOSET 90P MORTAR.
 - LAY INSULATING FIREBRICK (2800°F IFB & 2300°F IFB) IN RESCOSET 3000 MORTAR.
 - ALL SUPPORT SHELF AND THRUST PLATE BRACKETS ARE TO BE FIELD WELDED TO VESSEL SHELL AFTER DIMENSIONS SHOWN ON DRAWINGS ARE VERIFIED BY BRICKMASON.
 - TOTAL REFRACTORY WEIGHT = 568,000 LBS.

SECTIONAL ELEVATION A
scale > 1/4" = 1'-0" reference > -

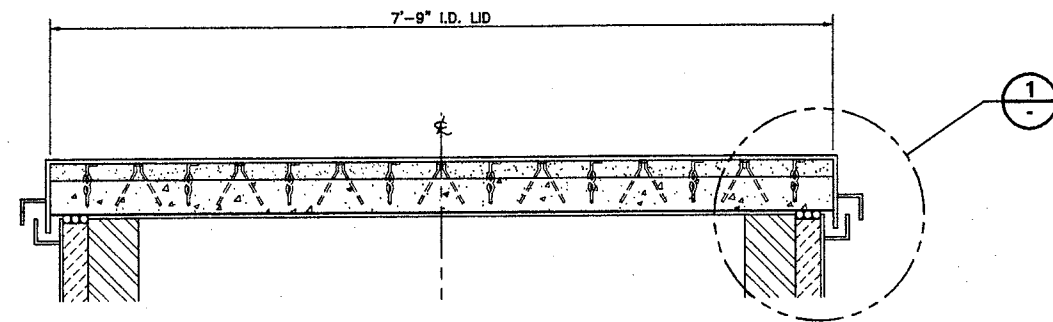
J. T. Thorpe & Son, Inc.
AS BUILT
By: *[Signature]* Date: *[Date]*

REFERENCE DRAWINGS		REVISIONS	
Δ	Δ	A > PRELIMINARY	date > 08/06/01
Δ	Δ	B > ISSUED FOR INFORMATION	date > 09/06/01
Δ	Δ	O > ISSUED FOR APPROVAL	date > 10/01/01
Δ	Δ	1 > ISSUED FOR CONSTRUCTION	date > 12/14/01
Δ	Δ	2 > AS BUILT	date > 01/24/03

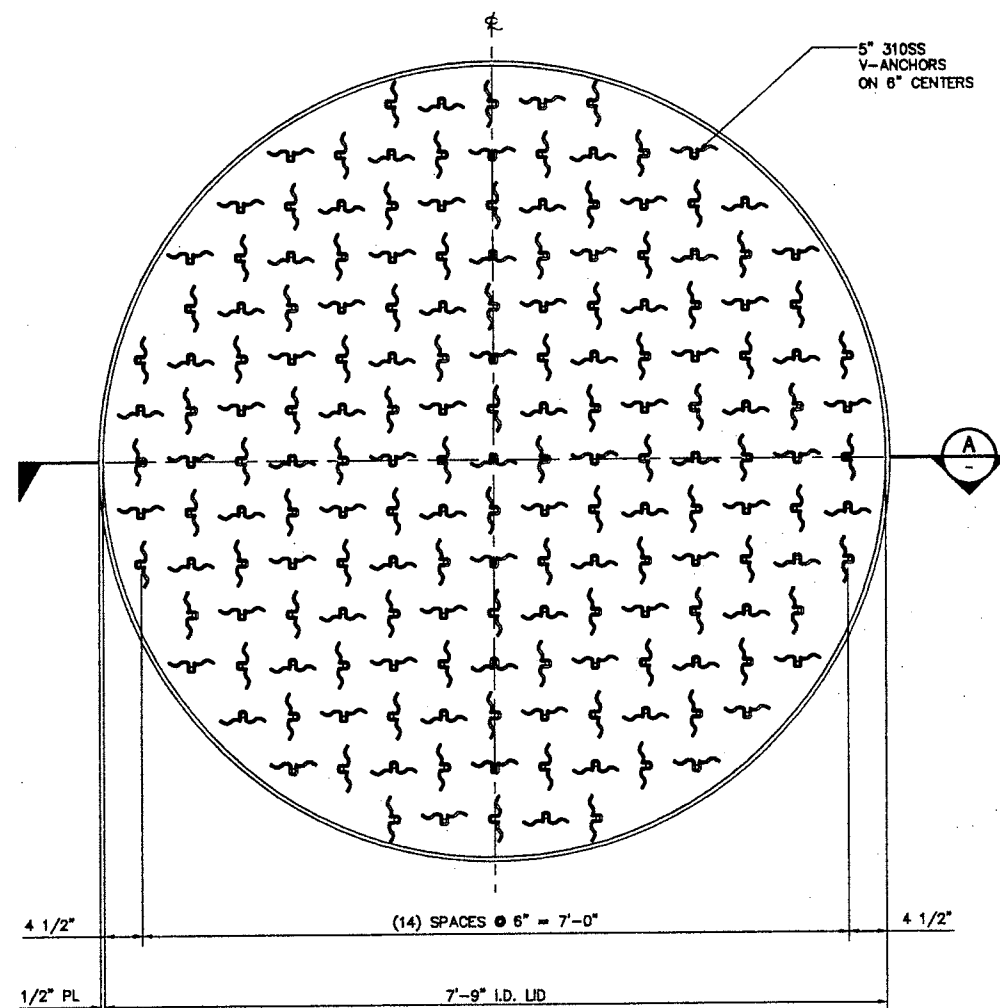
JTT **J. T. THORPE & SON, INC.**
Established 1906
ENGINEERS and CONTRACTORS
SAN FRANCISCO, CA • LOS ANGELES, CA • TUCSON, AZ • SALT LAKE CITY, UT

SECTIONAL ELEVATION
SCC HOT DUCT DU-2600 & R-2700
830 INCINERATOR UPGRADE
DOW CHEMICAL CO. - MIDLAND, MI.

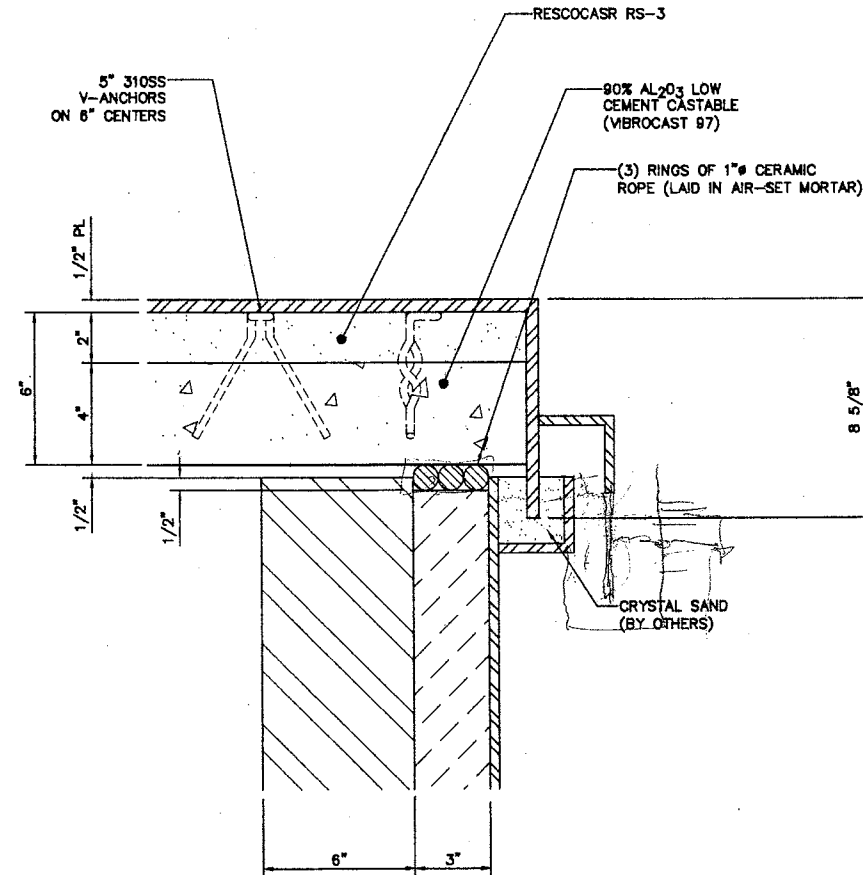
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scale > as noted	chk'd > BDG
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office size	job number
sheet	revision
R-D-60235-14-2	



SECTIONAL ELEVATION A
scale > 1" = 1'-0" reference > 1



EMERGENCY VENT LID
scale > 1" = 1'-0"



DETAIL 1
scale > 3" = 1'-0" reference > 1

J. T. Thorpe & Son, Inc.
AS BUILT
By: *[Signature]* Date: *1/26/03*

REFERENCE DRAWINGS		REVISIONS	
> *	>	0> ISSUED FOR APPROVAL	date > 10/05/01
>	>	1> ISSUED FOR CONSTRUCTION	date > 12/14/01
>	>	2> AS BUILT	date > 01/24/03
>	>	3>	date >
>	>	4>	date >



J. T. THORPE & SON, INC.
Established 1906

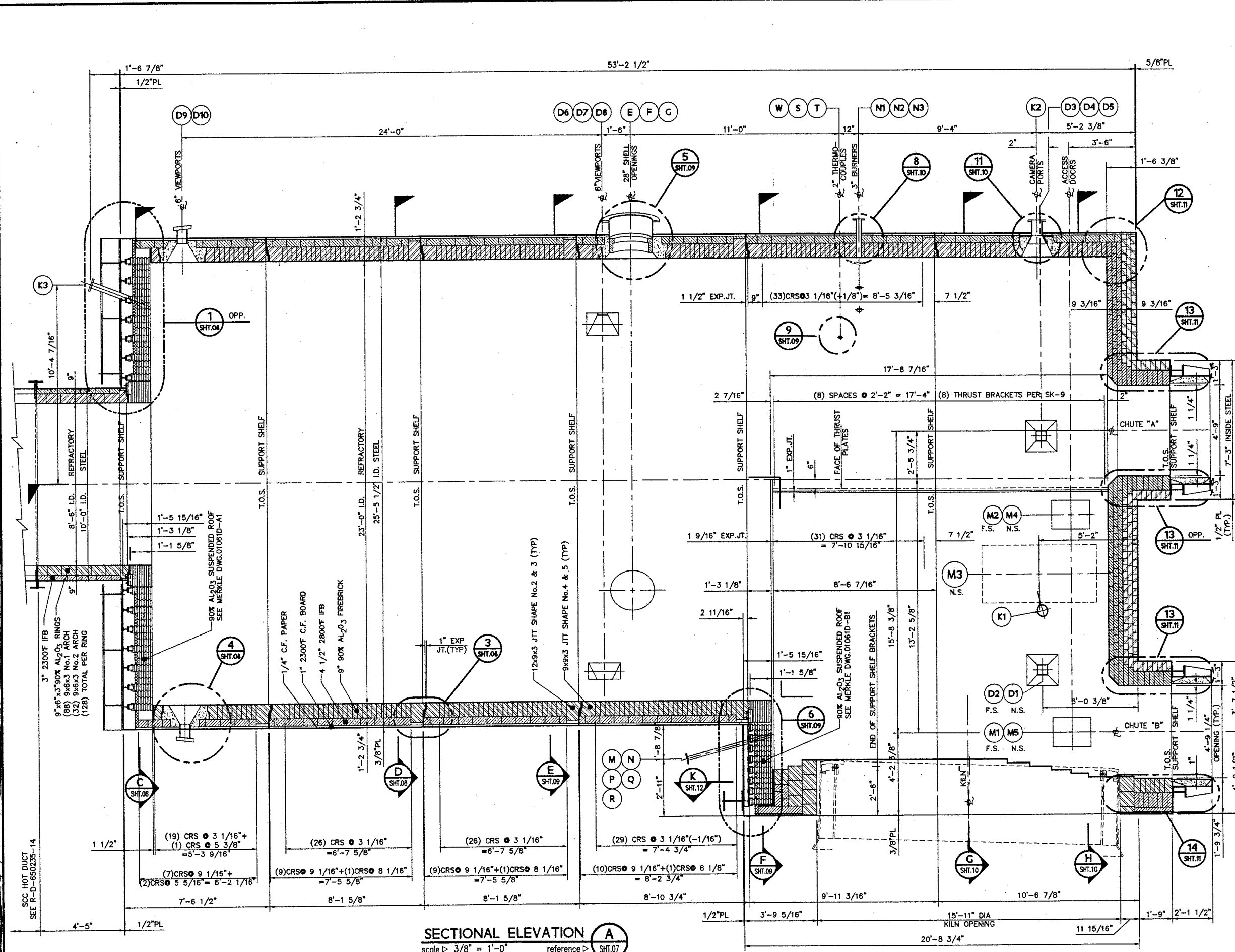
ENGINEERS and CONTRACTORS

SAN FRANCISCO, CA • LOS ANGELES, CA • TUCSON, AZ • SALT LAKE CITY, UT

EMERGENCY VENT LID DETAILS
SCC HOT DUCT DU-2600 & R-2700

830 INCINERATOR UPGRADE
DOW CHEMICAL CO. - MIDLAND, MI.

date > 10/03/01	pmgr > BDG
scale > as noted	chk'd > BDG
drawn > TKO	appr'd >
office size	job number
sheet	revision
R-D-60235-16-2	




BILL OF MATERIALS						
ITEM NO.	MASTER BOM NO.	NET QTY.	EXTRAS	TOTAL QUANTITY	MATERIAL	DESCRIPTION
1		37	4	41	EA 90% Al ₂ O ₃ Firebrick	12 x 9 x 3 Straight
2		47	5	52	EA 90% Al ₂ O ₃ Firebrick	12 x 9 x 3 #2 Arch
3		97	10	107	EA 90% Al ₂ O ₃ Firebrick	12 x 6 x 3 Straight
4		9	1	10	EA 90% Al ₂ O ₃ Firebrick	9 x 9 x 3 Straight
5	698	35	733	EA 90% Al ₂ O ₃ Firebrick	9 x 9 x 3 #1 Wedge	
6	24	2	26	EA 90% Al ₂ O ₃ Firebrick	9 x 9 x 3 #2 Wedge	
7	68	7	75	EA 90% Al ₂ O ₃ Firebrick	9 x 6.75 x 3 Straight	
8	480	23	483	EA 90% Al ₂ O ₃ Firebrick	9 x 6.75 x 3 #1 Wedge	
9	10	1	11	EA 90% Al ₂ O ₃ Firebrick	9 x 8.75 x 3 #2 Wedge	
10	11701	117	11818	EA 90% Al ₂ O ₃ Firebrick	9 x 6 x 3 Straight	
11	928	5	533	EA 90% Al ₂ O ₃ Firebrick	9 x 8 x 3 #1 Arch	
12	192	10	202	EA 90% Al ₂ O ₃ Firebrick	9 x 8 x 3 #2 Arch	
13	227	11	238	EA 90% Al ₂ O ₃ Firebrick	9 x 8 x 3 #1 Wedge	
14	11100	111	11211	EA 90% Al ₂ O ₃ Firebrick	9 x 6 x 3 #1 Key	
15	546	27	573	EA 90% Al ₂ O ₃ Firebrick	9 x 6 x 3 B21280-3 Anchor Brick	
16	68	7	73	EA 90% Al ₂ O ₃ Firebrick	9 x 4.5 x 3 Straight	
17	43	4	47	EA 90% Al ₂ O ₃ Firebrick	9 x 4.5 x 3 #1 Wedge	
18	2	0	2	EA 90% Al ₂ O ₃ Firebrick	9 x 4.5 x 3 #2 Wedge	
19	62	6	68	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #1 12 x 9 x 3	
20	113	6	119	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #2 12 x 9 x 3	
21	1301	39	1340	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #3 12 x 9 x 3	
22	712	36	748	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #4 9 x 9 x 3	
23	933	28	961	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #5 9 x 9 x 3	
24	78	8	86	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #6 12 x 6 x 3	
25	295	15	310	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #7 9 x 6 x 3	
26	126	8	132	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #8 9 x 6 x 3	
27	119	8	125	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #9 9 x 6 x 3	
28	129	8	135	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #10 9 x 6 x 3	
29	122	3	128	EA 90% Al ₂ O ₃ Firebrick	JTT Special Shape #11 8 x 6 x 3	
30	710	21	731	EA 90% Al ₂ O ₃ Firebrick	13.5 x 4.5 x 3 Straight	
31	8481	97	8578	EA 90% Al ₂ O ₃ Firebrick	9 x 4.5 x 3 Straight	
32	204	10	214	EA 90% Al ₂ O ₃ Firebrick	9 x 4.5 x 3 B21280-3 Anchor Brick	
33	64	6	70	EA 2800-°F IFB	9 x 6.75 x 3 Straight	
34	19225	192	19417	EA 2800-°F IFB	9 x 4.5 x 3 Straight	
35	5813	87	5900	EA 2800-°F IFB	9 x 4.5 x 3 #1 Arch	
36	260	13	273	EA 2800-°F IFB	9 x 4.5 x 2.5 Straight	
37	904	27	931	EA 2300-°F IFB	9 x 6 x 3 Straight	
38	5176	52	5228	EA 2300-°F IFB	9 x 4.5 x 3 Straight	
39	24399	2501	26900	LBS	90% Al ₂ O ₃ Mortar (Resocel 90P)	
40	3698	403	4100	LBS	90% Al ₂ O ₃ Mortar (Adacor 70)	
41	15721	1879	17400	LBS	SuperDuty Air Set Mortar (Resocel 3000)	
42	28901	2899	29600	LBS	90% Al ₂ O ₃ Castable (Vibrocast 97)	
43	983	137	700	LBS	Resocast RS-3	
44	8012	888	9700	LBS	AA-228 Castable	
45	10453	1047	11500	LBS	Silicon Carbide Castable (CN-183)	
46	579	71	850	GALS	HT-500 Mastic	
47	3909	782	4691	SQ.FT.	2300-°F HD Board	1" Thick
48	466	93	859	SQ.FT.	2300-°F HD Board	2" Thick
49	5855	2928	8783	SQ.FT.	C.F. Paper	1/4" Thick
50	811	256	787	SQ.FT.	2800-°F C.F. Blanket	1/2" Thick
51	877	439	1318	SQ.FT.	2800-°F C.F. Blanket	1" Thick
52	27	5	32	EA	310 SS	12" Lg. JTT X-mas Tree Anchors
53	51	10	61	EA	310 SS	12" Lg. Foisted V-Anchors
54	40	8	48	EA	310 SS	8" Lg. Foisted V-Anchors
55	441	88	529	EA	310 SS	12" Lg. Foisted V-Anchors
56	183	38	222	EA	310 SS	7" Lg. Marine Anchor
57	102	20	122	EA	310 SS	7.25" Lg. Marine Anchor
58	30	6	36	EA	310 SS	14" Lg. Marine Anchor
59	10	2	12	EA	310 SS	18" Lg. Marine Anchor
60	4	1	5	EA	310 SS	18.25" Lg. Marine Anchor
61	88	13	79	EA	310 SS	20.5" Lg. Marine Anchor
62	406	81	488	EA	Carbon Steel	U-Clp

- LEGEND**
- 2300°F INSULATING FIREBRICK (BNZ-PA 23)
 - 2800°F INSULATING FIREBRICK (BNZ-28)
 - 2300°F CERAMIC FIBER BOARD INSULATION
 - UFALA FIREBRICK (60% AL₂O₃)
 - KORUNDAL XD FIREBRICK (90% AL₂O₃)
 - 2200°F INSULATING CASTABLE (RESCOCAST RS-3)
 - LOW CEMENT CASTABLE (90% AL₂O₃) (VIBROCAST 97)
 - AA-22 S CASTABLE

- GENERAL NOTES**
- ALL INTERIOR STEEL SURFACES ARE TO BE COATED WITH $\frac{1}{8}$ " THICK HT-500 MASTIC.
 - $\frac{1}{4}$ " CERAMIC FIBER PAPER AGAINST VESSEL SHELL IS TO BE INSTALLED OVER ASPHALTIC MASTIC WITH STAGGERED BUTT JOINTS.
 - LAY HOTFACE (90% AL₂O₃) BRICK IN RESCOJET 90P MORTAR.
 - LAY HOTFACE (60% AL₂O₃) BRICK IN ADACOR 70 MORTAR.
 - LAY INSULATING FIREBRICK (2800°F IFB & 2300°F IFB) IN RESCOJET 3000 MORTAR.
 - ALL SUPPORT SHELF AND THRUST PLATE BRACKETS ARE TO BE FIELD WELDED TO VESSEL SHELL AFTER DIMENSIONS SHOWN ON DRAWINGS ARE VERIFIED BY BRICKMASON.
 - TOTAL REFRACTORY WEIGHT = 990,000 LBS.

SECTIONAL ELEVATION A
 scale > 3/8" = 1'-0" reference > SHT.07
 S.C.C. UNIT SHOWN ON SIDE LOOKING WEST
 (INSTALLED IN VERTICAL POSITION)

REFERENCE DRAWINGS		REVISIONS	
Δ		A> PRELIMINARY	date > 08/06/01
Δ		B> FOR INFORMATION	date > 08/22/01
Δ		O> ISSUED FOR APPROVAL	date > 09/24/01
Δ		1D> ISSUED FOR CONSTRUCTION	date > 12/14/01
Δ		2D> AS BUILT	date > 01/24/03

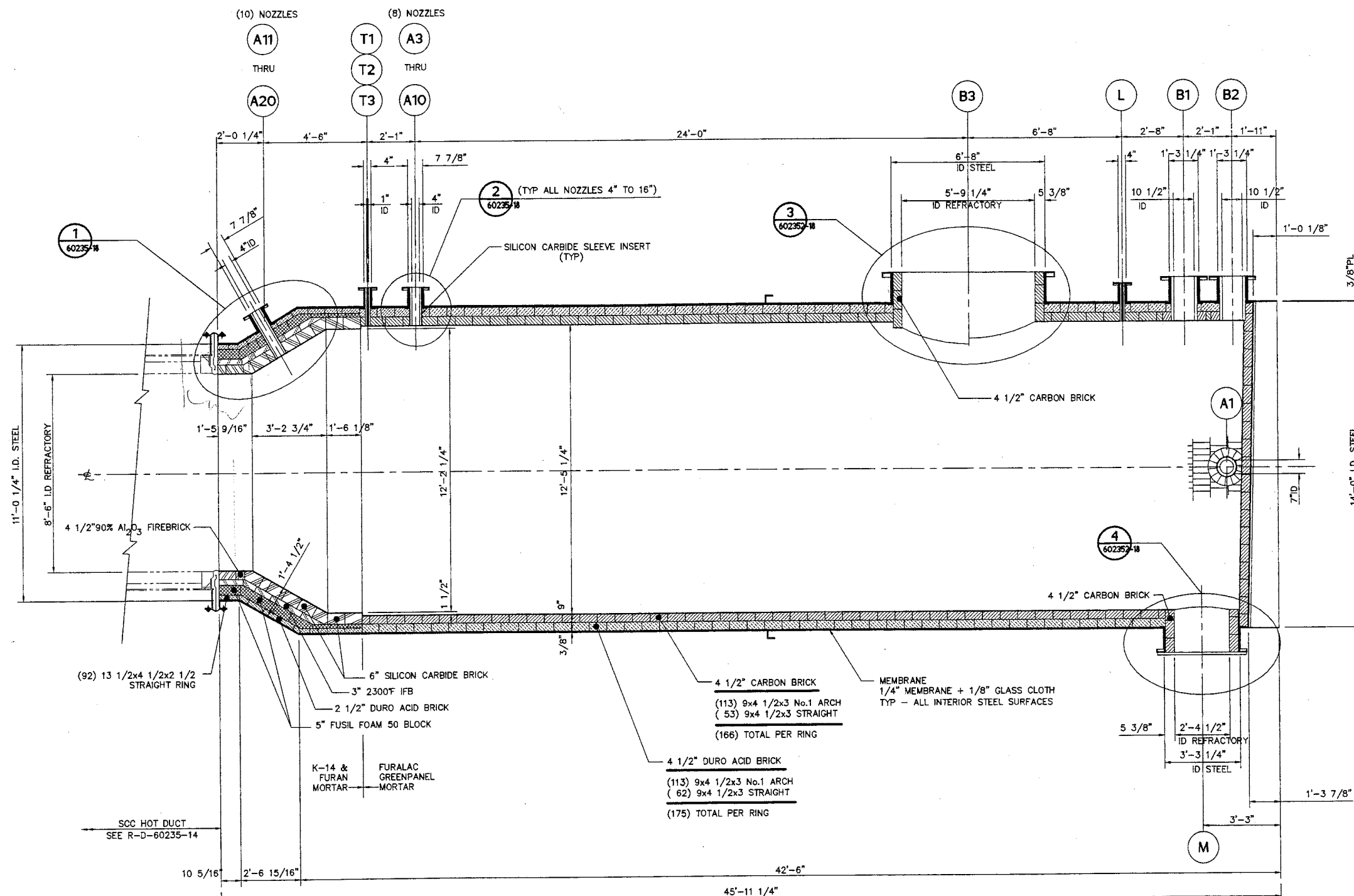


J. T. THORPE & SON, INC.
 Established 1906
 ENGINEERS and CONTRACTORS
 SAN FRANCISCO, CA • LOS ANGELES, CA • TUCSON, AZ • SALT LAKE CITY, UT

**SECTIONAL ELEVATION
 SECONDARY COMBUSTION CHAMBER IN-2600**

830 INCINERATOR UPGRADE
 DOW CHEMICAL CO. - MIDLAND, MI.

date > 07/20/01	pmgr > BDG
scale > as noted	chk > BDG
drawn > TKO	appr > d
office size	job number
sheet	revision
R-D-60235-06-2	



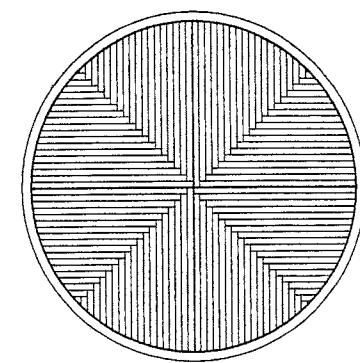
- LEGEND**
- FUSIL FOAM 50 BLOCK
 - DURO ACID BRICK
 - KORUNDAL XD FIREBRICK (90% Al₂O₃)
 - SILICON CARBIDE
 - CARBON BRICK
 - 2300°F IFB

- GENERAL NOTES**
- ALL INTERIOR STEEL SURFACES ARE TO BE ABRASIVE GRIT BLASTED TO SSPC-SP 10 AND COATED WITH $\frac{1}{4}$ " SAUERISEN 88 MEMBRANE PLUS $\frac{1}{8}$ " GLASS CLOTH AND FURAN RESIN.
 - ALL NOZZLES ARE TO RECEIVE FRP LINING PER DETAIL 2 / 60235-18 PRIOR TO INSTALLATION OF SAUERISEN 88 MEMBRANE.
 - LAY (90% Al₂O₃) FIREBRICK IN K14 MORTAR.
 - LAY FUSIL FOAM 50 BLOCK IN K14 AND FURAN MORTAR AS SHOWN IN DETAIL 1 / 60235-18.
 - LAY SILICON CARBIDE BRICK IN K14 AND FURAN MORTAR AS SHOWN IN DETAIL 1 / 60235-18.
 - LAY ALL DURO ACID BRICK AND CARBON BRICK IN GREEN PANEL FURAN MORTAR.
 - SET ALL SILICON CARBIDE NOZZLES SLEEVES IN FURAN MORTAR.
 - TOTAL REFRACTORY WEIGHT = 234,000 LBS.

BILL OF MATERIALS						
ITEM NO.	MASTER S.O.M. NO.	NET QTY.	EXTRAS	TOTAL QUANTITY	MATERIAL	DESCRIPTION
1	3499	82	3551	EA	Carbon Brick	9x4.5x3 Straight
2	5947	89	6036	EA	Carbon Brick	9x4.5x3 #1 Arch
3	138	14	152	EA	Carbon Brick	9x4.5x3 #2 Arch
4	77	8	85	EA	Carbon Brick	9x4.5x2.5 #1 Arch
5	146	15	161	EA	Carbon Brick	9x4.5x2.5 #2 Arch
6	184	18	202	EA	Carbon Brick	9x4.5x2.5 #3 Arch
7	25	3	28	EA	Carbon Brick	13.5x4.5x3 #1 Arch
8	16	2	18	EA	Carbon Brick	13.5x4.5x3 #2 Arch
9	3162	63	3225	EA	Carbon Brick	9x4.5x3 Straight
10	5763	115	5878	EA	Duro Acid Brick	9x4.5x3 #1 Arch
11	733	73	806	EA	Duro Acid Brick	9x4.5x2.5 Straight
12	263	26	289	EA	Duro Acid Brick	9x4.5x2.5 #1 Key
13	93	9	102	EA	Duro Acid Brick	13.5x4.5x2.5 Straight
14	190	19	209	EA	Silicon Carbide Brick	9x4.5x2.5 #3 Arch
15	30	3	33	EA	Silicon Carbide Brick	9x6x3 Straight
16	302	30	332	EA	Silicon Carbide Brick	9x6x3 #1 Arch
17	390	39	429	EA	Silicon Carbide Brick	9x6x3 #2 Arch
18	332	33	365	EA	Silicon Carbide Brick	9x6x3 #1 Wedge
19	174	17	191	EA	Silicon Carbide Brick	9x6x3 #2 Wedge
20	4	1	5	EA	90% Al ₂ O ₃ Firebrick	13.5x4.5x3 Straight
21	113	11	124	EA	90% Al ₂ O ₃ Firebrick	13.5x4.5x3 #1 Arch
22	294	29	323	EA	2300°F IFB	9x4.5x3 Straight
23	294	29	323	EA	2300°F IFB	9x4.5x3 #1 Key
24	78	8	86	EA	2300°F IFB	13.5x4.5x3 Straight
25	1	0	1	EA	Silicon Carbide	10" OD x 7" ID x 19" Long Sleeve
26	10	1	11	EA	Silicon Carbide	6" OD x 4" ID x 27" Long Sleeve
27	8	1	9	EA	Silicon Carbide	6" OD x 4" ID x 19" Long Sleeve
28	2	0	2	EA	Silicon Carbide	13.5" OD x 10.5" ID x 19" Long Sleeve
29	4	1	5	EA	Silicon Carbide	2.5" OD x 1" ID x 19" Long Sleeve
30	201	20	221	EA	Fusil Foam 50 Block	9x18x4.5
31	80	8	88	EA	Fusil Foam 50 Block	6x18x4.6
32	70	10	80	LBS	90% Al ₂ O ₃ Mortar	
33	7860	811	8471	LBS	Green Panel Mortar - Powder	
34	3144	244	3388	LBS	Green Panel Mortar - Liquid	
35	257	95	352	LBS	Furalac FN Mortar - Powder	
36	143	53	196	LBS	Furalac FN Mortar - Liquid	
37	709	141	850	LBS	Silicon Carbide Mortar	
38	890	155	1045	LBS	K-14 Mortar - Powder	
39	358	82	418	LBS	K-14 Mortar - Liquid	
40	333	67	400	GALS	Sauerisen 88 Membrane	
41	2127	1173	3300	Sq Ft	1/8" X 1/8" Fiberglass Cloth (1 1/2 Oz Mat)	
42	1758	242	2000	LBS	Furalac Membrane Resin	
43	6	1	7	GALS	Furalac Membrane Hardener	
44						

NOZZLE SCHEDULE						
NO.	QTY	SIZE	ID LINING	SILICON CARBIDE SLEEVE	BULLSEYE BRICK	
					9x4.5x2.5 No.2 ARCH	9x4.5x2.5 No.3 ARCH
A1	1	12"	7"	10" OD x 7" ID X 19" Long	(10) EA.	(14) EA.
A3 Thru A10	8	8"	4"	5 3/4" OD x 4" ID X 19" Long	-	(19) EA.
A11 Thru A20	10	8"	4"	5 3/4" OD x 4" ID X 27" Long	-	(19) EA.
B1	1	16"	11 1/2"	13 1/2" OD x 11 1/2" ID X 19" Long	(20) EA.	(9) EA.
B2	1	16"	11 1/2"	13 1/2" OD x 11 1/2" ID X 19" Long	(20) EA.	(9) EA.
B3	1	81"	5'-9 1/4"	NONE - 4 1/2" CARBON BRICK	SEE DETAIL 3, SHT. 60235-18	
L	1	4"	1 5/16"	2 3/8" OD x 1 5/16" ID X 19" Long	N/A	N/A
M	1	40"	2'-4 1/2"	NONE - 4 1/2" CARBON BRICK	SEE DETAIL 4, SHT. 60235-18	
T1 Thru T3	3	4"	1 5/16"	2 3/8" OD x 1 5/16" ID X 19" Long	N/A	N/A

SECTIONAL ELEVATION A
 scale > 3/8" = 1'-0" reference > -
 QUENCH CHAMBER SHOWN ON SIDE
 (INSTALLED IN VERTICAL POSITION)



FLOOR PLAN
 scale > 1/4" = 1'-0"

REFERENCE DRAWINGS		REVISIONS	
> *	>	A > PRELIMINARY	date > 08/06/01
>	>	O > ISSUED FOR APPROVAL	date > 10/01/01
>	>	1 > ISSUED FOR CONSTRUCTION	date > 12/14/01
>	>	2 > AS BUILT	date > 01/24/03
>	>	3 >	date >

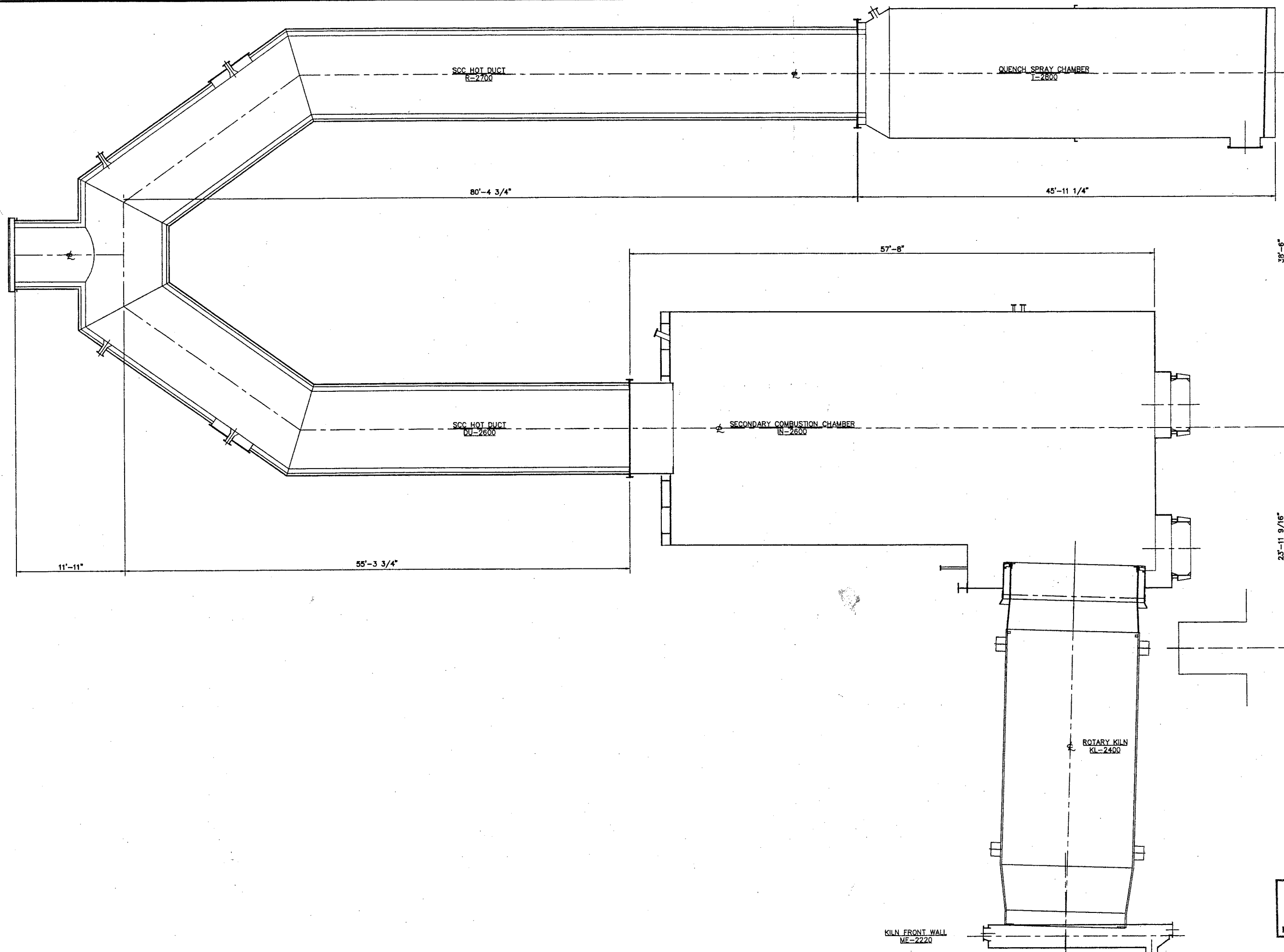
J. T. THORPE & SON, INC.
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SECTIONAL ELEVATION
QUENCH SPRAY CHAMBER T-2800
 830 INCINERATOR UPGRADE
 DOW CHEMICAL CO. - MIDLAND, MI.

J. T. Thorpe & Son, Inc.
AS BUILT
 By: *[Signature]* Date: *1/2/03*

date > 07/31/01	pmgr > BDG
scale > as noted	chk'd > BDG
drawn > TKO	appr'd >
office size	job number
sheet	revision

R-D-60235-17-2



SECTIONAL ELEVATION
scale 3/16" = 1'-0"

J. T. Thorpe & Son, Inc.
AS BUILT
By: *[Signature]* Date: *[Signature]*

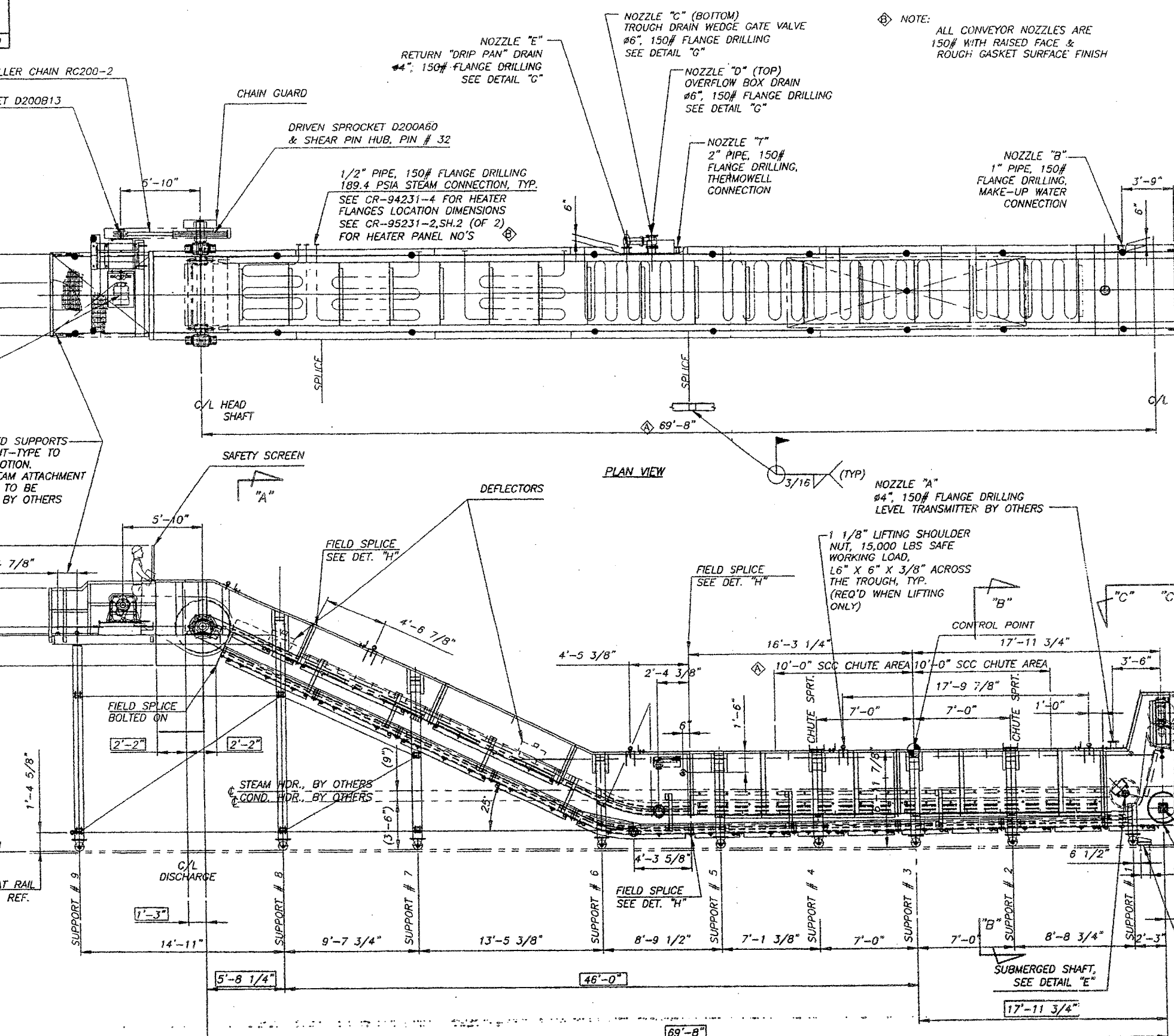
REFERENCE DRAWINGS		REVISIONS	
Δ *	Δ	A Δ PRELIMINARY	date Δ 08/06/01
Δ	Δ	1 Δ ISSUED FOR CONSTRUCTION (AS 60235_100)	date Δ 12/14/01
Δ	Δ	2 Δ AS BUILT	date Δ 01/24/03
Δ	Δ	3 Δ	date Δ
Δ	Δ	4 Δ	date Δ



J. T. THORPE & SON, INC.
Established 1906
ENGINEERS and CONTRACTORS
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PROCESS
GENERAL ARRANGEMENT
830 INCINERATOR UPGRADE
DOW CHEMICAL CO. - MIDLAND, MI.

date Δ 07/20/01	pmgr Δ BDG
scale Δ as noted	chk'd Δ BDG
drawn Δ TKO	appr'd Δ
office size	job number
sheet	revision
R-D-60235-100-2	



NOTE: ALL CONVEYOR NOZZLES ARE 150# WITH RAISED FACE & ROUGH GASKET SURFACE FINISH

HEAD END MACHINERY (PER CONVEYOR)

M-1 (1)-10 HP COUPLED MOTOR, DODGE MAXUM, TCRB REDUCER 7.5 RPM OUTPUT AGMA CLASS 2, 158.9:1 RATIO UNIT COMPLETE WITH 10 H.P. RELIANCE MOTOR @ 1200 R.P.M., INVERTER DUTY, HIGH EFF., T.E.F.C., 230/460V., 3 PH., 60 HZ., 1.0 S.F., UNIT TO INCLUDE: SCOOP BRACKET, H.S. PARA-FLEX PX80 COUPLING, COUPLING GUARD & ADJ. DRIVE BASE MOTOR SHALL BE REVERSIBLE. JOG REVERSE ONLY, SEE DWG. CR-95231-1 INSTALLATION NOTE # 20

NOTE: AC VARIABLE FREQUENCY CONTROLLER (W/CURRENT SENSOR) IS PROVIDED BY OTHERS

CAUTION!!! IN ORDER TO UTILIZE FULL PULL-OUT, IT IS NECESSARY TO USE VFD RATED FOR AT LEAST 20 HP

M-6 (1)-DRIVE SPKT., D200B13, 13T, 10.447" PD

M-7 (1) STRAND-DRIVE CHAIN, ROLLER TYPE RC200-2

M-9 (1)-DRIVEN SPKT. SHEAR PIN TYPE, D200A60, 60T, 47.768" PD

M-19 (5)-SHEAR PIN # 32

M-20 (2)-HEAD SPKT. 6T, 23.18" PD., #698-CONV CHAIN, SPLIT

M-21 (2)-MATCHED STRANDS CHAIN, 6"P., #698, D.F.H.T., RIVETLESS TYPE, TO INCLUDE:

M-22 (1)-LOT FLIGHTS 1" X 8" X 54", AR400 (SPACED, @ 4'-0")

M-23 (1)-LOT S-22 ATTACH. #698

M-24 (1)-LOT FILLER BLOCKS #698

M-25 (1)-LOT BOLTED COUPLER PIN #698

M-30 (1)-HEAD SHAFT 6 7/16" DIA.

M-31 (2)-SPHR ROLL BRG. PILLOW BLOCKS 6 7/16" DIA.

M-32 (1 FIXED, 1 EXP.)

M-34 (1)-CHAIN GUARD

TAKE-UP MACHINERY

M-38 (1)-TAKE-UP SHAFT 3 15/16" DIA., C1045

M-42 (2)-TRACTION WHEEL 17" TRD. DIA. 3 15/16" DIA. BORE, SPLIT

M-43 (2)-ROLLER BEARING TAKE-UP UNIT, 3 15/16"x 18" ADJ. (1 FIXED, 1 EXP.)

M-47 (1)-MODEL 907-HIT EXPLOSION PROOF SENSOR, BY ELECTRO SENSORS, INC.

M-48 (2)-LIMIT SWITCH "SQ.-D" CLASS 9007, TYPE-C, MOD. NO.: C6282

SUBMERGED MACHINERY

M-50 (1)-SUBMERGED SHAFT 3 7/16" DIA., C1045

M-51 (2)-TRACTION WHEEL 17" TRD. DIA. 3 7/16" DIA. BORE, SPLIT

M-52 (2)-3 7/16" ROLLER BEARING PILLOW BLOCKS (1 FIXED, 1 EXP.)

M-53 (2)-3 7/16" PACKING GLAND ASSEMBLY

M-55 (1)-6" WEDGE GATE VALVE

BEND MACHINERY

M-65 (1)-BEND SHAFT 3 7/16" DIA., C1045

M-66 (2)-TRACTION WHEEL 17" TRD. DIA. 3 7/16" DIA. BORE, SPLIT

M-67 (2)-3 7/16" ROLLER BEARING FLANGE UNITS (1 FIXED, 1 EXP.)

GENERAL NOTES:

- SEE DRAWING CR-95231-1 FOR INSTALLATION AND FINISH NOTES.
- SEE DRAWING CR-95231-3 FOR SECTIONS AND ASSEMBLY NOTES NOT SHOWN HERE
- SEE DRAWING CR-95231-4 FOR SUPPORT LOADING AND NOZZLE SCHEDULE
- ALL CONTROL SWITCHES AND DRAINS ARE LOCATED ON THE FAR SIDE SUPPLY & DRAIN PIPING BY OTHERS
- ANCHOR BOLTS AND GROUT BY OTHERS. UNLESS STATED OTHERWISE, ALL CONCRETE ANCHOR SHALL BE 3/4" DIA W / 2" PROJECTION LENGTH MIN.

SLAG DRAG CONVEYORS

TAG NO.: CV-2500, ONE (1) REQ'D; MCV-2500

TAG NO.: CV-2510, ONE (1) REQ'D; MCV-2510

CONVEYOR CAPACITY (EACH): 15,000 TPD

CHAIN SPEED: 10 FPM

POWER: 10 H.P.

MATERIAL DENSITY: VOLUME 60 PCF

HORSE POWER 140 PCF

& LOAD CALCULATION

CHAIN TENSION SENSOR SEE DETAIL "F"

TRAVEL STOPS @ TERMINAL POINTS LOCATED AND INSTALLED BY OTHERS

DRAWING CODE No.: 5157 5007

SHEET 1 OF 2

SHIPMENT NOTES:

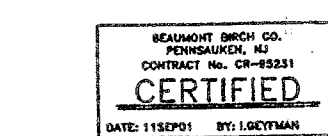
- TAIL SECTION: 36 FT. LONG X 8 FT. WIDE X 10.5 FT. HIGH SHIPPING WEIGHT = 39,000 LBS. FOUR (4) LIFTING POINTS.
- INCLINED & CURVE SECTIONS: 37 FT. LONG X 9 FT. WIDE X 9 FT. HIGH SHIPPING WEIGHT = 30,000 LBS. FOUR (4) LIFTING POINTS.
- HEAD SECTION: 19 FT. LONG X 9.5 FT. WIDE X 9 FT. HIGH SHIPPING WEIGHT = 26,000 LBS. FOUR (4) LIFTING POINTS.

NOTE: MAINTENANCE PLATFORM IS AN INTEGRAL PART WITH HEAD SECTION.

- PLATFORM & INCLINED SECTION SUPPORTS No. 6, 7, 8, & 9 AND CONNECTING BRACES WILL BE SHIPPED LOOSE FOR FIELD ASSEMBLY.
- WHEEL ASSEMBLIES FOR SUPPORTS # 1 THROUGH 5 WILL BE SHIPPED SEPARATELY AND BOLTED ON BY ERECTION CONTRACTOR.
- AFTER ORIGINAL ERECTION AND TEST RUN, INSTALL AND SECURE SUSPENDED SUPPORTS (FURNISHED BY OTHERS) AND REMOVE SUPPORT # 9 AND CONNECTING BRACES. REINSTALL AND BRACE SUPPORT # 9 BEFORE MOVING THE CONVEYOR.

DRAWING ISSUE RECORD					
REV.	DATE	BY	CHKD.	APP.	REASON
1	6/14/01	WV			

SEE CR-95231-2,SH.2 FOR ERECTION MARKS AND NOTES



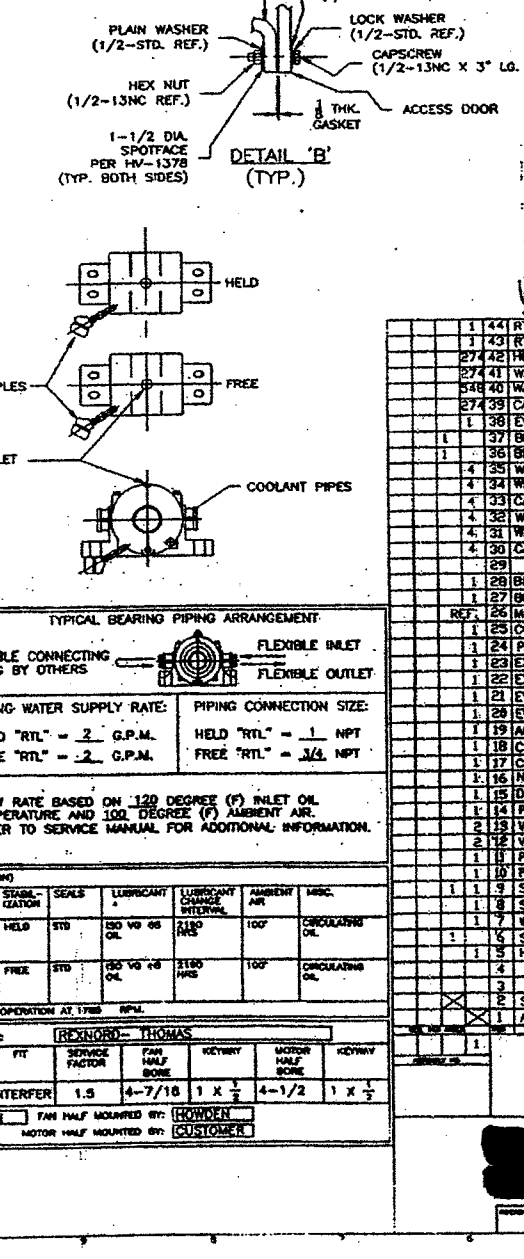
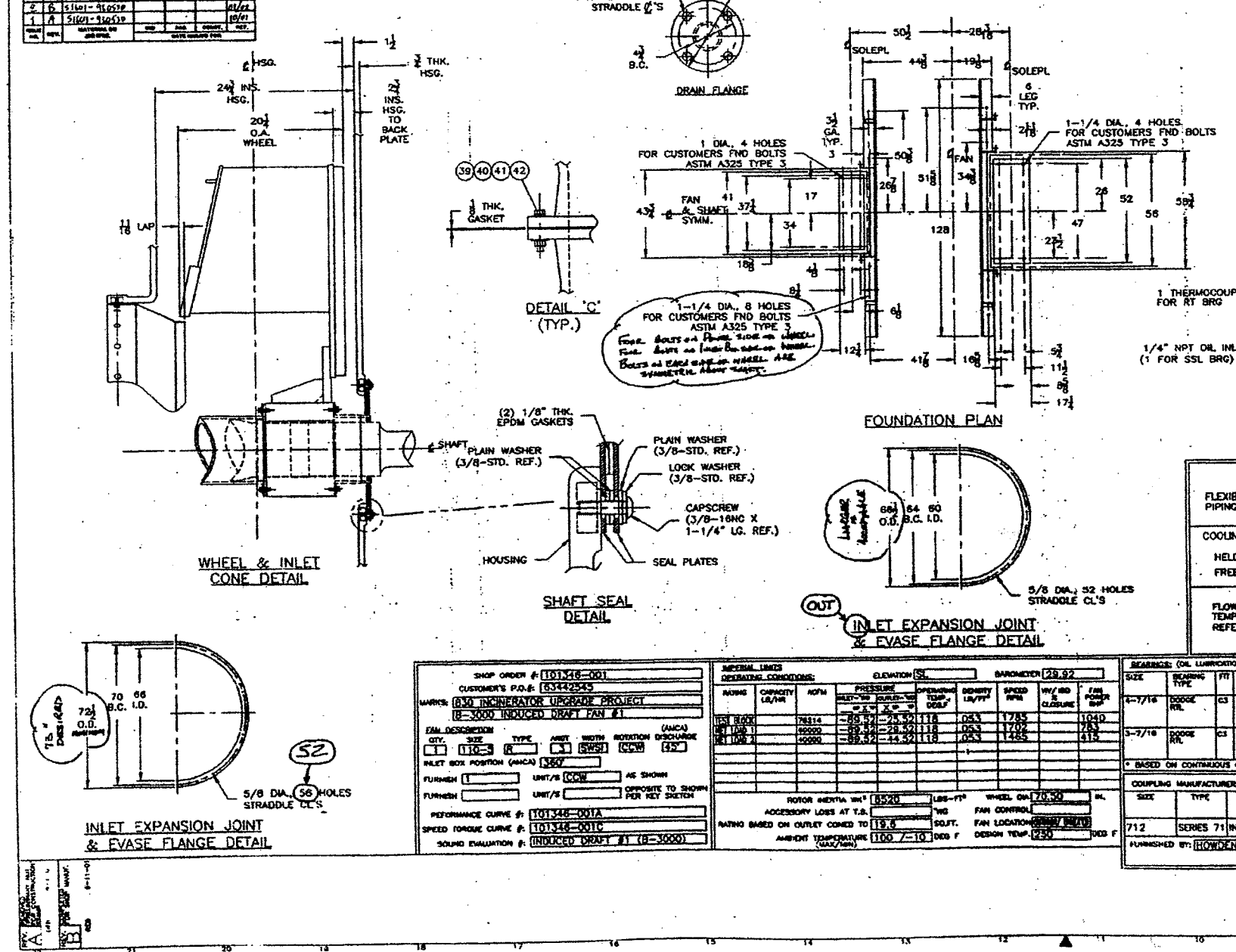
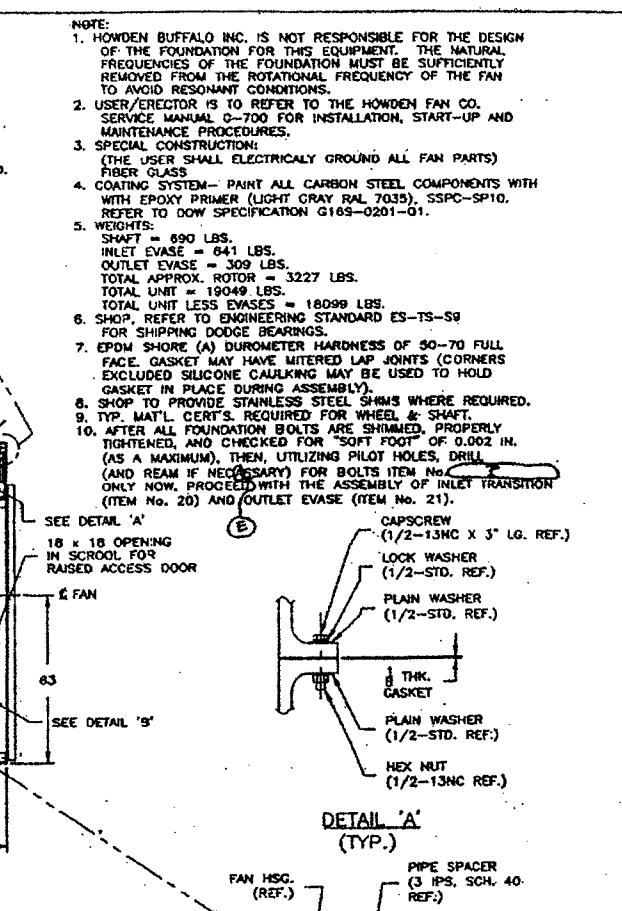
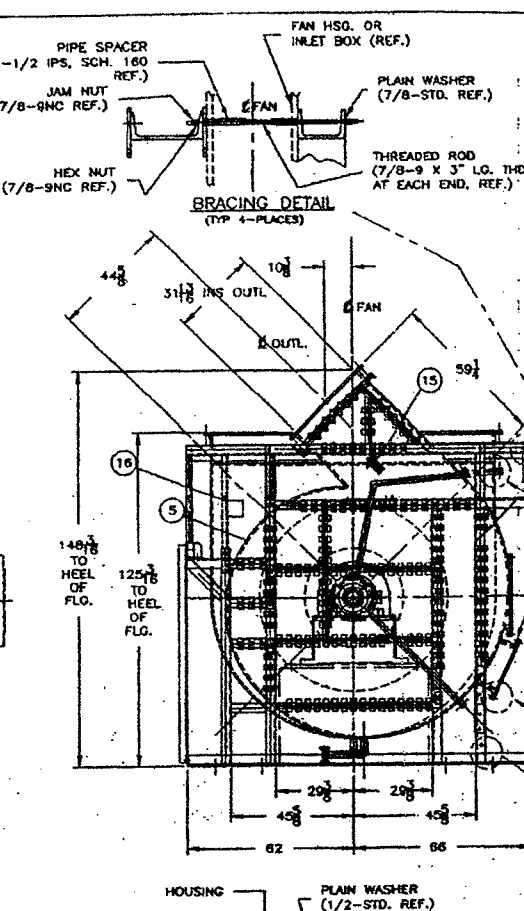
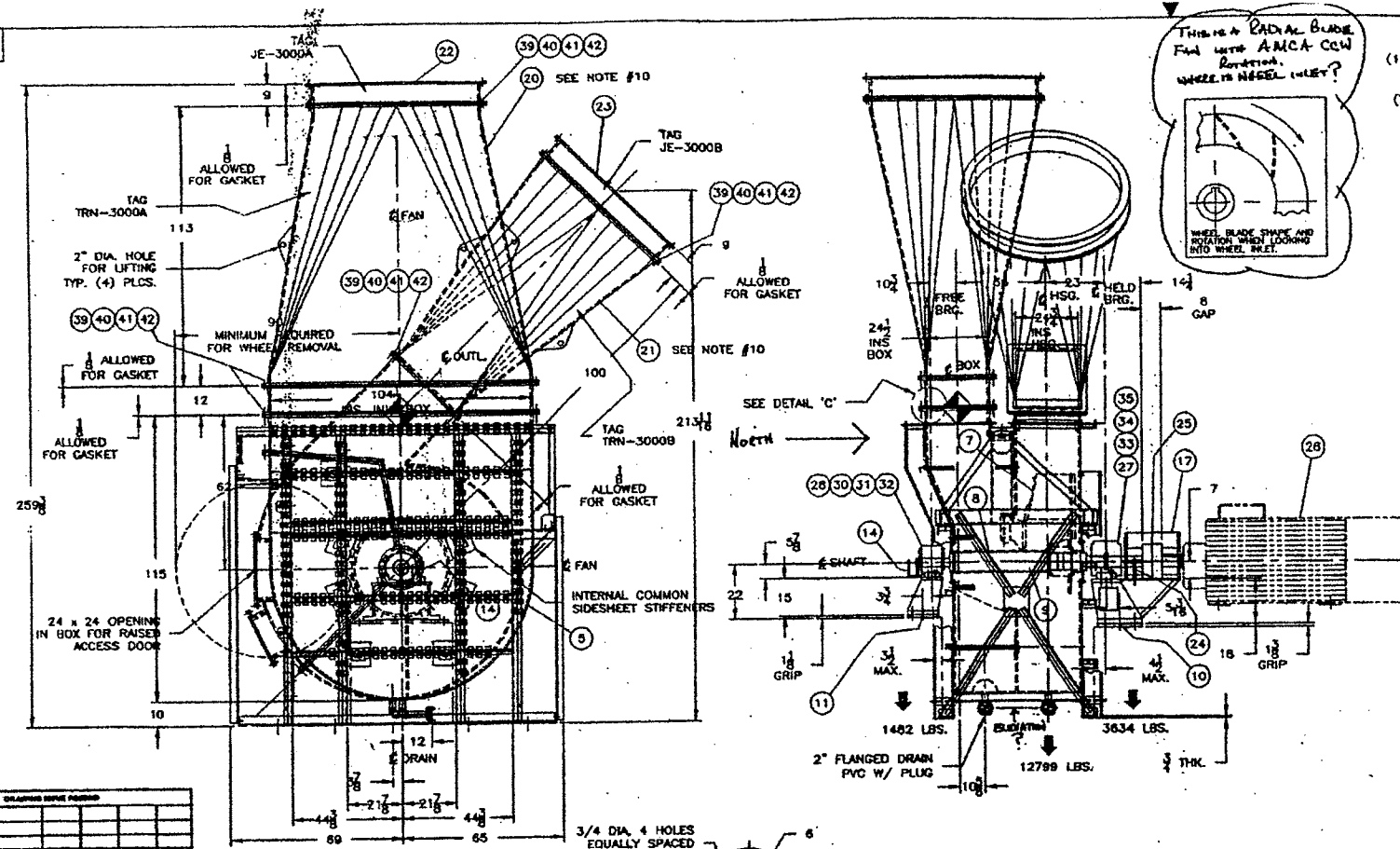
FOR PARTS, INFORMATION, OR QUESTIONS, CONTACT: BEAUMONT BIRCH COMPANY
PHONE # (856) 663-8440
FAX # (856) 663-2732

APPROVED FOR CONSTRUCTION		DESCRIPTION	
P.O. No.: 83443930 / 880530-6663		CA-SUBMERGED DRAG CONVEYORS	
DIMENSION TOLERANCES EXCEPT AS SPECIFIED		TAG NO. CV-2500 & CV-2510	
DECIMAL & FRACTIONAL ± 1/16		DOW CHEMICAL USA	
MATERIAL STL		MIDLAND, MI	
HOLES N/A			
BOLTS N/A			
FINISH SEE DWG. NO. CR-95231-1			
CAD FILE 95231-2,SH.1			

BILL OF MATERIALS		REVISIONS	
ITEM	QTY	REV	DATE
1	1	1	6/14/01

PERMISSION OF BEAUMONT BIRCH CO.		REFERENCE	
DRAWN ILYA G.	CHECKED A.K. 15 JUN 01	00-134	
DATE 6/14/01	APPROVED A.K. 25 JUL 01		
SCALE 1/4"=1'-0"			

DRAWING NO.		REV	
CR-95231-2,SH.1			

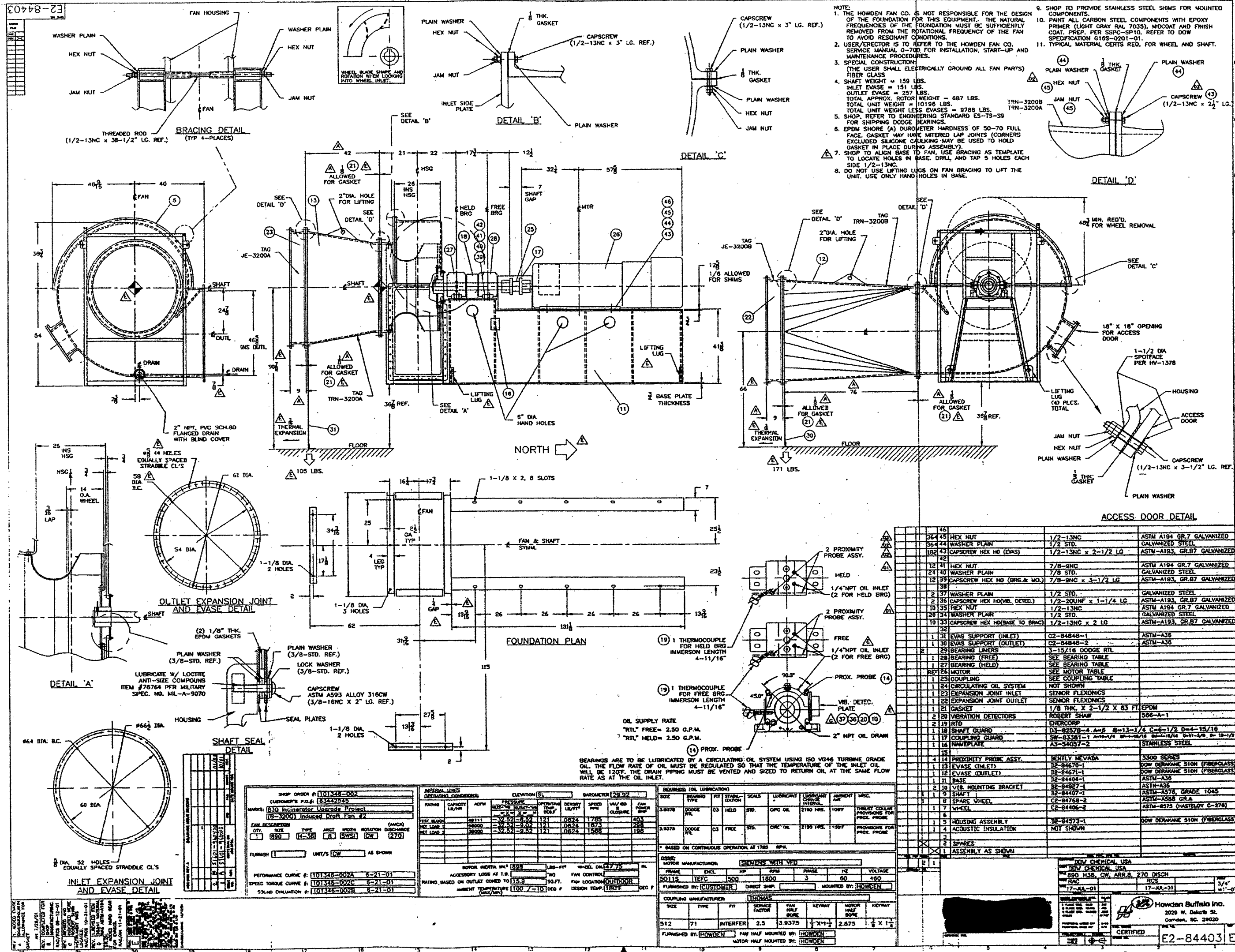


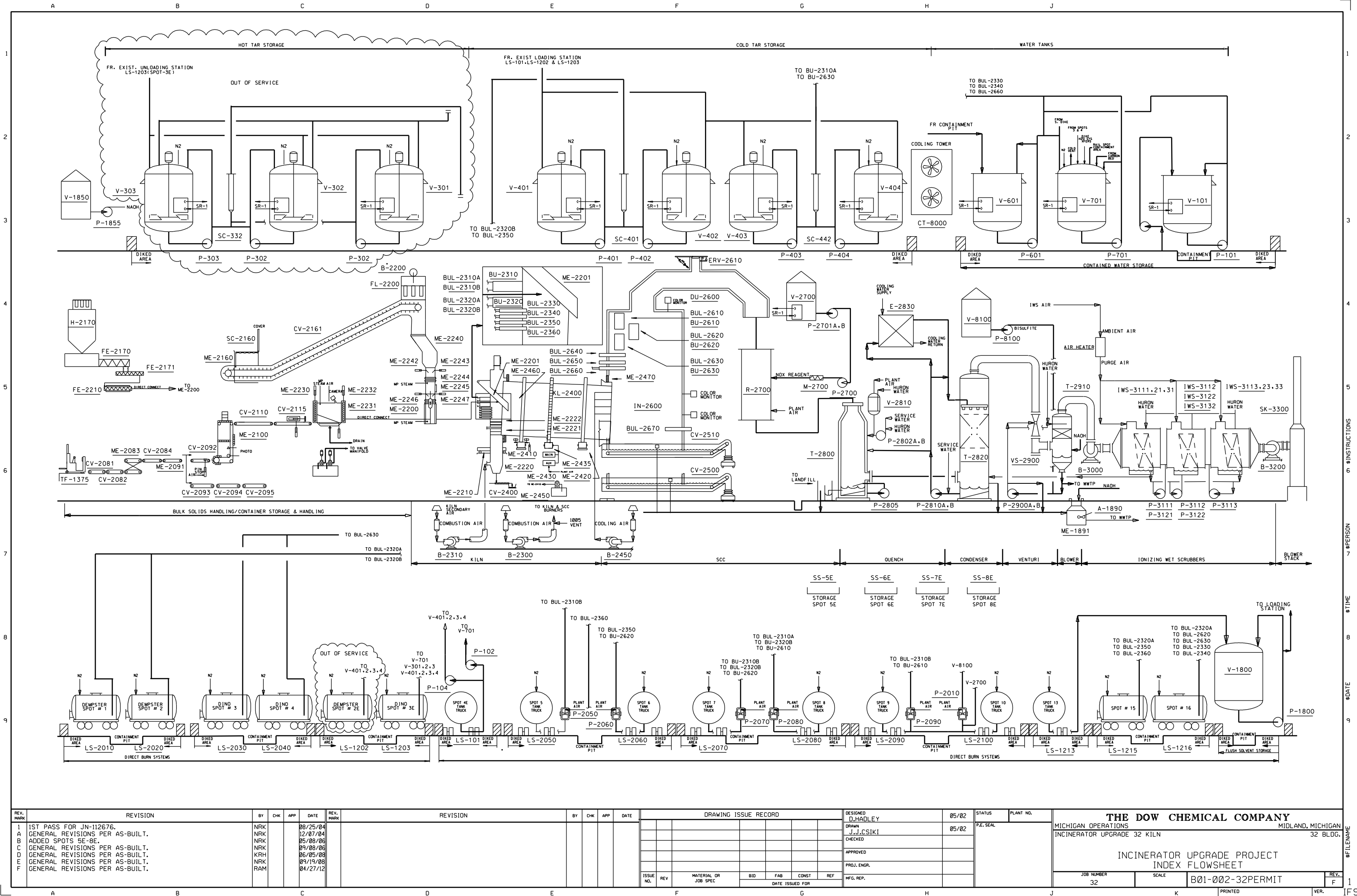
1	44	RTD	ENERCORP	
1	43	RTD	ENERCORP	
1	42	HEX NUT	1/2-13NC	HASTELLOY C-276
1	41	WASHER LOCK	1/2 STD.	HASTELLOY C-276
1	40	WASHER PLAIN	1/2 STD.	HASTELLOY C-276
1	39	CAPSCREW HEX HD	1/2-13NC X 3 LG.	HASTELLOY C-276
1	38	EVASE EXTENSION	C2-84825-1	
1	37	BEARING LINERS	4-7/16 DODGE RIL	
1	36	BEARING LINERS	3-7/16 DODGE RIL	
1	35	WASHER LOCK	1 STD.	304 SST
1	34	WASHER PLAIN	1 STD.	ZINC CHROMATE STEEL
1	33	CAPSCREW HEX HD	1-8NC X 4-1/2 LG.	ASTM A193 GR. B7
1	32	WASHER LOCK	3/4 STD.	304 SST
1	31	WASHER PLAIN	3/4 STD.	ZINC CHROMATE STEEL
1	30	CAPSCREW HEX HD	3/4-10NC X 3-1/2 LG.	ASTM A193 GR. B7
1	29			
1	28	BEARING (FREE)	SEE BEARING TABLE	
1	27	BEARING (HELD)	SEE BEARING TABLE	
1	26	MOTOR	CUSTOMER SUPPLIED	SIEMENS TORBY FRAME
1	25	COUPLING	SEE COUPLING TABLE	
1	24	PROXIMITY PROBE ASSY (HELD BRG.)	C2-84845-1	
1	23	EXPANSION JOINT (OUTLET)		SENIOR FLEXONICS PATHWAY
1	22	EXPANSION JOINT (INLET)		SENIOR FLEXONICS PATHWAY
1	21	EVASE (OUTLET)	D2-84753-1	DOW DERAKANE 510N FRP
1	20	EVASE (INLET)	D2-84752-1	DOW DERAKANE 510N FRP
1	19	ACOUSTIC INSULATION	NOT SHOWN	
1	18	CIRCULATING OIL SYSTEM	NOT SHOWN	
1	17	COUPLING GUARD	5W-83361-1 A-22 BF-6-1/2 BM-6-1/2 C-27 D-7	
1	16	NAMEPLATE	C3-81334-2	304 SST
1	15	DIRECTION ARROW	4W-14938-1	
1	14	PROXIMITY PROBE ASSY (FREE BRG.)	C2-84836-1	
1	13	VIBRATION DETECTORS	BENTLY NEVADA	
1	12	VIBRATION MOUNTING BRACKET	C2-84837-1	
1	11	PEDESTAL & SOLE PL. (FREE BRG.)	D3-84906-2-4	ASTM A-36
1	10	PEDESTAL & SOLE PL. (HELD BRG.)	D3-14906-4-1	ASTM A-36
1	9	SHAFT	C2-84648-1	ASTM A-376 GR. 1045
1	8	SHAFT SLEEVE	C2-84653-1	
1	7	WHEEL	C2-84647-1	ASTM B575 (HAST. C-276)
1	6	SPARE WHEEL	C2-84648-1	ASTM A588 GRA
1	5	HOUSING ASSEMBLY	E2-84563-1	DOW DERAKANE 510N FRP
1	4			
1	3			
1	2			
1	1			
1				

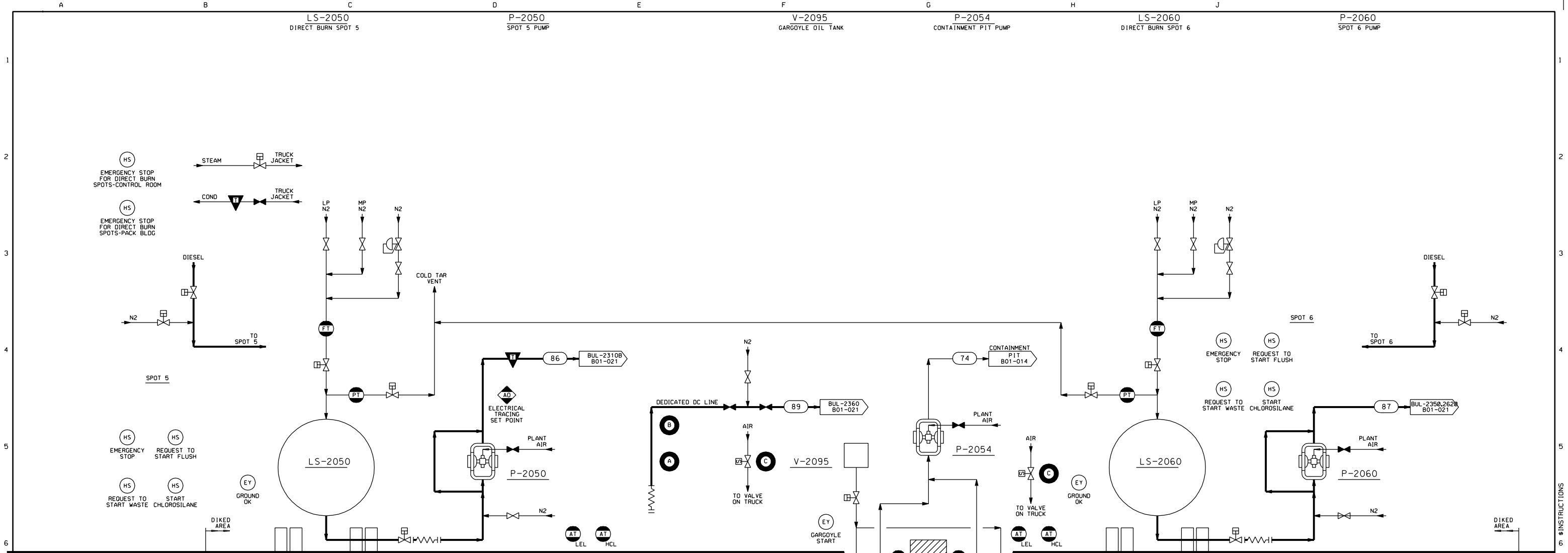
Please see
Customer Manual
for More Information


Howden Buffalo, Inc.
2029 W. DeKor Street
Camden, SC 29020, USA

E2-84401







																			
										CONTAINMENT PIT									
										<div><div>A</div><div>CAN BE HOOKED TO EITHER SPOT LS-2050 OR SPOT LS-2060.</div></div> <div><div>B</div><div>PRESSURE TRANSFER FROM SPOT LS-2050 OR SPOT LS-2060.</div></div> <div><div>C</div><div>SOLENOID VALVE TO CONTROL AIR TO TRUCK VALVE.</div></div>									

7

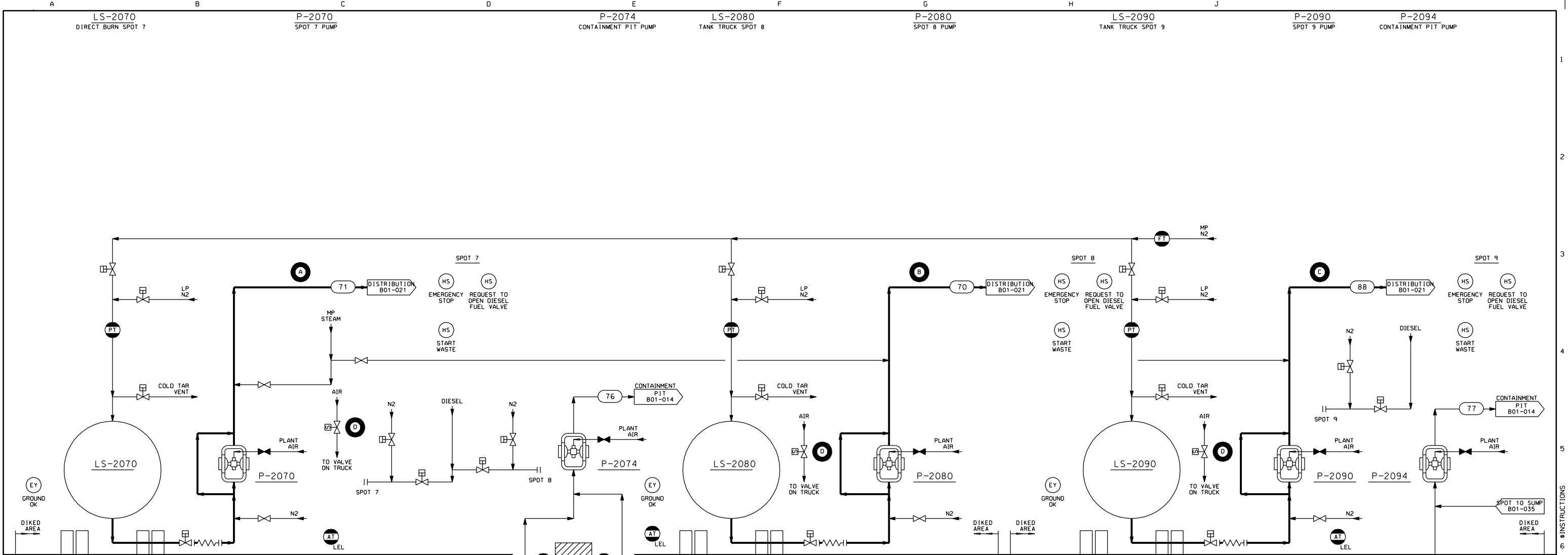
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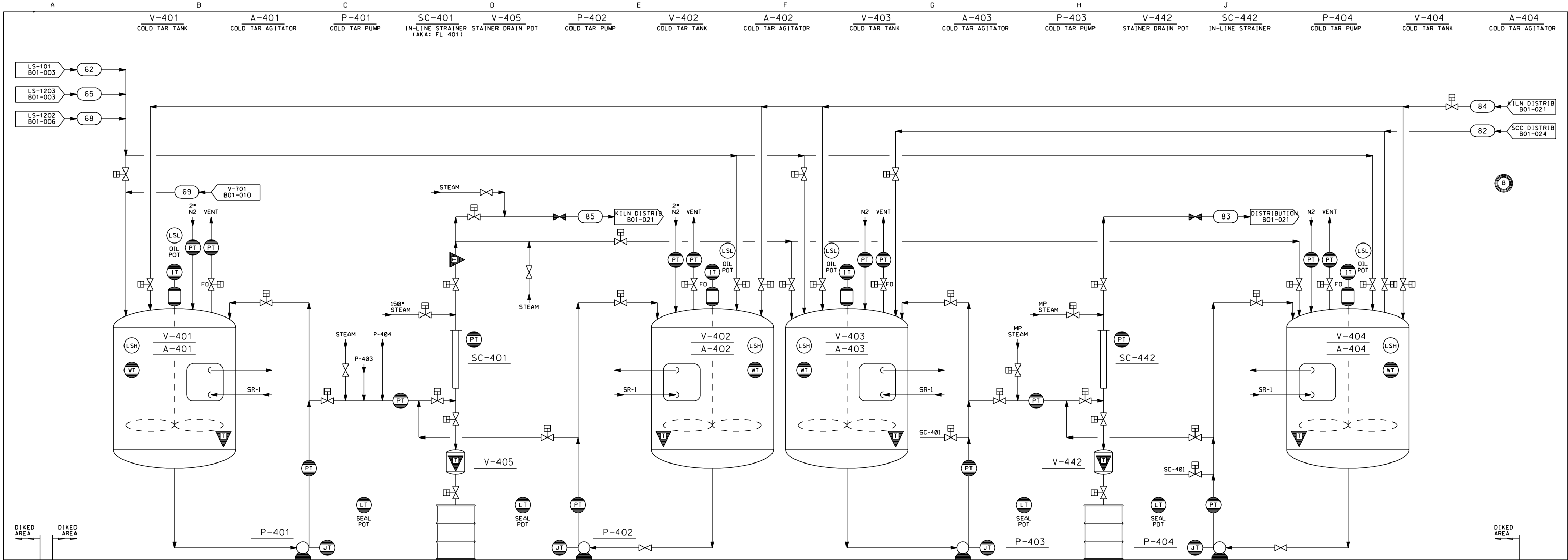
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\$DATE



- A** FROM SPOT 7 ONLY.
- B** FROM SPOT 8 ONLY.
- C** FROM SPOT 9 ONLY.
- D** SOLENOID VALVE TO CONTROL AIR TO TRUCK VALVE.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD					DESIGNED	02/02	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02												D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03												J.J.CSIKI	02/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08												CHECKED				INCINERATOR UPGRADE 32 KILN			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12												APPROVED				32 BLDG			
												ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	PROJ. ENGR.		SPOTS LS-2070, LS-2080 & LS-2090			
												DATE ISSUED FOR					MFG. REP.				PROCESS FLOWSHEET			
																					DISPLAY			
																					JOB NUMBER			
																					32			
																					SCALE			
																					B01-005-32PERMIT			
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Ⓑ RECIRCULATE FLUID ALL THE WAY TO THE BURNER FACE AND BACK.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/02	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12																		
												APPROVED											
												PROJ. ENGR.											
												MFG. REP.											
												ISSUE NO.				MATERIAL OR JOB SPEC				JOB NUMBER			
												REV				BID				SCALE			
																FAB				B01-008-32PERMIT			
																CONST				REV.			
																REF				D			
																DATE ISSUED FOR				PRINTED			
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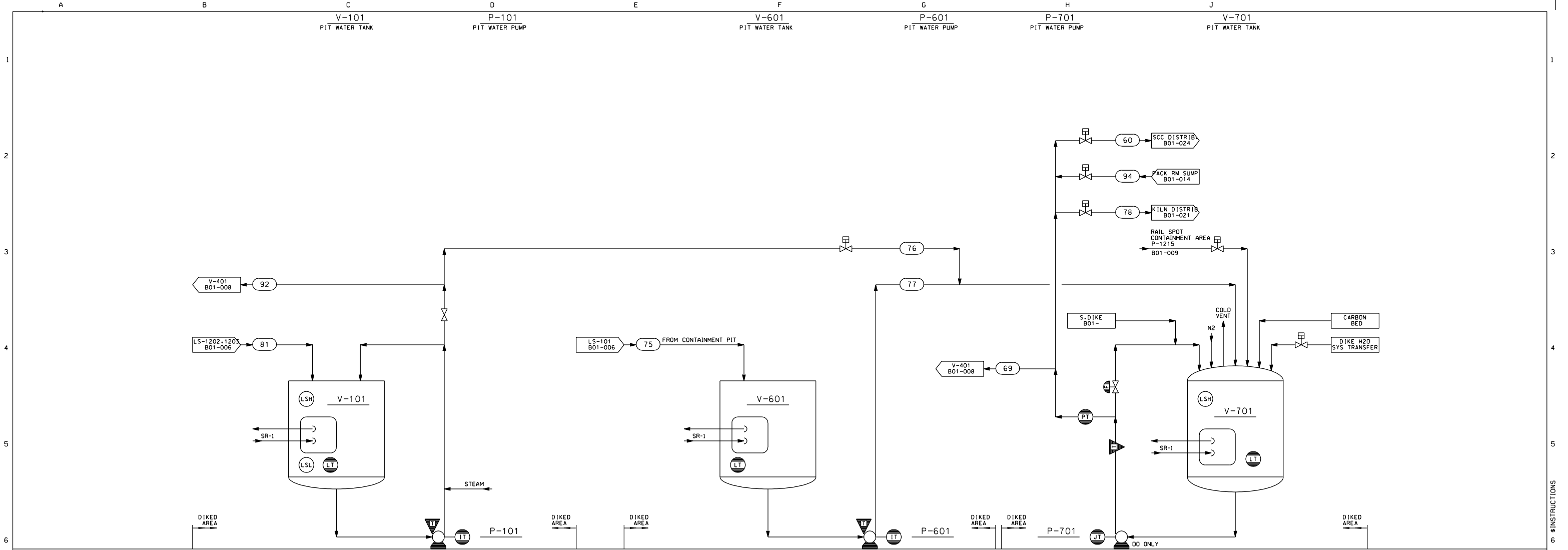
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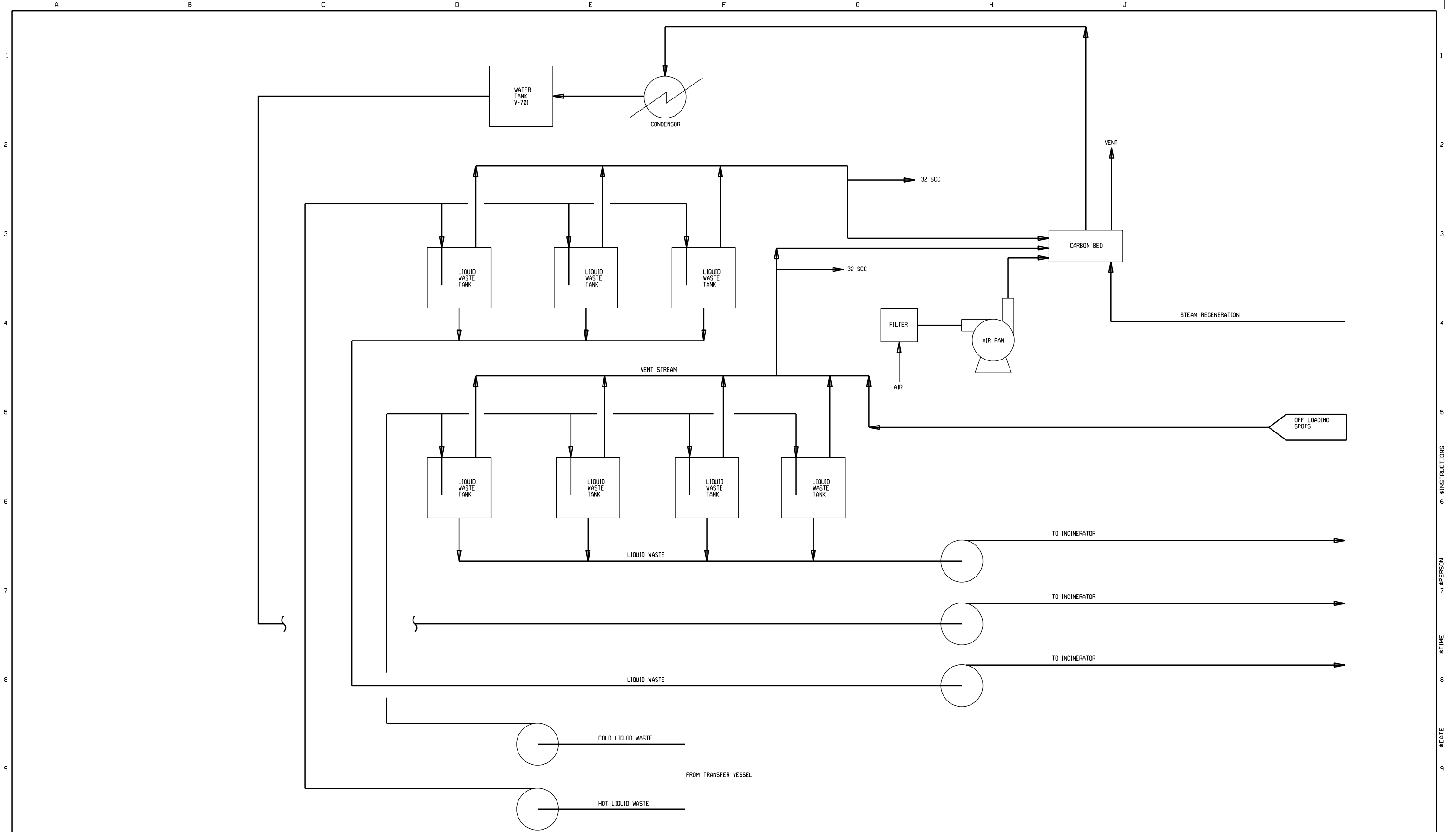
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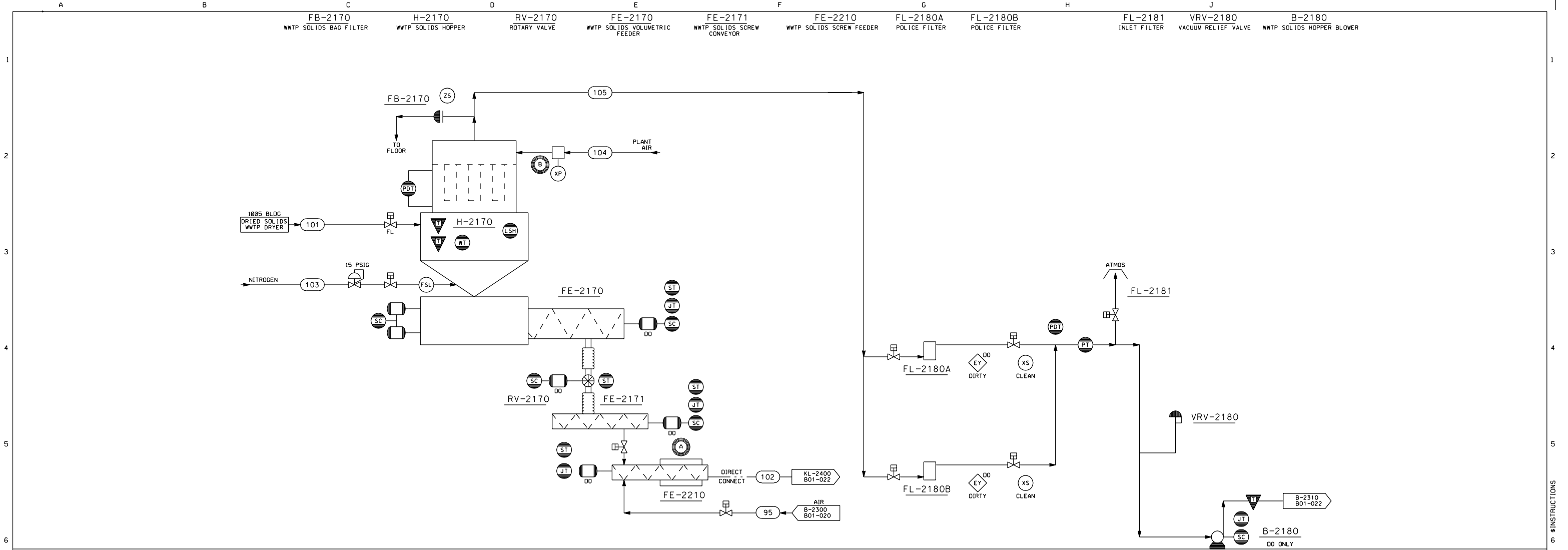
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REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/04											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			01/08/06															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															WATER CONTAINMENT TANKS			
E	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															V-101, V-601 & V-701			
																				PROCESS FLOWSHEET			
																				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-010-32PERMIT			
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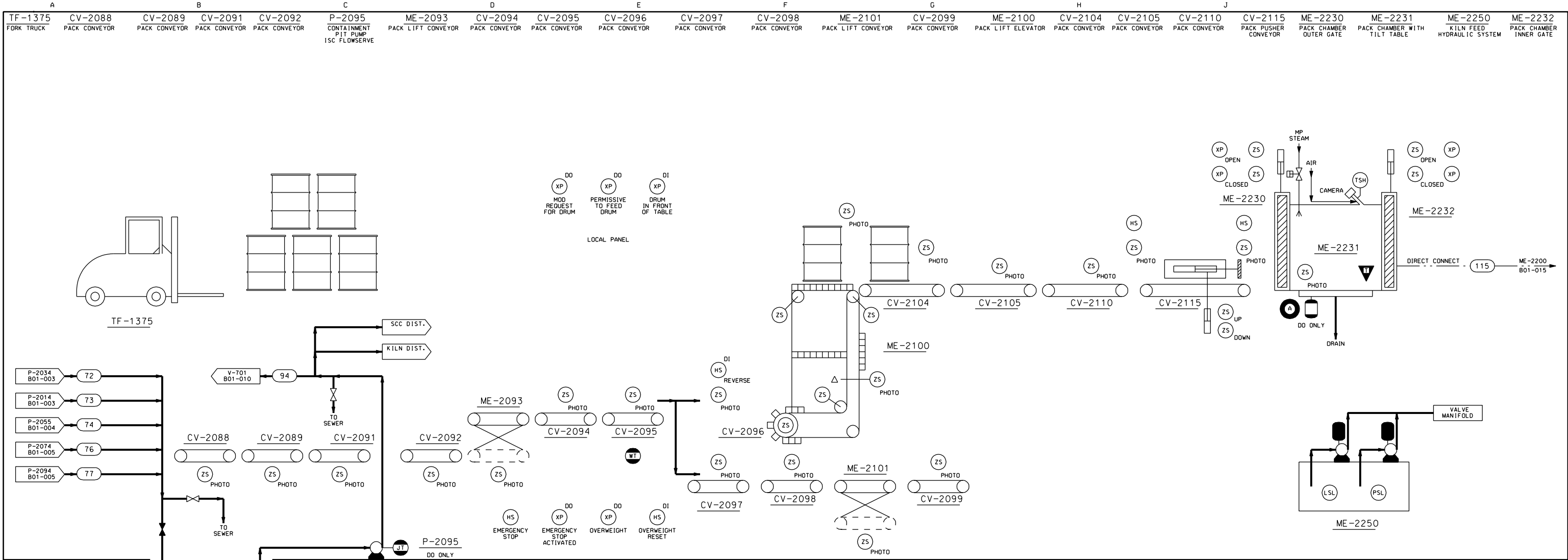


REV. MARK	REVISION				BY	CHK	APP	DATE	REV. MARK	REVISION				BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED		STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY MICHIGAN OPERATIONS INCINERATOR UPGRADE 32 KILN MIDLAND, MICHIGAN 32 KILN VENT SYSTEM INCINERATOR TANK FARM PROCESS FLOWSHEET JOB NUMBER 32 SCALE B01-011-32PERMIT REV. A				
A	GENERAL REVISIONS PER AS-BUILT.				RAM			04/27/12															P.E. SEAL							
																						DRAWN								02/94
																						CHECKED								02/94
																														APPROVED
																							PROJ. ENGR.							
																							MFG. REP.							

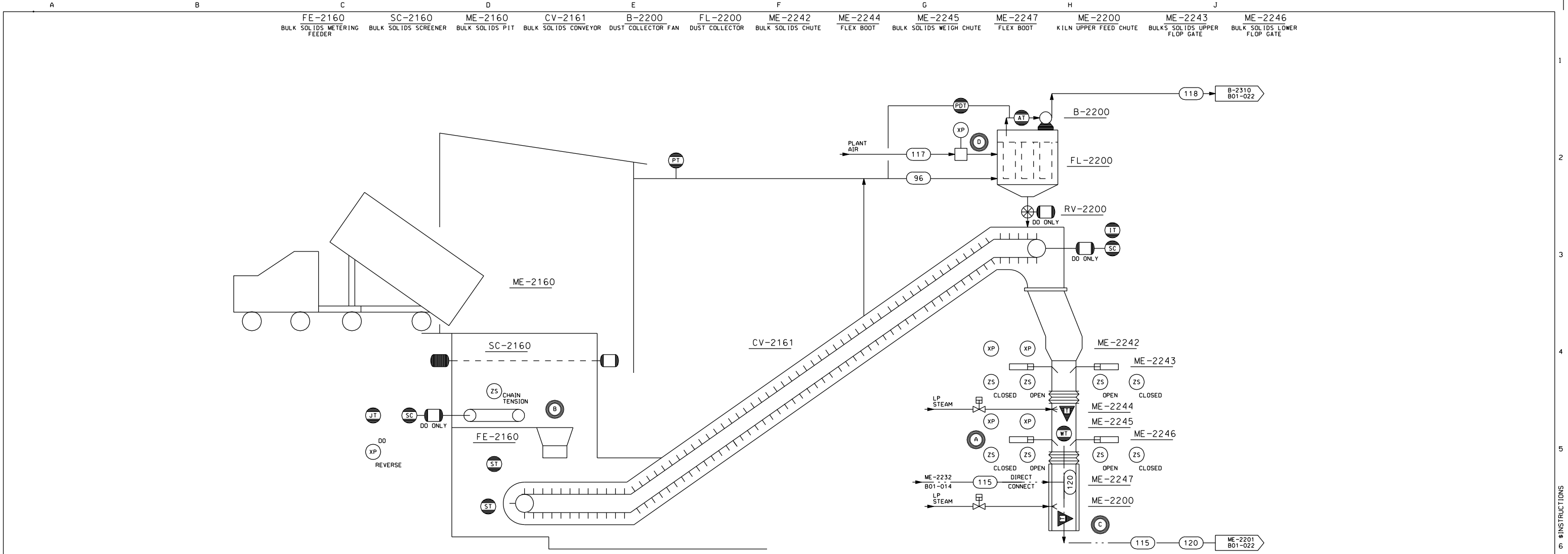


- (A) FOR COOLING SEE B01-061.
- (B) PULSE CONTROLLER, DO TO ACTIVATE.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															WWTP SOLIDS			
																				INCINERATOR UPGRADE 32 KILN			
																				32 KILN			
																				WWTP SOLIDS			
																				H-2170, FE-2170, FE-2171 & FE-2210			
																				PROCESS FLOWSHEET			
																				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-013-32PERMIT			
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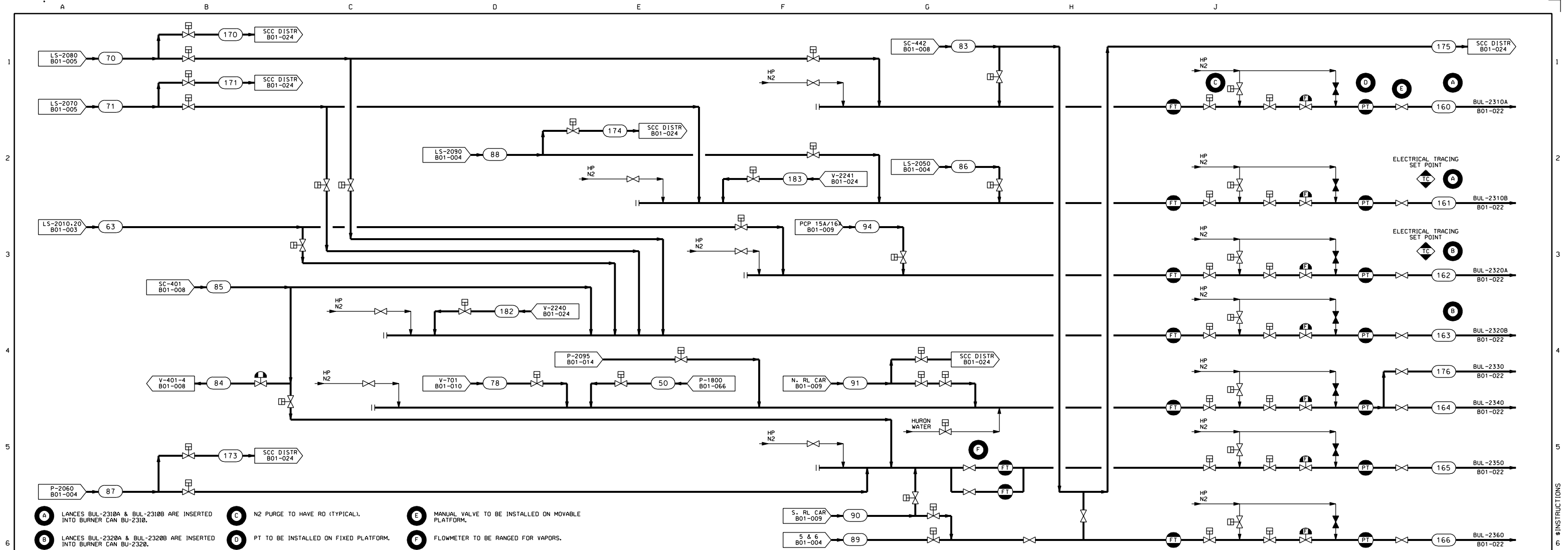


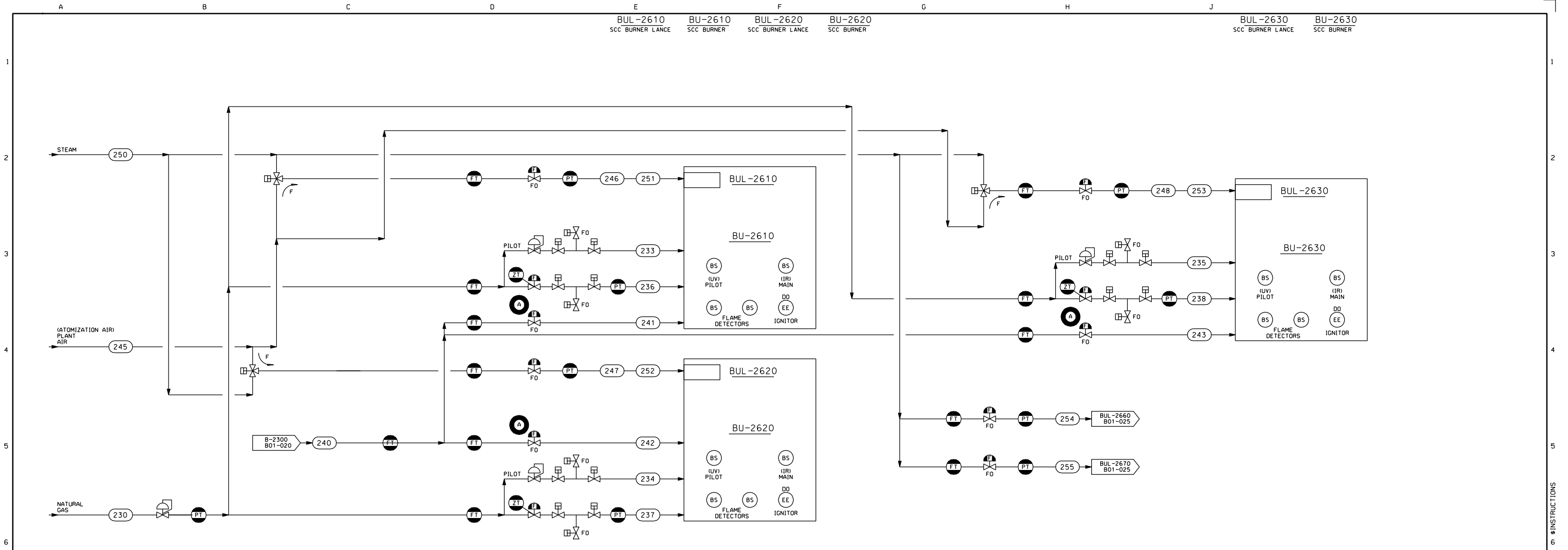
<div>LT</div>		WATER CONTAINMENT PIT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												</	
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- (A) WT ON ME-2242 IS NEW. NEED METHOD TO WEIGH BULK SOLIDS TO KILN.
- (B) GATE TO LIMIT HEIGHT OF SOLIDS.
- (C) SEE B01-061 FOR COOLING.
- (D) PULSE CONTROLLER. DO TO ACTIVATE.

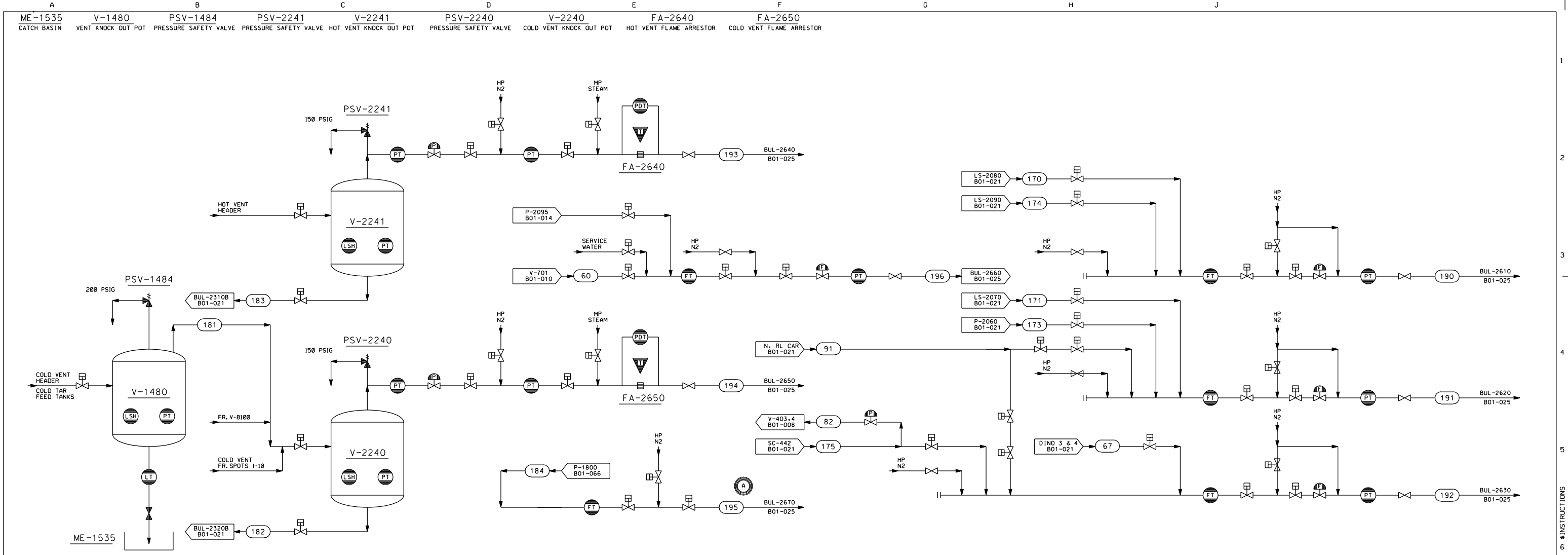
REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			12/06/04											CHECKED				32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	NRK			10/25/06											APPROVED				BULK SOLIDS			
E	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08											PROJ. ENGR.				ME-2160, CV-2161 & FL-2200			
F	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12											MFG. REP.				PROCESS FLOWSHEET			
												ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	DATE ISSUED FOR				REV.
																				JOB NUMBER	SCALE	B01-015-32PERMIT	F
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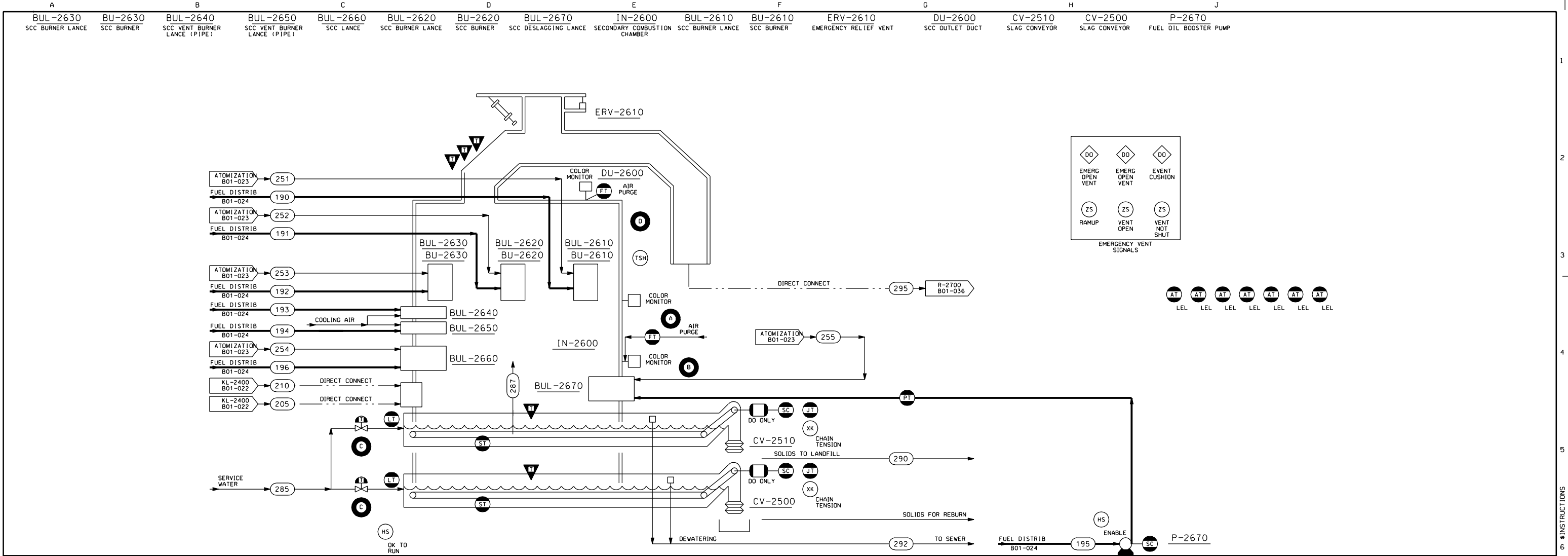
(A) EACH COMBUSTION AIR VALVE EQUIPPED WITH MECHANICAL STOP TO MAINTAIN MINIMUM AIR FLOW.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															32 KILN			
																APPROVED				SCC AUXILIARY FUEL & ATOMIZATION			
																PROJ. ENGR.				BU-2610, BU-2620 & BU-2630			
																MFG. REP.				PROCESS FLOWSHEET			
																				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-023-32PERMIT			
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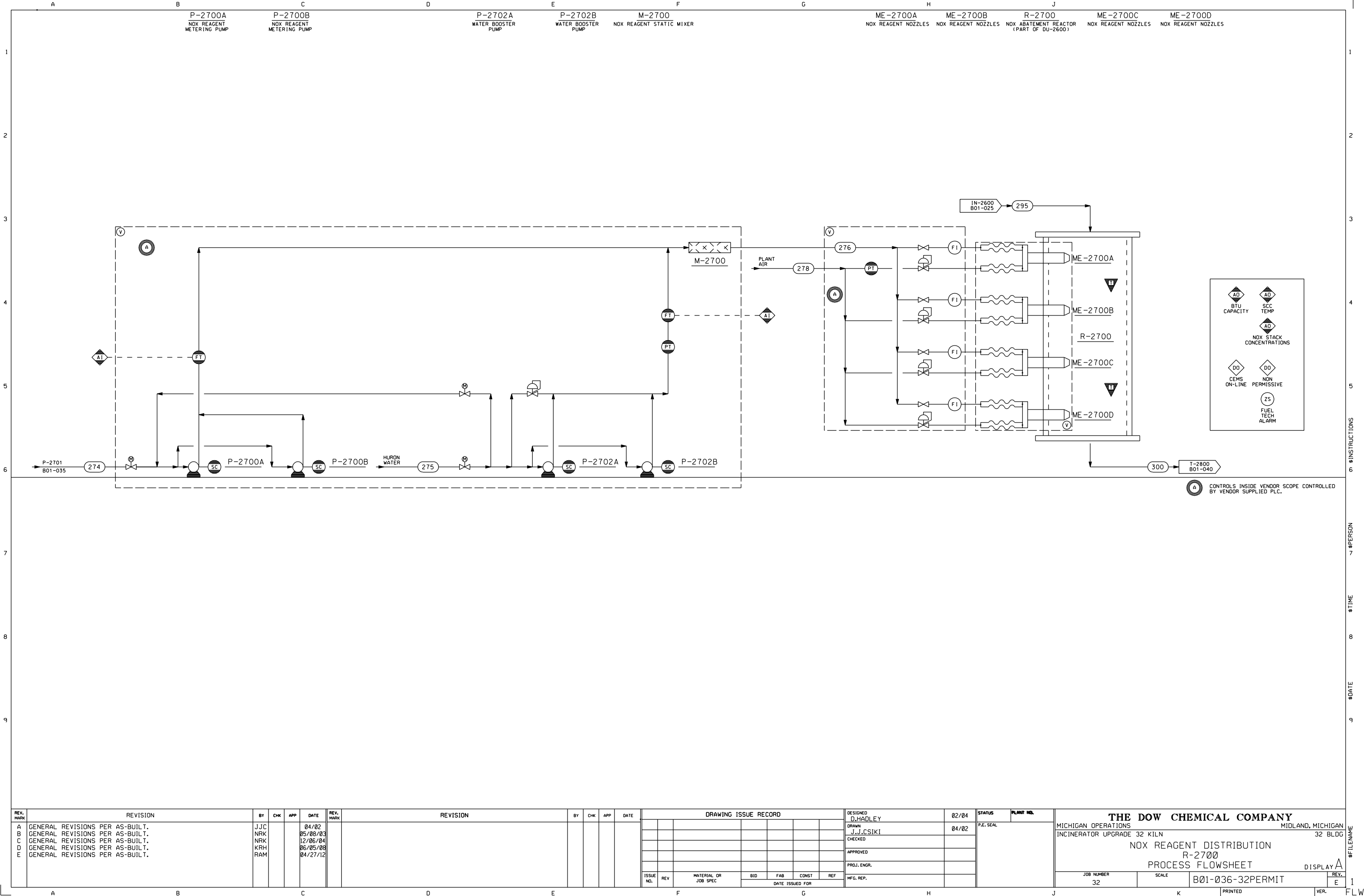
- (A) BU-2670 IS THE KILN DESLAGGER LANCE.
- (B) MAXIMUM TOTAL FEED RATE FOR EACH LANCE FROM ANY FEED SOURCE.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	1ST PASS FOR JN-112676.	NRK			08/25/04											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			12/06/04															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															INCINERATOR UPGRADE 32 KILN			
E	GENERAL REVISIONS PER AS-BUILT.	NRK			04/27/09															32 KILN			
F	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															32 BLDG			
												APPROVED				PROJECT ENGR.				SCC LIQUID FUEL DISTRIBUTION			
												MFG. REP.				V-2240, V-2241 & V-1480				PROCESS FLOWSHEET			
												ISSUE NO.				MFG. REP.				JOB NUMBER			
												REV				MFG. REP.				SCALE			
												MATERIAL OR JOB SPEC				MFG. REP.				B01-024-32PERMIT			
												DATE ISSUED FOR				MFG. REP.				32			
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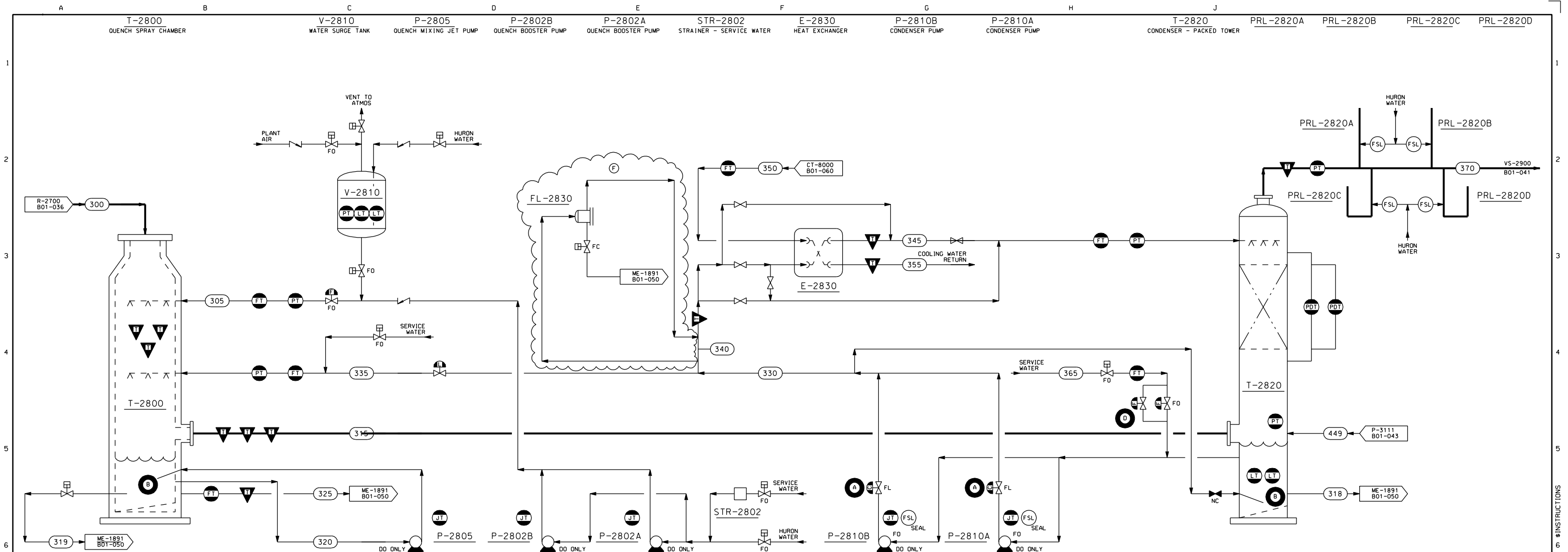


- A** ONE TV SYSTEM LOOKS UP LILN; ONE TV SYSTEM LOOKS AT SLAG AND SLAG DISCHARGE TO THE SLAG CONVEYOR (CV-2500).
- B** BUL-2670 CAN BE POSITIONED IN FOUR DIFFERENT LOCATIONS.
- C** ENSURE THAT WATER ADDITION CAN HANDLE MAXIMUM FLOW NEEDED DURING DESLAGGING CONDITIONS.
- D** POWER SHOTS AND AIR CANNON PORTS TO BE DETERMINED.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/04											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08											CHECKED				INCINERATOR UPGRADE 32 KILN			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12											APPROVED				32 BLDG			
																PROJ. ENGR.				INCINERATION - SCC & ASH SYSTEM			
																MFG. REP.				IN-2600			
																				PROCESS FLOWSHEET			
																				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-025-32PERMIT			
																				REV. D			
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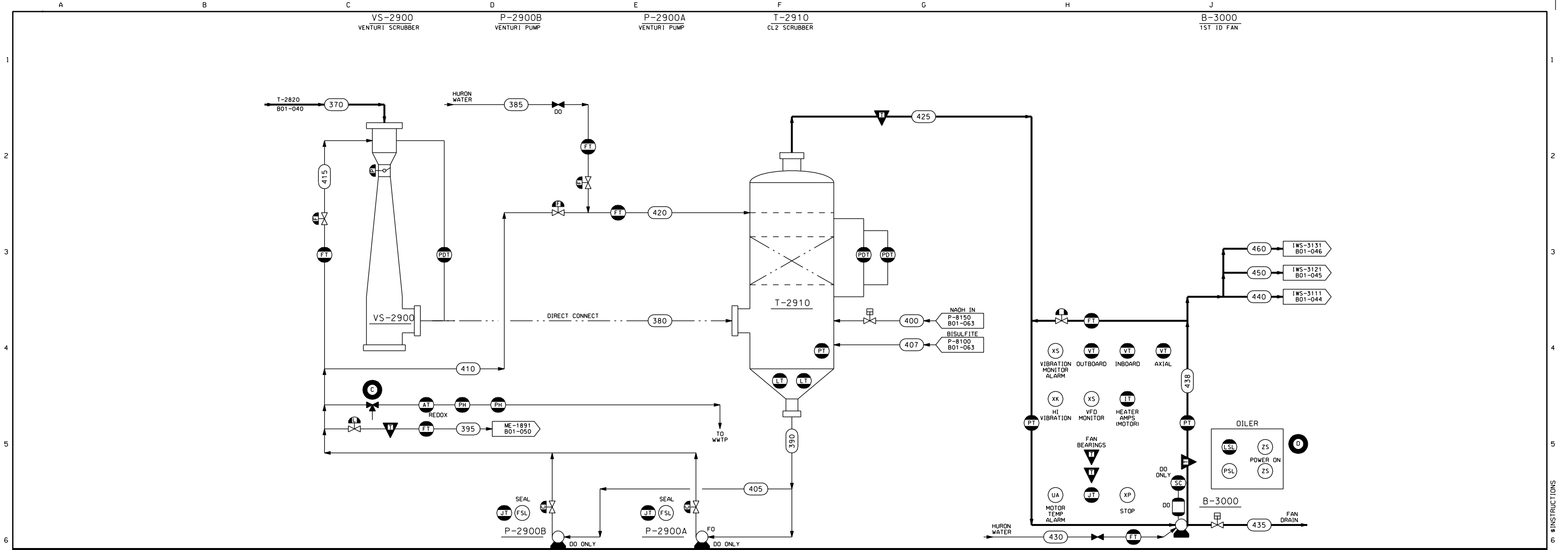


REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
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B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			12/06/04															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															NOX REAGENT DISTRIBUTION			
E	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															R-2700			
												ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	PROJ. ENGR.	PROCESS FLOWSHEET			
												DATE ISSUED FOR				MFG. REP.				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-036-32PERMIT			
																				REV.			
																				E			
																				1			



- A** CONTROL VALVE USED TO START-UP PUMPS TO CONTROL WATER HAMMER.
- B** MIXING JET TO MIX ASH IN SUMP SO THAT THE ASH LEAVES THE SYSTEM.
- D** FOR GOOD FLOW CONTROL OVER ENTIRE RANGE. ONE LARGE AND ONE SMALL CONTROL VALVE

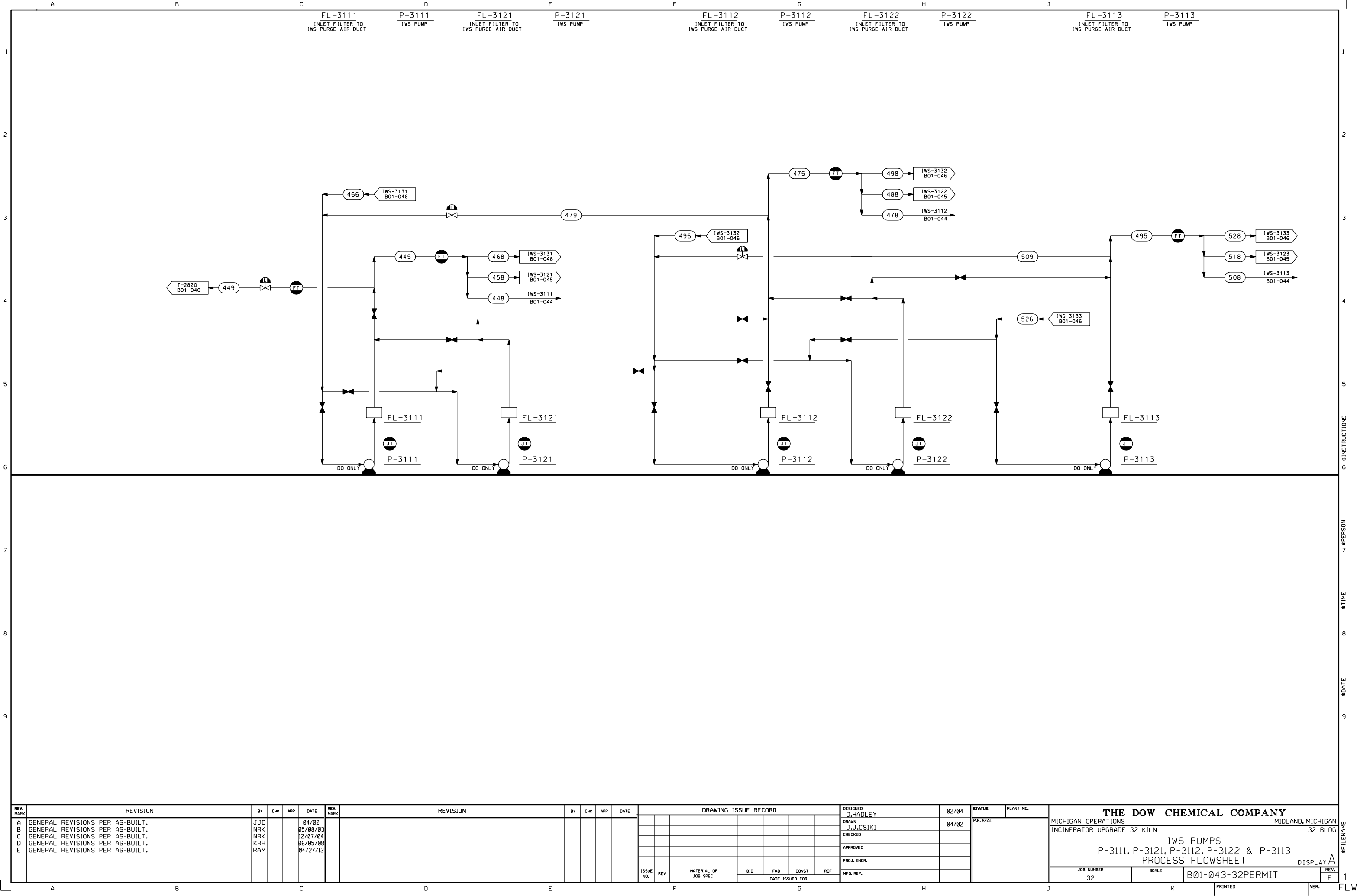
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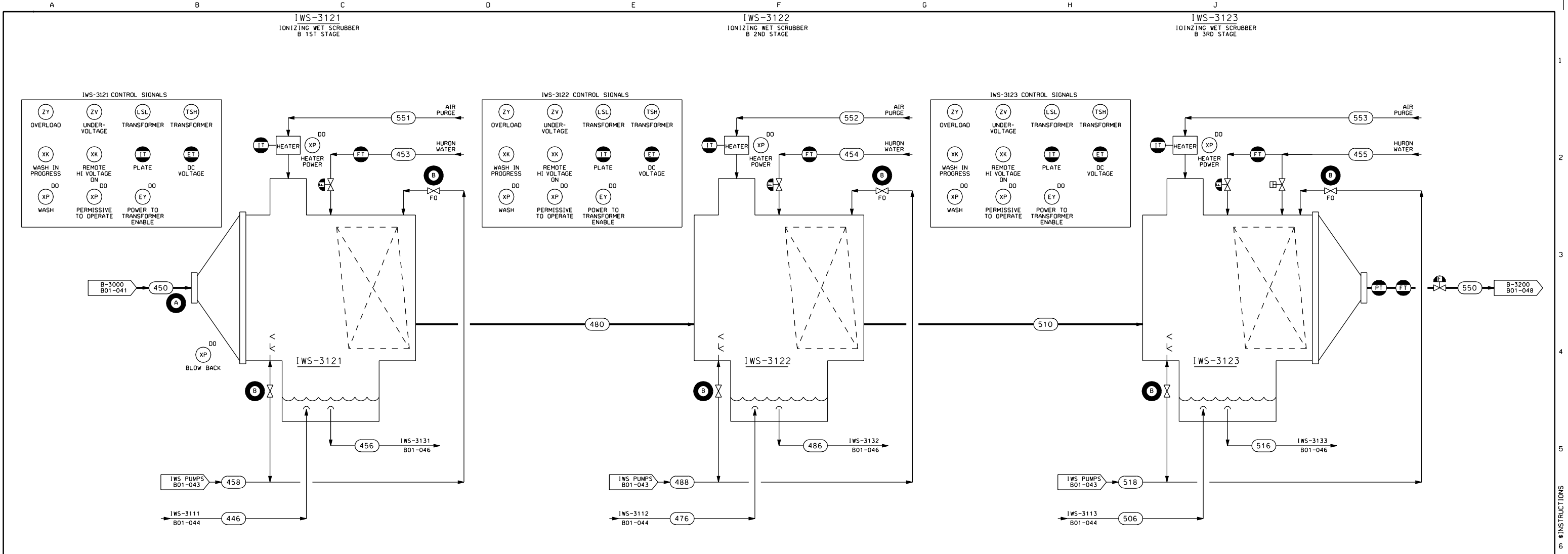
C SAMPLE VALVE.

D THERE IS AN EXTERNAL OILER.

REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			12/07/04															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															VENTURI SCRUB., CL2 SCRUB. & 1ST ID FAN			
E	GENERAL REVISIONS PER AS-BUILT.	NRK			05/20/09															VS-2900, T-2910 & B-3000			
F	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															PROCESS FLOWSHEET			
												ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	PROJ. ENGR.	JOB NUMBER			
												DATE ISSUED FOR				MFG. REP.				32		SCALE	
																				B01-041-32PERMIT		REV.	
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																				PRINTED		VER.	
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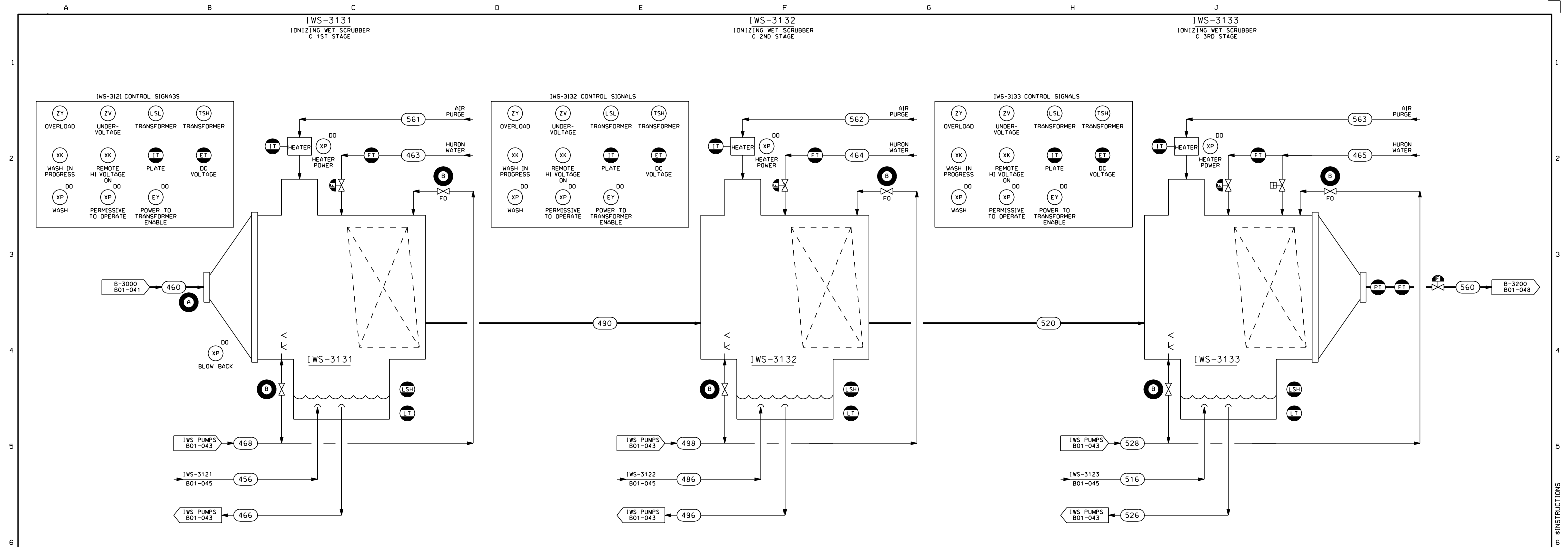


REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	04/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	NRK			12/07/04															32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08															IWS PUMPS			
E	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12															P-3111, P-3121, P-3112, P-3122 & P-3113			
																				PROCESS FLOWSHEET			
																				DISPLAY			
																				JOB NUMBER			
																				32			
																				SCALE			
																				B01-043-32PERMIT			
																				REV.			
																				E			



(A) IWS IS ONE OF THREE.
(B) PLC CONTROLLED.

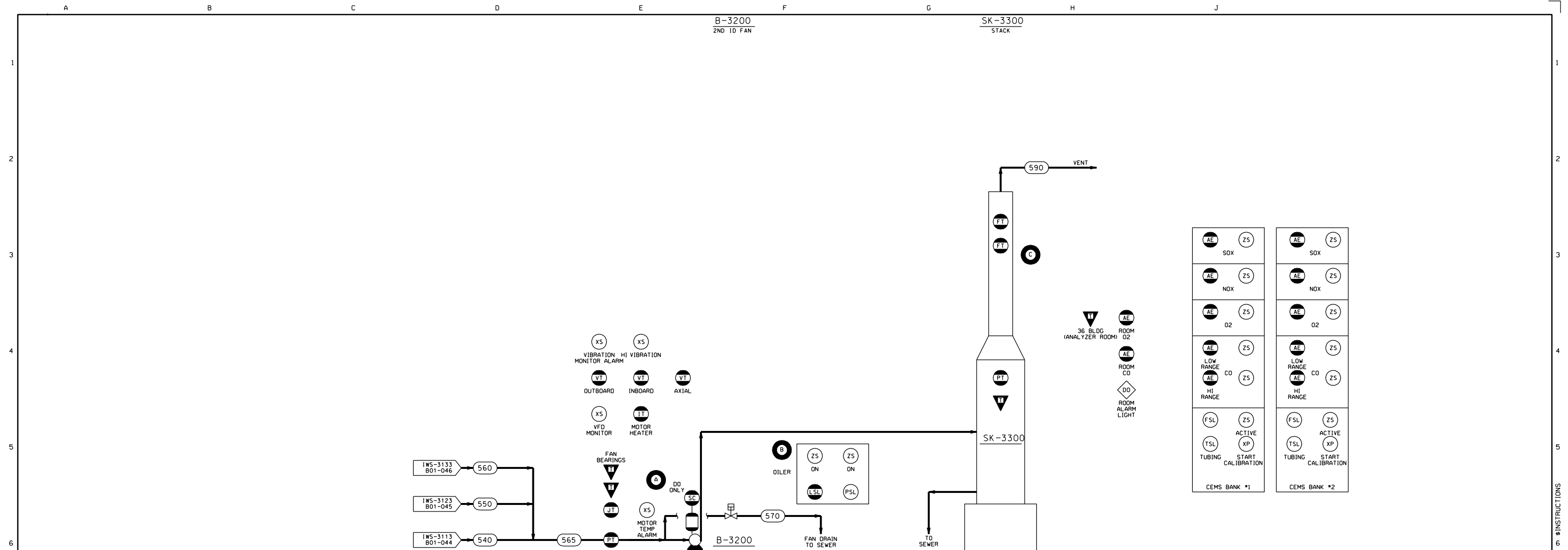
REVISION					BY	CHK	APP	DATE	REV. MARK	REVISION					BY	CHK	APP	DATE	DRAWING ISSUE RECORD					DESIGNED D.HADLEY		02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY				
A	GENERAL REVISIONS PER AS-BUILT.					JJC			04/02															04/02	P.E. SEAL		MICHIGAN OPERATIONS INCINERATOR UPGRADE 32 KILN						
B	GENERAL REVISIONS PER AS-BUILT.					NRK			05/08/03																	MIDLAND, MICHIGAN 32 BLDG							
C	GENERAL REVISIONS PER AS-BUILT.					KRH			06/05/08																	IONIZING WET SCRUBBER TRAIN 2							
D	GENERAL REVISIONS PER AS-BUILT.					RAM			04/27/12																	IWS-3121, IWS-3122 & IWS-3123							
																									APPROVED								
																									PROJ. ENGR.								
																									MFG. REP.								



A IWS IS ONE OF THREE.

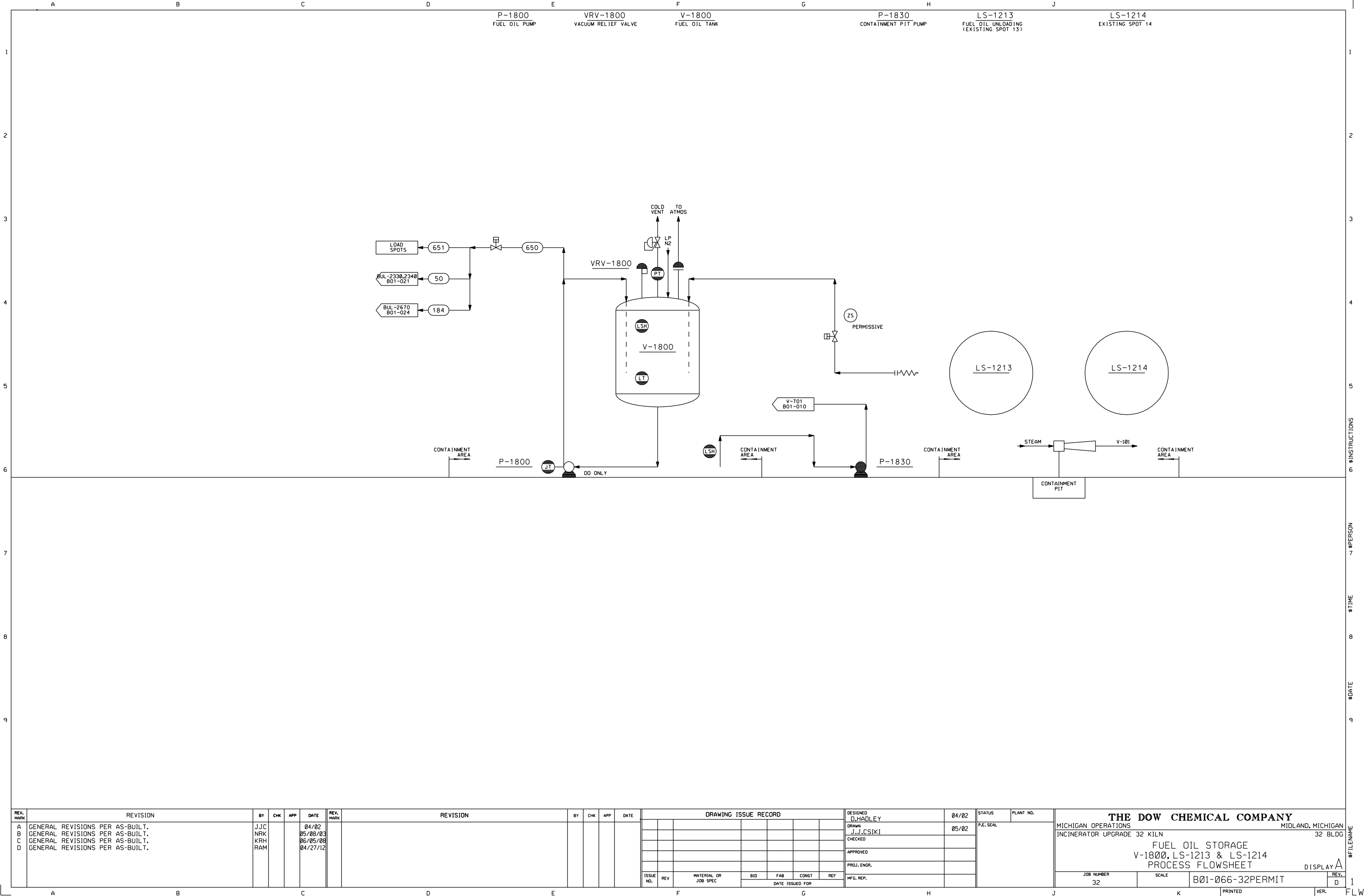
8 PLC CONTROLLED.

REV. MARK	REVISION				BY	CHK	APP	DATE	REV. MARK	REVISION				BY	CHK	APP	DATE	DRAWING ISSUE RECORD								DESIGNED D.HADLEY		02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY															
A	GENERAL REVISIONS PER AS-BUILT.				JJC			04/02																				MICHIGAN OPERATIONS																		
B	GENERAL REVISIONS PER AS-BUILT.				NRK			05/08/03																				MIDLAND, MICHIGAN																		
C	GENERAL REVISIONS PER AS-BUILT.				KRH			06/05/08																				32 BLDG																		
D	GENERAL REVISIONS PER AS-BUILT.				RAM			04/27/12																				INCINERATOR UPGRADE 32 KILN																		
																												IONIZING WET SCRUBBER TRAIN 3																		
																												IWS-3131, IWS-3132 & IWS-3133																		
																												PROCESS FLOWSHEET																		
																												JOB NUMBER				SCALE				B01-046-32PERMIT								REV. D		
																												32																		



- A** CONSIDER AUXILIARY POWER FOR POWER OUTAGE.
- B** THERE IS AN EXTERNAL OILER.
- C** STACK TO BE EQUIPPED WITH THREE STACK SAMPLING PLATFORMS FOR COMPLIANCE TESTING IN ADDITION TO THE CEM PORTS.

REV. MARK	REVISION				BY	CHK	APP	DATE	REV. MARK	REVISION				BY	CHK	APP	DATE	DRAWING ISSUE RECORD						DESIGNED D.HADLEY		02/04	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
A	GENERAL REVISIONS PER AS-BUILT.				JJC			04/02															02/04	P.E. SEAL		MICHIGAN OPERATIONS INCINERATOR UPGRADE 32 KILN 32 BLDG SECOND ID FAN & STACK B-3200 & SK-3300 PROCESS FLOWSHEET DISPLAY A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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REV. MARK	REVISION	BY	CHK	APP	DATE	REV. MARK	REVISION	BY	CHK	APP	DATE	DRAWING ISSUE RECORD				DESIGNED	04/02	STATUS	PLANT NO.	THE DOW CHEMICAL COMPANY			
A	GENERAL REVISIONS PER AS-BUILT.	JJC			04/02											D.HADLEY				MICHIGAN OPERATIONS			
B	GENERAL REVISIONS PER AS-BUILT.	NRK			05/08/03											J.J.CSIKI	05/02	P.E. SEAL		MIDLAND, MICHIGAN			
C	GENERAL REVISIONS PER AS-BUILT.	KRH			06/05/08											CHECKED				32 BLDG			
D	GENERAL REVISIONS PER AS-BUILT.	RAM			04/27/12											APPROVED				FUEL OIL STORAGE			
																PROJ. ENGR.				V-1800, LS-1213 & LS-1214			
																MFG. REP.				PROCESS FLOWSHEET			
																				DISPLAY			
																				REV. 1			
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JOB NUMBER	32	SCALE	B01-066-32PERMIT	PRINTED	VER.	FLW
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Table T-1
Incinerator Process Monitors¹

Item	Description
Mass Element	Bulk Solids-Weigh Scale
Mass Element	Containerized Solids-Weigh Scale
Flow Element	Liquid Waste to BU-2310A-Flow Meter
Flow Element	Liquid Waste to BU-2310B-Flow Meter
Flow Element	Liquid Waste to BU- 2320A-Flow Meter
Flow Element	Liquid Waste to BU- 2320B-Flow Meter
Flow Element	Liquid Waste to BUL-2330 –Flow Meter
Flow Element	Liquid Waste to BUL-2340-Flow Meter
Flow Element	Liquid Waste to BUL-2350-Flow Meter
Flow Element	Vapor Waste to BUL-2350-Flow Meter
Flow Element	Liquid Waste to BUL-2360-Flow Meter
Mass Element	Wastewater Treatment Plant Dried Solids Scale
Flow Element	Kiln Supplemental Fuel BU-2310-Flowmeter
Flow Element	Kiln Supplemental Fuel BU-2320-Flowmeter
Flow Element	Primary Combustion Air-BU-2310 Kiln Flowmeter
Flow Element	Primary Combustion Air –BU-2320 Kiln Flowmeter
Flow Element	Auxiliary Combustion Air– Chute air Flowmeter
Flow Element	Auxiliary Combustion Air– Seal Flowmeter
Proximity Switch	Kiln Speed-Speed Switch
Temperature Element	Flue Gas from Kiln-Temperature
Pressure Element	Combustion chamber pressure
Pressure Element	Combustion chamber pressure
Temperature Element	SCC- Temperature
Flow Element	SCC Supplemental Fuel BU-2610-Flowmeter
Flow Element	SCC Supplemental Fuel BU-2620-Flowmeter
Flow Element	SCC Supplemental Fuel BU-2630-Flowmeter
Flow Element	Liquid Waste to BU-2610-Flowmeter
Flow Element	Liquid Waste BU-2620-Flowmeter
Flow Element	Liquid Waste BU-2630-Flowmeter
Flow Element	Liquid Waste BUL-2660-Flowmeter
Flow Element	SCC Supplemental Fuel BU-2670-Flowmeter
Flow Element	Primary Combustion Air-BU-2610 SCC-Flowmeter
Flow Element	Primary Combustion Air –BU-2620 SCC-Flowmeter
Flow Element	Primary Combustion Air –BU-2630 SCC-Flowmeter
Flow Element	Quench Water Top Ring-Flowmeter
Flow Element	Quench Water Bottom Sprays-Flowmeter
Flow Element	Quench Tank Blowdown – Flowmeter
Temperature Element	Quench Gas Outlet-Temperature
Flow Element	Condenser Water-Flowmeter
Temperature Element	Condenser Water Temperature – Temperature
Level Element	Condenser Tank Water Level – Level Transmitter
Temperature Element	Condenser Gas-Outlet Temperature
Pressure Element	Condenser Differential Pressure – Pressure Transmitter
Flow Element	Venturi Water In-Flowmeter
PH Element	Venturi Water In-pH
Pressure Element	Venturi Differential-Pressure Transmitter
Flow Element	Demister Water In-Flowmeter
Pressure Element	Demister Differential Pressure-Pressure Transmitter
Flow Element	Demister Tank Blowdown – Flowmeter
Level Element	Demister Tank Water Level – Level Transmitter

**Table T-1 (cont.)
Incinerator Process Monitors¹**

Amperage Element	Primary I.D. Fan Motor-Power
Flow Element	IWS Water In-Flowmeters
Amperage Elements	IWS Power-Amperage
Voltage Elements	IWS Power- Voltage
Flow Element	IWS Recycle Water-Flowmeter
Temperature Element	Stack Gas-Temperature
Amperage Element	Secondary I.D. Fan Motor-Amperage
Flow Element	Stack Gas Flowrate – Flowmeter
Continuous Emission Monitor	Oxygen Monitor- Range 0-25%. Utilizes electrochemical transducer for signal generation in proportion to presence of oxygen. Calibration is with atmospheric air and prepurified nitrogen. Output of 4-20 MA for alarm. etc.
Continuous Emission Monitor	CO Monitor-Non-Dispersive Infrared analyzer w/extractive system Dual Range measuring 0-200 ppmv and 0-3000 ppmv. Calibration is with certified gases. Output of 4-20 MA is received in PCC for record and calculation of hourly averages.
Continuous Emission Monitor	SOx monitor. Calibration is with certified gases. Output of 4-20 MA is received in PCC for record and calculation of hourly averages.
Continuous Emission Monitor	NOx monitor. Calibration is with certified gases. Output of 4-20 MA is received in PCC for record and calculation of hourly averages.

¹More detail is provided in Table T-2

Table T-2
Instrumentation And Monitors

PFD page	Parameter	Location	Symbol	Description	Manufacturer	Model No.	Range
B01-13-32PERMIT	Weight	H-2170	WT	Dried Solids Feed Hopper	BLH Electronics		
B01-13-32PERMIT	Speed	FE-2170	ST	Volumetric Feeder	Electro-Sensors	SA420	TBD
B01-13-32PERMIT	Speed	RV-2170	ST	Rotary Valve	Electro-Sensors	SA420	TBD
B01-13-32PERMIT	Speed	FE-2171	ST	Transfer Conveyor	Electro-Sensors	SA420	TBD
B01-13-32PERMIT	Speed	FE-2210	ST	Injection Auger	Electro-Sensors	SA420	TBD
B01-15-32PERMIT	Speed	FE-2160	ST	Volumetric Feeder	Electro-Sensors	SA420	TBD
B01-15-32PERMIT	Speed	CV-2161	ST	Elevating Conveyor	Electro-Sensors	SA420	TBD
B01-15-32PERMIT	Weight	ME-2245	WT	Air Lock Weight			
B01-20-32PERMIT	Flow	BU-2310	FT	Natural Gas	Micromotion	RFT9739E55UJ	0-2000 #/hr
B01-20-32PERMIT	Flow	BU-2320	FT	Natural Gas	Micromotion	RFT9739E55UJ	0-2000 #/hr
B01-20-32PERMIT	Pressure	BU-2310	PT	Natural Gas	Yokogawa	EJA430A	0-25 psig
B01-20-32PERMIT	Pressure	BU-2320	PT	Natural Gas	Yokogawa	EJA430A	0-25 psig
B01-20-32PERMIT	Pressure	BU-2310/20	PT	Natural Gas	Yokogawa	EJA430A	0-50 psig
B01-20-32PERMIT	Pressure	BU-2310/20	PT	Combustion Air	Yokogawa	EJA110A	0-30" wc
B01-20-32PERMIT	Flow	BU-2310/20	FT	Combustion Air	Panametrics	PRE868-2-20	0-20000 acfm
B01-20-32PERMIT	Flow	BU-2310	FT	Combustion Air	Panametrics	PRE868-2-20	0-10000 acfm
B01-20-32PERMIT	Flow	BU-2320	FT	Combustion Air	Panametrics	PRE868-2-20	0-10000 acfm
B01-20-32PERMIT	Flame	BU-2310	BS	IR Flame Detector	Fireye	61-6944-030	
B01-20-32PERMIT	Flame	BU-2310	BS	UV Flame Detector	Fireye	61-6944-030	
B01-20-32PERMIT	Flame	BU-2320	BS	IR Flame Detector	Fireye	61-6944-030	
B01-20-32PERMIT	Flame	BU-2320	BS	UV Flame Detector	Fireye	61-6944-030	
B01-21-32PERMIT	Flow	BUL-2310A	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2310B	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2320A	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2320B	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2330/40	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2350	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2350	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-21-32PERMIT	Flow	BUL-2360	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-22-32PERMIT	Pressure	B-2310	PT	Auxilliary Air	Yokogawa	EJA110A	0-30" wc
B01-22-32PERMIT	Flow	B-2310	FT	Auxilliary Air	Panametrics	PRE868-2-20	0-30000 acfm

Table T-2 (continued)
Instrumentation And Monitors

PFD page	Parameter	Location	Symbol	Description	Manufacturer	Model No.	Range
B01-22-32PERMIT	Flow	ME-2220	FT	Auxilliary Air	Yokogawa	YF108	0-30000 acfm
B01-22-32PERMIT	Flow	ME-2220	FT	Auxilliary Air	Yokogawa	YF108	0-15000 acfm
B01-22-32PERMIT	Flow	B-2450	FT	Rear Seal Fan	Panametrics	PRE868-2-20	0-10000 acfm
B01-22-32PERMIT	Temperature	KL-2400	T	Kiln Outlet	Pyromation	Type K TH02-XMTDOW	0-1200 C
B01-22-32PERMIT	Temperature	KL-2400	T	Kiln Outlet	Pyromation	Type K TH02-XMTDOW	0-1200 C
B01-22-32PERMIT	Temperature	KL-2400	T	Kiln Outlet	Pyromation	Type K TH02-XMTDOW	0-1200 C
B01-22-32PERMIT	Pressure	IN-2600	PT	Combustion Pressure	Yokogawa	EJA110A	-5 to +5" wc
B01-22-32PERMIT	Pressure	IN-2600	PT	Combustion Pressure	Yokogawa	EJA110A	-5 to +5" wc
B01-23-32PERMIT	Flow	BU-2610	FT	Natural Gas	Micromotion	RFT9739E55UJ	0-2000 #/hr
B01-23-32PERMIT	Flow	BU-2620	FT	Natural Gas	Micromotion	RFT9739E55UJ	0-2000 #/hr
B01-23-32PERMIT	Flow	BU-2630	FT	Natural Gas	Micromotion	CMF200	0-2000 #/hr
B01-23-32PERMIT	Pressure	BU-2610	PT	Natural Gas	Yokogawa	EJA430A	0-25 psig
B01-23-32PERMIT	Pressure	BU-2620	PT	Natural Gas	Yokogawa	EJA430A	0-25 psig
B01-23-32PERMIT	Pressure	BU-2630	PT	Natural Gas	Yokogawa	EJA430A	0-25 psig
B01-23-32PERMIT	Pressure	BU-2610-30	PT	Natural Gas	Yokogawa	EJA430A	0-50 psig
B01-23-32PERMIT	Flow	BU-2610	FT	Combustion Air	Panametrics	PRE868-2-20	0-8000 acfm
B01-23-32PERMIT	Flow	BU-2620	FT	Combustion Air	Panametrics	PRE868-2-20	0-8000 acfm
B01-23-32PERMIT	Flow	BU-2630	FT	Combustion Air	Panametrics	PRE868-2-20	0-8000 acfm
B01-23-32PERMIT	Flow	BU-2610-30	FT	Combustion Air	Panametrics	PRE868-2-20	0-24000 acfm
B01-24-32PERMIT	Flow	BU-2610	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-24-32PERMIT	Flow	BU-2620	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-24-32PERMIT	Flow	BU-2630	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-24-32PERMIT	Flow	BU-2660	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-24-32PERMIT	Flow	BU-2670	FT	Liquid Waste	Endress & Hauser	63FC25	0-6000 #/hr
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Inlet	Sensycon	TH02	0-1200
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Inlet	Sensycon	TH02	0-1200
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Inlet	Sensycon	TH02	0-1200
B01-40-32PERMIT	Level	T-2800	LT	Quench	Yokogawa	EJA110A	55.4" w.c.
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Outlet	Sensycon	TH02	0-200 C
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Outlet	Sensycon	TH02	0-200 C
B01-40-32PERMIT	Temperature	T-2800	T	Quench - Outlet	Sensycon	TH02	0-200 C

Table T-2 (continued)
Instrumentation And Monitors

PFD page	Parameter	Location	Symbol	Description	Manufacturer	Model No.	Range
B01-40-32PERMIT	Flow	T-2800	FT	Quench water out	Rosemount	8732	304000 #/hr
B01-40-32PERMIT	Temperature	T-2800	T	Quench water out	Sensycon	TH02	0-200 C
B01-40-32PERMIT	Pressure	T-2800	PT	Quench lower sprays	Yokogawa	EJA430A	0-100 psig
B01-40-32PERMIT	Flow	T-2800	FT	Quench lower sprays	Rosemount	8732	32000 #/hr
B01-40-32PERMIT	Pressure	T-2800	PT	Quench upper sprays	Yokogawa	EJA430A	0-100 psig
B01-40-32PERMIT	Flow	T-2800	FT	Quench upper sprays	Rosemount	8732	200000 #/hr
B01-40-32PERMIT	Flow	T-2820	FT	Service Water in	Rosemount	8732	1800000 #/hr
B01-40-32PERMIT	Pressure	T-2820	PT	Water from E-2830	Yokogawa	EJA430A	0-100 psig
B01-40-32PERMIT	Level	T-2820	LT	Condenser	Yokogawa	EJA110A	110.58" wc
B01-40-32PERMIT	Level	T-2820	LT	Condenser	Yokogawa	EJA110A	110.58" wc
B01-40-32PERMIT	Differential Pressure	T-2820		Across packing	Yokogawa	EJA110A	0-15" wc
B01-40-32PERMIT	Pressure	T-2820		Below packing	Yokogawa	EJA430AE	-110" wc
B01-40-32PERMIT	Temperature	T-2820		Outlet	Sensycon	TH02	0-200 C
B01-40-32PERMIT	Pressure	T-2820		Outlet	Yokogawa	EJA110A	-110" wc
B01-41-32PERMIT	Differential Pressure	VS-2900		Venturi Scrubber	Yokogawa	EJA110A	0-100" wc
B01-41-32PERMIT	Flow	VS-2900		Water in	Rosemount	8732	540000 #/hr
B01-41-32PERMIT	Pressure	T-2910		Lower Chlorine Scrubber	Yokogawa	EJA110A	-110/40" wc
B01-41-32PERMIT	Flow	T-2910		Water in	Rosemount	8732	76000 #/hr
B01-41-32PERMIT	Flow	T-2910		Water in	Rosemount	8732	130000 #/hr
B01-41-32PERMIT	Flow	T-2910		Water in	Rosemount	8732	540000#/hr
B01-41-32PERMIT	Differential Pressure	T-2910		Across packing	Yokogawa	EJA110A	0-15" wc
B01-41-32PERMIT	Level	T-2910		Chlorine Scrubber	Yokogawa	EJA110A	115.43" wc
B01-41-32PERMIT	Level	T-2910		Chlorine Scrubber	Yokogawa	EJA110A	115.43" wc
B01-41-32PERMIT	Temperature	T-2910		Chlorine Scrubber Outlet	Sensycon	TH02	0-200 C
B01-41-32PERMIT	Pressure	T-2910		Chlorine Scrubber Outlet	Yokogawa	EJA110A	-110/40" wc
B01-41-32PERMIT	pH	T-2910		pH scrubbing liquid	Rosemount	3081	0-14
B01-41-32PERMIT	pH	T-2910		pH scrubbing liquid	Rosemount	3081	0-14
B01-41-32PERMIT	Pressure	B-3000		1st ID Fan outlet	Yokogawa	EJA110A	-110/40" wc
B01-43-32PERMIT	Flow	IWS		Water back to condenser	Rosemount	8732	160000 #/hr
B01-43-32PERMIT	Flow	IWS		IWS recirculation	Rosemount	8732	1000000 #/hr
B01-43-32PERMIT	Flow	IWS		IWS recirculation	Rosemount	8732	1000000 \$/hr

Table T-2 (continued)
Instrumentation And Monitors

PFD page	Parameter	Location	Symbol	Description	Manufacturer	Model No.	Range
B01-43-32PERMIT	Flow	IWS		IWS recirculation	Rosemount	8732	1000000 #/hr
B01-43-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-43-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-43-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-43-32PERMIT	Level High	IWS		IWS Tank Level	Sensall	FMJNOP	N.A.
B01-43-32PERMIT	Level High	IWS		IWS Tank Level	Sensall	FMJNOP	N.A.
B01-43-32PERMIT	Level High	IWS		IWS Tank Level	Sensall	FMJNOP	N.A.
B01-43-32PERMIT	Level	IWS		IWS Tank Level	Yokogawa	EJA110A	14.76" w.c.
B01-43-32PERMIT	Level	IWS		IWS Tank Level	Yokogawa	EJA110A	14.76" w.c.
B01-43-32PERMIT	Level	IWS		IWS Tank Level	Yokogawa	EJA110A	14.76" w.c.
B01-43-32PERMIT	Flow	IWS		IWS outlet - gas flow	Panametrics	GM868-1-11-10003-S	0 - 25000 acfm
B01-45-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-45-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-45-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-45-32PERMIT	Flow	IWS		IWS outlet - gas flow	Panametrics	GM868-1-11-10003-S	0 - 25000 acfm
B01-46-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-46-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-46-32PERMIT	Flow	IWS		IWS Plate water	Rosemount	8732	50000 #/hr
B01-46-32PERMIT	Flow	IWS		IWS outlet - gas flow	Panametrics	GM868-1-11-10003-S	0 - 25000 acfm
B01-48-32PERMIT	Pressure	B-3200		Fan inlet	Yokogawa	EJA110A	=-110/40
B01-48-32PERMIT	Flow	SK-3300		Stack Gas Flow	Panametrics	GM868-1-11-10003-S	0 - 75000 acfm
B01-48-32PERMIT	Flow	SK-3300		Stack Gas Flow	Panametrics	GM868-1-11-10003-S	0 - 75000 acfm
B01-48-32PERMIT	Temperature	SK-3300		Stack Temperature	Sensycon	TH02	0 - 200 C
B01-48-32PERMIT	SO2	SK-3300		Sulfur dioxide	ABB Inc	Limas 11	0 - 300 ppmv
B01-48-32PERMIT	NOx	SK-3300		Nitrogen Oxides	ABB Inc	Limas 11	0 - 600 ppmv, 0 -2500 ppmv
B01-48-32PERMIT	CO	SK-3300		Carbon Monoxide	ABB Inc	Uras 14	0-200 ppmv, 0-3000 ppmv
B01-48-32PERMIT	O2	SK-3300		Oxygen	ABB Inc	Magnos 16	0-25%

*Instruments subject to change but will maintain equivalent performance

Table T-3
Automatic Waste Feed Cutoffs for Incinerator
From MDEQ Air Permit, EU32INCINERATOR-S1*

Operating Parameter	Waste Feed Cutoff Limit	Averaging Time Period
a. Induced fan on	Off	Response initiated immediately upon detection
b. ESV closed (See Note #2)	Open	Response initiated immediately upon detection
c. Span value of any CMS	Met or exceeded	Response initiated immediately upon detection
e. Maximum Kiln Pressure (upon installation & operation of the plenums)	<p>If the pressure in the kiln is greater than ambient, and any of the following three scenarios occur:</p> <p>(A) The pressure difference between the kiln pressure and the inlet and/or outlet plenums is less than 0.2 inches of water.</p> <p>(B) The pressurizing equipment for either plenum fails.</p> <p>(C) The pressure in the kiln is greater than the pressure in the inlet and/or outlet plenums at any time.</p>	Response initiated immediately upon detection
f. Minimum O ₂ content	3.0 %	15 minutes
g. Maximum CO concentration	100 ppmv at 7% O ₂	One hour
h. Maximum total waste feed to the incinerator	30,000 lb/hr	One hour
i. Maximum total pumpable waste feed to kiln	11,409 lb/hr	One hour
j. Maximum total waste feed to SCC	6941 lb/hr	One hour
k. Maximum Stack Gas Flow rate	51,871 scfm	One hour
l. Minimum Kiln Temperature	783°C	One hour
m. Minimum SCC Temperature	959°C	One hour
n. Minimum chlorine scrubber differential pressure	0.35 in. w.c.	One hour
o. Maximum Inlet temperature to condenser	120°C	One hour
p. Minimum Water flow to venturi	750 gpm	One hour
q. Minimum Differential pressure venturi	50 in. w.c.	One hour
r. Minimum pH Venturi	7.5	One hour
s. Minimum total water flow to HCl scrubber	1000 gpm	One hour
t. Minimum Blowdown from Quench	425 gpm	One hour
u. Minimum Blowdown from chlorine scrubber/venturi	65 gpm	One hour

Table T-3 (cont.)
Automatic Waste Feed Cutoffs for Incinerator
From MDEQ Air Permit, EU32INCINERATOR-S1*

Operating Parameter	Waste Feed Cutoff Limit	Averaging Time Period
v. Minimum total water Flow to Quench	638 gpm	One hour
w. Minimum water flow to Condenser	2,707 gpm	One hour
x. Minimum Condenser differential pressure	0.25 in. w.c.	One hour
y. Minimum inlet water pressure to Condenser	5 psig	One hour
z. Minimum water flow from Condenser to Quench	300 gpm	One hour
aa. Minimum power (kV) to IWS	8 in 7 or more units	2 minutes
bb. Maximum ash feed rate in all feedstreams	10,636 lb/hr	12 hours
cc. Maximum chlorine and chloride feed rate in all feedstreams	5,500 lb/hr	12 hours
dd. Maximum mercury in all feedstreams	0.70 lb/hr	12 hours
ee. Maximum SVM feed rate in all feedstreams	48.1 lb/hr	12 hours
ff. Maximum LVM feed rate in all feedstreams	28.6 lb/hr	12 hours
gg. Maximum pumpable LVM feed rate	8.23 lb/hr	12 hours
hh. Minimum water flow in each recycled water system (i.e., 1 st , 2 nd and 3 rd stage) of the IWS.	900 gpm	One hour
ii. Minimum water flow to the plates of each IWS unit. (There are 9 IWS units in the IWS system.)	15 gpm in each of 7 or more units	One hour
jj. Minimum blowdown from IWS to packed tower condenser	161 gpm	One hour
kk. Flame detectors system (See note #3)	Off	Response initiated immediately upon detection
<p>Note #1: Where redundant devices are used, malfunction is defined as failure of all redundant monitoring devices.</p> <p>Note #2: The permittee shall monitor and record the emergency bypass operating time (minutes per day) of the APC system and associated cause on a continuous basis, unless otherwise noted, in a manner and with instrumentation approved in writing by the AQD.</p> <p>Note #3: The flame detectors system is only used during startup until the combustion chamber has reached the auto-ignition temperature.</p> <p>Note #4: Automatic cutoff of the vent streams from 1005 Building (EUC3-S1) and the tank farm (EUB7-S1) is not required unless one of the following three operating parameters is not met: Maximum Stack Gas Flow Rate (4.k), Minimum Kiln Temperature (4.l), or Minimum SCC Temperature (4.m).</p>		

* These limits may change based on Compliance Performance Testing. The Renewable Operating Permit should be referenced for the current operating parameters and their associated limits and averaging times.