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PLANT 6 PERCHED WATER REMOVAL ACTION SPECIFICATIONS WMCO PROJECT #00-90701 WMCO SITE ENGINEERING

03/27/91

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REPORT

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U. S. Department of Energy

Feed Materials Production Center

Plant 6 Perched Water Removal Action Specifications

WMCO Project #00-90701

WMCO Site Engineering

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OU Manager

U. S. Department of Energy

Approved by: RSS for APAvel 3/29/91

OU Manager

PLANT 6 CONTAMINATED GROUNDWATER REMOVAL ACTION SPECIFICATION

1.0 SCOPE OF WORK

1.1 EXTRACTION PUMP CARTS

1.1.1 Provide 20 AMP GFCI protected electrical circuit to each of the following wells: 1148, 1149, 1615, 1161, and the clarifier pit.

See Drawing #06X-5500-E-08150 for conduit routing and lighting panel to be used.

1.1.2 Install suction line and control sensors in well 1615 and the clarifier pit. The suction line is to be PVC pipe inside the well and SS pipe outside the well, not completely PVC as shown in Drawing #06X-5500-G-08123. Other details, including the well cap, are to be followed.

1.1.3 Update all six (6) extraction pumps as shown in Drawing #06X-5500-G-08123. This includes adding an interlocking relay on each pump cart and supplying necessary hardware missing on spare pump carts so all carts are ready for use. Pump assemblies at Wells 1161 and 1149 require removal of pressure gauge and extra faucet.

1.1.4 Provide interlocking control wiring to all pump carts and storage tank control box. See Drawing #06X-5500-E-08150.

1.1.5 Provide stainless steel piping from all pump carts to the Plant 6 storage tank. See Drawing # 06X-5500-P-08151.

1.1.6 Provide support for start-up of pump carts.

1.2 PLANT 6 STORAGE TANK (Formerly NO_x System Recirculating Tank #2)

1.2.1 Demolition

Disconnect recirculating tank #2 from the NO_x system. This requires electrical power, instrumentation and piping disconnections. Such items as the recirculating pumps need to be removed and their wiring removed back to the local disconnect switches.

The discharge piping from the recirculating pumps and the tank vent pipe are to be removed. Also, the overflow, drain, by-pass, scrubber drain return and caustic delivery lines are to be removed. The tank instrumentation is to be disconnected but left in place. The high, low and fill level floats are to be re-used. See Drawing #06H-3900-E-07599, #06H-3900-E-07603, #06H-3900-E-07601, #06H-3900-E-07600, #06H-3900-S-07824, #06H-3900-S-07829, #06H-3900-M-07845, #06H-3900-M-07847, #06H-3900-E-07850 and #06H-3900-E-07849.

<u>Note</u>: The NO_x system control panel needs to remain operational because Plant 6 operations uses the pH meter in the caustic tank each Friday

to check the tank's contents.

1.2.2 Provide new electrical service to the Plant 6 storage tank. This includes new 480V electrical service and 120V controls. See Drawing #06X-5500-E-08150, #06H-3900-E-07601, #06H-3900-E-07600, #06H-3900-M-07847 and #06H-3900-E-07599.

1.2.3 Blank off all ports on former NO_x recirculating tank #1. See Drawing #06H-3900-M-07845.

1.2.4 Install new float valve and carbon filter on existing vent port. See Drawing #06H-3900-M-07845.

1.2.5 Provide Plant 6 storage tank with new SS piping and pump for unloading. See Drawing #06H-3900-S-07824 and #06H-3900-M-07845.

1.2.6 Modify existing Plant 6 NO_x system sump to pump to storage tank. See Drawing #06H-3900-P-07587.

LIST OF DRAWINGS

Number	Title
1	Extraction Pump Discharge Lines for Perched Water System (Drawing #06X-5500-P-08151, Rev. 0)
2	Electrical Power and Control Conduit for Perched Water System (Drawing #06X-5500-E-08150, Rev. 0)
3	Pump Assembly and Details (Drawing #06X-5500-G-08123, Rev. 1)
4	NO_x Single Line Diagram (Drawing #06H-3900-E-07599, Rev. 2)
5	NO_x Electrical Elementary Diagrams (Drawing #06H-3900-E-07603, Rev. 2)
6	NO_x Lighting and Instrumentation Plan (Drawing #06H-3900-E-07601, Rev. 2)
7	NO_x Power and Grounding Plan (Drawing #06H-3900-E-07600, Rev. 2)
8	NO_x Destructor System (Drawing #06H-3900-S-07824, Rev. 7)
9	NO_x Destructor System (Drawing #06H-3900-S-07829, Rev. 4)
10	NO_x Destructor System (Drawing #06H-3900-M-07845, Rev. 5)
11	NO_x Destructor System (Drawing #06H-3900-M-07847, Rev. 2)
12	NO_x Destructor System (Drawing #06H-3900-E-07850, Rev. 3)
13	NO_x Destructor System (Drawing #06H-3900-E-07849, Rev. 3)
14	NO_x Destructor System (Existing Sump) (Drawing #06H-3900-P-07587, Rev. 3)

2.0 ELECTRICAL - GENERAL

2.1 GENERAL

2.1.1 The specifications and plans determine the general arrangement and locations of the equipment, conduit and wiring work of the electrical systems as covered in these specifications.

2.1.2 The Construction Contractor shall, with the approval of the Operating Contractor, make all reasonable modifications as may be needed to prevent conflict with the work of other trades and for proper execution of this work.

2.1.3 The Construction Contractor shall inspect the area in which the work is to be performed and note any obstructions to the placement of equipment or other material he is to install. Any foreseeable deviation from the design will be processed in accordance with the Construction Change Proposal (CCP) Procedure.

2.2 DESCRIPTION OF WORK

2.2.1 The work covered by these specifications consists of the installation of all electrical equipment and systems, or partial systems, as shown on the drawings and as specified herein. The Construction Contractor shall furnish all labor and material required for the complete installation of electrical equipment, systems and partial systems unless otherwise specified.

2.2.2 Wherever the specifications or electrical plans require the Construction Contractor to install any apparatus or equipment, he shall furnish the apparatus or equipment (unless otherwise specified), connect same, test and leave it ready for operation.

2.2.3 The installation shall be in strict accordance with the latest edition of the National Electrical Code (NFPA No. 70) unless otherwise shown or specified.

2.3 PLANS

2.3.1 The work shall be in strict conformance with specifications and drawings. The Construction Contractor shall follow the electrical drawings in routing out the work where specific locations are given for conduits or equipment. The Construction Contractor shall refer to all architectural, heating and ventilating, mechanical, piping, and structural drawings to verify the spaces in which all of his work will be installed.

2.3.2 The Construction Contractor shall provide red lined sketches at the time of contract completion to the WMCO PM/PE in charge of the project.

2.4 MATERIAL AND WORKMANSHIP

2.4.1 Unless otherwise noted on drawings or specified, all material furnished by the Construction Contractor shall be new, of industrial grade, and shall

conform to the standards of the Underwriter's Laboratories, where such standard has been established for the particular type of material.

2.4.2 Installation workmanship shall be of the best quality and skill. The completed installation shall present a neat mechanical appearance.

2.5 GAUGES

2.5.1 Unless otherwise specified, all wire and cable sizes given in this specification or on the electrical drawings shall be understood to be in American Wire Gauge, and thickness of metal in U.S.S. Sheet Steel Gauge.

2.6 CUTTING, DRILLING AND REPAIRING

2.6.1 The Construction Contractor may do any cutting necessary for proper installation of electrical work and he shall repair same. All penetrations through or removal of any asbestos materials must be handled according to current Site rules and permits.

2.6.2 Cutting, drilling or tapping of building structural steel shall not be permitted, except where approved by the WMCO PM/PE in charge of the project.

2.7 CONDUIT INSTALLATION

2.7.1 All conduit furnished by the Construction Contractor shall be heavy wall aluminum or hot-dipped galvanized steel, except where otherwise shown on the drawings or specified.

2.7.2 Conduits shall be continuous from outlet to outlet, and from fitting to fitting. Conduit shall be secured to all boxes and fittings in such a manner that each system shall be electrically continuous and mechanically secure from point of service to all outlets. Terminals of heavy wall conduit shall be furnished with two lock-nuts and one insulating bushing, except where threaded into hubs. Conduit ends must be capped with an approved cap to keep clean and clear until wire is drawn into the conduit.

2.7.3 All conduit shall be supported by approved conduit hangers. Hangers shall be attached with cinch anchors, toggle bolts or threaded connection, as required by the prevailing conditions. Existing conduit supports shall be used wherever practicable.

2.7.4 Conduit runs shall be installed at least 12 inches from parallel steam or hot water piping, or any other hot pipe or ducts, and at least three inches from parallel cold water piping. Conduits shall in no case be secured directly to any piping or ducts, except where specifically noted or shown.

2.7.5 All conduit connections to motors on sliding bases or other electrical equipment subject to movement for position adjustment or subject to excess vibration shall be made with liquid-tight flexible conduit (or Code Type SO cable when noted on drawings). Liquid-tight flexible conduit termination shall be with liquid-tight connector. Type SO cable shall be

terminated in a sealing grip connector. If and when type SO cable is used, one conductor is to be utilized for a ground. Length of flexible conduit or SO cable shall be held to the minimum required to provide the necessary movement. Flexible conduit or SO cable is to be used only in the above-mentioned instances, unless otherwise specifically noted on drawings.

2.7.6 All exposed conduit shall run parallel with building walls using right angle bends. Exposed diagonal runs of conduit will not be permitted, except where specifically noted or shown on drawings.

2.7.7 Right angle turns or tees shall consist of symmetrical bends or cast fittings, unless otherwise specified or shown on the drawings. Bends and offsets shall be avoided wherever possible. Field bends shall be made so as to avoid changing the internal diameter of the conduit and so as not to damage its protective coating, either outside or inside. Bends and offsets shall be free from kinks, indentations, or flattened surfaces and shall be made with approved conduit bending machines or devices. The use of heat in bending will not be permitted.

2.7.8 All conduit shall be cut with square ends and cleaned by reaming.

2.7.9 Heavy wall conduit joints shall be threaded fully and pulled tight with a wrench.

2.7.10 Extreme care shall be exercised to prevent the accumulation of water, dirt, concrete or other foreign materials in conduits during the execution of the work. Conduits in which water or other foreign material has accumulated shall be thoroughly cleaned. Where such accumulation cannot be removed by methods approved by the Operating Contractor, the conduit run shall be replaced.

2.7.11 Conduit unions or other threaded couplings shall be used where required. Split and welded couplings, running threads or other makeshift methods of joining heavy wall conduits are not permitted except where specifically shown on drawings.

2.8 FITTINGS, JUNCTION BOXES AND PULL BOXES

2.8.1 All necessary fittings, junction boxes and pull boxes, required for complete installation, shall be installed whether shown on the drawings or not.

2.8.2 All fittings, junction boxes and pull boxes installed outdoors shall be water-tight with rubber-gasketed covers. Conduit shall enter through threaded hubs.

2.8.3 All sheet metal junction boxes and pull boxes shall be galvanized steel unless otherwise shown or specified.

2.8.4 Threaded cast junction fittings shall be used where necessary for conduit junctions. Small pressed metal boxes are not to be used for this purpose.

2.8.5 All nuts, bolts, screws or other fastening devices used in the fabrication or

installation shall be brass or cadmium-plated steel unless otherwise noted.

2.9 WIRE AND CABLE

2.9.1 All wire and cable shall be of the size shown on the drawing and shall comply with the material specifications on drawing or as herein specified. All wires and cable shall be 600 Volt rating, Code Type THWN (unless otherwise shown on drawing or specified) and labeled.

2.9.2 All power wiring shall be stranded unless otherwise shown or specified.

2.9.3 All control wiring shall be stranded and shall be marked at each terminal with a permanent tag or adhesive marker and shall be marked in accordance with wiring diagram identification.

2.9.4 Wires and cables shall be installed in a conduit system after the conduit system has been completely installed. Wires and cables shall not be taped or tied together prior to pulling in conduit unless otherwise shown on the drawings or specified.

2.9.5 Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet boxes, junction boxes or wiring troughs. (Exception: Fixture drops from "T" type conduit fittings, ground wire, and in junction fittings adjacent to small coil devices without splice box.)

2.9.6 All splices and taps shall be made with solderless cable connectors. Where cable connectors are used, it is important that all contact surfaces shall be cleaned to insure maximum conductivity.

2.9.7 All stranded wire shall be terminated in screw type or crimped pressure lugs.

2.9.8 All splices shall be properly insulated and shall provide insulation not less than that of the insulation of the conductors.

2.9.9 The best care shall be exercised while installing wire in conduit so as not to injure the conductor insulation. No oil, grease or compound other than an approved wire pulling compound shall be used in pulling conductors.

2.9.10 Panel wiring shall be done in a neat and workmanlike manner. Control wiring shall be installed in a wiring channel or formed and tied to present a neat mechanical appearance.

2.9.11 Wire insulation may be any color with the exceptions that white or gray shall be used for neutrals only and green shall be used for equipment grounding only.

2.10 MOTOR CONTROL

2.10.1 All motor starters (new or existing) shall be equipped with the proper sized heaters in accordance with motor nameplate data (obtained by field inspection) and the starter manufacturer's recommendations.

2.10.2 Adjustable circuit breakers of combination starters so equipped shall be adjusted to the lowest setting which will permit the motors to start. All poles shall be set to the identical set point.

2.10.3 Fuses for switches and combination starters and control circuits shall be dual element type of volt and ampere rating indicated on drawing.

2.11 EQUIPMENT GROUNDING

2.11.1 All electrical equipment, including panelboards, junction boxes, safety switches, etc., shall be securely grounded. Existing grounding systems shall be retained and utilized as appropriate.

2.11.2 Under no circumstances shall conduit be used as an equipment grounding conductor. All equipment grounding conductors shall be copper, either bare or green-color insulated. Where aluminum conduit is used, <u>only</u> the green-color insulated conductor is acceptable.

2.11.3 Equipment grounding conductors, where not otherwise specified, shall be sized in accordance with the National Electrical Code.

2.11.4 In all buildings, the conduit system, pipes or metallic tubing of the plumbing system, gas system, air system and/or other systems employing metallic tubing or piping, and all other members which may act as a current carrying path to ground shall be effectively bonded together to keep the electrical potential differential essentially at or very near zero.

2.12 IDENTIFICATION

2.12.1 Each item of electrical equipment, pushbuttons, switches, motor starters, relays, etc., shall be identified by means of a white and black laminated plastic nameplate with black letters on white background properly attached to the equipment and so located to be visible from the front. Nameplates shall be attached by screws where practical.

2.12.2 The Construction Contractor shall furnish and install all nameplates where drawings call for labeling of equipment.

2.13 MATERIAL SPECIFICATIONS

2.13.1 The Construction Contractor shall furnish and install all materials required for the complete installation called for on the drawings and in the specifications except where otherwise noted. Upon receipt of electrical material and equipment, the Construction Contractor shall inspect, test, sign for, and assume full responsibility for damage or loss.

2.13.2 All parts are generic description on the drawings. Certain vendor part numbers are noted as aids to obtaining the correct materials and are not to imply this is the only material acceptable. All materials are to be approved by Operating Contractor.

2.14 INSPECTION AND TESTING

All electrical equipment, materials and systems installed in the facility shall be thoroughly tested for satisfactory operation in accordance with applicable industry standards and as herein specified to determine compliance with the specifications and drawings. In addition, the Construction Contractor shall conduct such tests from time to time as may be requested by the Operating Contractor.

2.14.1 Wire and cable shall be visually inspected prior to installation for faulty insulation. Before connection to equipment, all wire shall be tested for resistance to ground.

2.14.2 The Construction Contractor shall visually inspect all field connections for proper phasing and connections.

2.14.3 The Construction Contractor shall be responsible for furnishing all test equipment and for the proper and safe conductance of all tests. The Construction Contractor shall repair or replace all circuit components where test values are unacceptable. The repair or replacement of circuit components damaged by the Construction Contractor during testing will not constitute a reason for contract revision.

2.14.4 All testing shall be performed in the presence of and with the approval of the Operating Contractor and, where applicable, the manufacturer's service engineer. All parties shall be notified in writing well in advance of any tests to be performed to allow ample time for them to schedule for witnessing.

2.14.5 Perform continuity and operational tests on all receptacle, power and control circuits.

Test all 125 Volt, 3-wire grounding receptacles, including those provided for temporary power, for correct wiring and for correct operation of GFCI (if receptacle is so protected), by use of a receptacle circuit tester such as Leviton Model 6185 or approved equal.

Check all control and interlocking wiring for proper operation. Perform operational tests with Construction Contractor to assure that control wiring has been properly installed.

Perform insulation resistance test on 480 Volt circuits and motors after installation and before energization using a 1,000 Volt Biddle Megger test set, or approved equal. Investigate causes and take appropriate remedial action when insulation resistance tests less that 5 Megohms, or when multiple tests indicate a significant downward trend in the resistance readings. Similarly test circuits for lower voltages using a 500 Volt test set.

Do not perform insulation resistance test on circuits operated below 120 Volts nor on solid-state equipment or static ground fault devices, including ground fault circuit interrupters, nor on any circuit connected to equipment containing solid-state devices, unless such test is authorized by, and is performed in strict accordance with, equipment manufacturer's

recommendations, or in lieu thereof, disconnect equipment from the circuit.

2.14.6 All test and calibration data must be recorded on approved data sheets and submitted to the Operating Contractor for review.

3.0 PIPING - GENERAL

3.1 SERVICE RATING

3.1.1 Maximum Pressure - 50 psig for Perched Water System

3.1.2 Temperature Range - 32°F to 100°F

3.2 MATERIALS AND EQUIPMENT

The material list of this specification is comprehensive in nature. It is not intended that all materials listed will necessarily be required, but that those required for the work shall be selected from this listing unless otherwise shown on the drawings.

3.2.1 CODES

Where details of fabrication are not shown on the drawings or specified in this or other specifications, fabrication shall be in accordance with the applicable requirements of ASME/ANSI B31.3, "Code for Pressure Piping, Chemical Plant and Petroleum Refinery Piping."

3.2.2 MATERIALS

ITEM	SIZE	SPECIFICATION
Pipe	1/2" to 4"	Stainless steel, Type 304L, Schedule 405, ASTM A-312, seamless or welded, or ASTM A-269, seamless or welded.
Pipe Fittings	1/2" to 4"	Wrought stainless steel, Schedule 405, ASTM A-403, screw and socket weld end socket ANSI-15.11, NPT pipe threads ANSI B1.20.1.
Dope		TFE, ribbon thread sealant, Permacel or Scotch brand.
Bolts & Nuts		Semifinished regular hex-head cap screws (bolts), Type 304 stainless steel, ASTM A-193, Grade B8, NC thread, with semifinished regular hex-head nuts, Type 303 stainless steel, ASTM A-194, Grade 8F, NC thread.
Valve Stem Packing	All	Teflon

Valve Body Seat/Seal	Teflon

3.2.3 VALVES

Shut-off

SERVICE	SIZE	MATERIAL BODY	TRIM	TYPE OF ENDS
Ball	1/4" to 2"	316SS	TFE/316SS	Socket Weld or Threaded

Check

SERVICE	SIZE	MATERIAL BODY	TRIM	TYPE OF ENDS
Swing	1/2" to 2"	316LSS	TFE/316SS	SW or threaded

3.2.4 CLEANING

Flush the new piping with potable water. Block the control valves in the open position, then introduce the water at remote ends of the piping system. Flush from the upstream side of the checkvalves. Alternately open each extremity of the line so that the entire system is flushed. Flushing of pipe shall be witnessed by Operating Contractor.

3.2.5 PIPING INSTALLATION

3.2.5.1 Materials

Unless otherwise noted on the drawings, materials shall be provided as specified herein. All materials shall be in strict accordance with the required American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM) Standards or other approved standards and specifications. All valves shall be as specified.

3.2.5.1 Fabrication and Installation

The following details of fabrication and installation apply to this specification. Additional requirements, if any, will be detailed within the various subsections or on the drawings.

A. General

(1) Piping materials, including valves and fittings, shall be delivered to the site in a clean and protected condition. End seals of pipe, valves and flange covers shall be maintained in place and may be removed only as necessary for cleaning, fabrication,

erection or inspection. Care shall be exercised in the handling and storage of all piping materials and prefabricated piping so that contamination by moisture, grease, dirt, or injurious foreign matter shall not occur.

(2) Piping specified on the drawings shall follow the routing shown on the drawings. The pipe shall be cut accurately to measurements specified on the drawings and to suit field conditions, and shall be carefully worked into place without forcing or springing. Connections to the headers shall be top entry.

(3) The interior or exterior surfaces of all piping shall be kept clean at all times. Pipe shall be free of fins and burrs.

(4) Flanges, unions and valves shall be installed as specified and shall be located where they will be accessible after erection.

(5) Valves shall be properly packed and made leak proof under the test pressure described.

(6) Valves which are to be soldered, brazed or welded shall be disassembled prior to heating. Valves shall be allowed to cool, shall be cleaned if necessary and shall be reassembled.

B. Cutting

Pipe and tubing shall be cut accurately to measurements as specified on the drawings and to suit field conditions. Tube or pipe cutters, or other methods approved by the Operating Contractor, shall be used. All cuts shall be reamed to remove burrs. Any objectionable defects shall be removed by machining, chipping or grinding.

C. Bending

(1) RADIUS: Bending radii shall, in no case, be less than the minimum radii recommended in the "Pipe Fabrication Institute Standard ES3," latest edition.

(2) COLD BENDING: Cold bending shall be done only with approved standard bending methods.

D. Joining Methods

(1) THREADING: Threading of pipe shall be done preferably after any bending, forging or heat treating operations. Where threading must be

performed first, threads shall be protected during such operations. Threads shall conform to ANSI B2.1. Pipe dope shall be applied to the male threads only.

a. When threading chemically cleaned pipe, use OSHA approved cutting fluid.

b. Teflon ribbon, when used as thread dope, shall not be applied to the first two threads on the pipe.

(2) WELDING:

a. General

1. All welding, qualification procedures and qualification of welders shall be in accordance with ASME Boiler and Pressure Vessel Code, Section IX, and applicable ANSI code for pressure piping and welding specifications. Welding procedures and welders shall be qualified by the Construction Contractor or by an independent testing laboratory. Approval of welding procedures and Welders' qualifications by Operating Contractor only. Each welder shall be assigned an identification number, letter or symbol that shall be used to identify his work when specified in applicable codes, standards or specifications.

2. All welds are subject to inspection by the Operating Contractor. The Operating Contractor reserves the right to accept, reject or demand removal of welds which are in violation or believed to be in violation of these specifications. Welders performing welds found to be unsound shall be subject to appropriate retest provisions of the ASME Boiler Code or other applicable standards.

3. Socket weld joints shall be assembled so that the space between the end of the pipe and the bottom of the socket is no less than 1/16 inch or no more than 1/8 inch.

4. Welded branch connections to headers shall be made by the use of welded outlet fittings, such as reducing tees, weldolets, sockolets and threadolets as shown on the drawings in compliance with the ANSI Code for Pressure Piping B31.1.0, Paragraph 127.4.8.

5. Welded miter bends shall not be used unless so specified on the drawings.

b. Welding Rods and Electrodes

1. All bundles, boxes or kegs in which rods and electrodes are delivered shall be legibly marked with the following information:

   Classification
   Trade Designation
   Manufacturer's Name
   Standard Size and Length
   Heat Number

2. All welding rods shall be identified with at least one imprint per rod showing the AWS classification number in accordance with AWS A5.1(15). In addition, welding rods 1/8 inch diameter and over shall be marked or stamped with positive identification marks at intervals of not than 18 inches. Such marks shall be clearly distinguishable and shall include the classification number of the welding rod and the trade designation of the manufacturer.

3. Welding rods and electrodes shall be stored, handled and identified at all times to ensure the use of the proper welding rod in a welding process.

c. Welding Standards

Welding procedures and welders' qualifications for the various stainless steel and nonferrous service piping systems listed below shall be in accordance with the applicable welding specifications specified:

SERVICE	WELDING PROCEDURE
Perched Water System	All welds shall be made in accordance with Welding Procedure Specification WPS No. SS 2.0 (Gas Tungsten - Arc Welding Stainless Steel Materials).

d. Hangers and Anchors

The location and spacing of hangers shall be such that the piping or tubing is held in position without swaying, vibrating or sagging excessively. Spacing shall not exceed maximum spans given below:

PIPE SUPPORT SPACING
MAXIMUM SPAN IN FEET

SCHEDULE NUMBER	NOMINAL PIPE SIZE, INCHES 1/2"	3/4"	1"	1-1/2"	2"	3"	4"
40	9	11	14	16	18	22	24

3.3 TESTING AND INSPECTION OF PIPING SYSTEM

3.3.1 TESTING AND INSPECTION

General requirements for tests to be performed on installed piping systems under this specification shall be as follows:

3.3.1.1 Blank off or replace with spool pieces items of equipment (e.g. vessels, pumps, instruments, controls, safety and relief valves) rated for pressures below the test pressure. Before performing final operating pressure tests on a system, remove test blanks and spool pieces and reconnect protected instruments and equipment.

3.3.1.2 Inspect all parts of the system for leaks, especially at valves, flanges, welds, threaded connections, and packed joints. All leaks shall be repaired and the repaired joints retested.

3.3.1.3 Soap solution for soap testing shall be a soapless lather, leak detector solution.

3.3.1.4 Use adequate precautions during pressure testing. Clear the installation area of personnel not engaged in testing operations. Visually inspect the system installation for compliance with the design drawings and specifications.

3.3.1.5 Potable water shall be used as the test medium when testing piping systems.

3.3.1.6 The test shall be performed in the presence of an authorized representative of the Operating Contractor.

3.3.2 HYDROSTATIC TESTING

3.3.2.1 Testing consists of hydrostatically pressure testing piping systems or isolated sections of piping systems with water. Test pressures and test procedures shall be as follows:

A. Test Pressure

Test pressure shall be 1.5 times the maximum working pressure, unless otherwise specified on the drawings, but not less than 50 psig.

B. Test Procedure

(1) All weld inspections by Operating Contractor shall be performed prior to pressure testing the system.

(2) Pressure gauges shall have current calibration stackers attached to the gauge (within one year of current date).

(3) All equipment items shall be protected in accordance with Paragraphs 3.3.1.1 and 3.3.14 and all joints to be exposed during the test period.

(4) Pressurize the system to test pressure and hold pressure for 10 minutes. While holding pressure visually inspect all joints and connections for leaks.

(5) Repair leaks by approved repair procedures by the Operating Contractor.

(6) Retest repaired joints with service medium and repeat Steps 2 through 5.

ENGINEERING STANDARD

NUMBER	Y-ES-4.3-5
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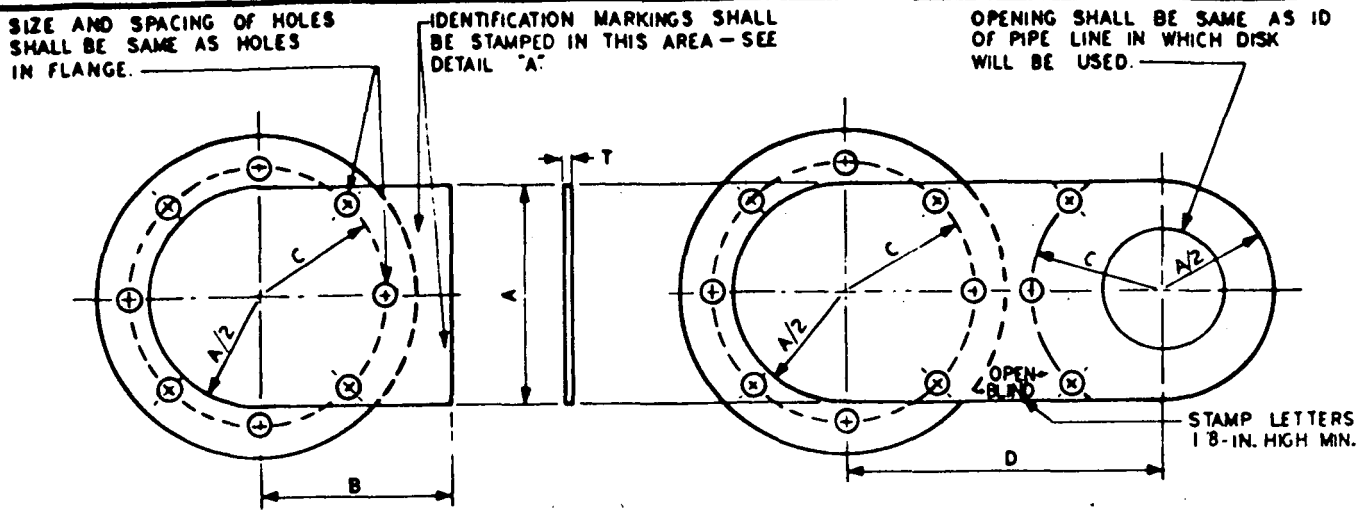
BLANKING DISKS FOR PIPE LINES



TYPE I

TYPE II

NOMINAL PIPE SIZE	FOR 150 LB. STANDARD FLANGES									FOR 300 LB. STD. FLANGES						FOR 400-LB. STD. FLANGES					FOR 600-LB. STD. FLANGES				
	A	B	C	D	"T" FOR 15 PSI	"T" FOR 30 PSI	"T" FOR 50 PSI	"T" FOR 100 PSI	"T" FOR 150 PSI	A	B	C	D	"T" FOR 200 PSI	"T" FOR 300 PSI	A	B	C	D	"T" FOR 400 PSI	A	B	C	D	"T" FOR 600 PSI
1/2	1 3/4	2 3/4	1 3/16	4 1/2	SEE NOTE 1				#GA[2]	SEE NOTE 3						SEE NOTE 3					2	2 7/8	1 5/16	4 3/4	#GA[2]
3/4	2 1/8	2 15/16	1 5/8	4 7/8					#GA[2]												2 1/2	3 5/16	1 5/8	5 5/8	#GA[2]
1	2 1/2	3 1/8	1 9/16	5 1/4					#GA[2]												2 3/4	3 7/16	1 3/4	5 7/8	#GA[2]
1 1/2	3 1/4	3 1/2	1 15/16	6					#GA[2]	SEE NOTE 3						3 5/8	4 1/16	2 1/4	7 1/8	#GA[2]	3 5/8	4 1/16	2 1/4	7 1/8	3/16
2	4	4	2 5/8	7					#GA[2]	SEE NOTE 3						SEE NOTE 3					4 1/4	4 1/4	2 1/2	7 1/2	3/16
3	5 1/4	4 3/4	3	8 1/2	SEE NOTE 1			#GA[2]	3/16	5 3/4	5 1/8	3 5/16	9 1/4	SEE NOTE 1	3/16	5 3/4	5 1/8	3 5/16	9 1/4	1/4	5 3/4	5 1/8	3 5/16	9 1/4	3/8
4	6 3/4	5 1/2	3 3/4	9	SEE NOTE 1	#GA[2]	SEE NOTE 1	3/16	3/16	7	6	3 5/16	10	SEE NOTE 1	1/4	6 7/8	6	3 5/16	10	3/8	7 1/2	6 3/8	4 1/4	10 3/4	3/8
6	8 5/8	6 1/2	4 3/4	11	SEE NOTE 1	#GA[2]	3/16	SEE NOTE 1	1/4	9 3/4	7 1/4	5 5/16	12 1/2	SEE NOTE 1	3/8	9 5/8	7 1/4	5 5/16	12 1/2	1/2	10 5/8	8	5 3/4	14	1/2
8	10 7/8	7 3/4	5 7/8	13 1/2	#GA[2]	SEE NOTE 1	3/16	SEE NOTE 1	3/8	12	8 1/2	6 1/2	15	3/8	1/2	11 7/8	8 1/2	6 1/2	15	5/8					
10	13 1/4	9	7 1/8	16	SEE NOTE 1	3/16	1/4	3/8	1/2	14 1/8	9 3/4	7 5/8	17 1/2	1/2											
12	16	10 1/2	8 1/2	19	3/16	1/4	3/8	SEE NOTE 1	1/2	16 1/2	11 1/4	8 7/8	20 1/2	5/8											
14	17 5/8	11 1/2	9 5/8	21	3/16	1/4	3/8	1/2																	
16	20 1/8	12 3/4	10 5/8	23 1/2	3/16	SEE NOTE 1	3/8	1/2																	
18	21 1/2	13 1/2	11 3/8	25	1/4	3/8																			
20	23 3/8	14 3/4	12 1/2	27 1/2	1/4	3/8																			
24	28 5/8	17	14 3/4	32	3/8	1/2																			

ALL DIMENSIONS GIVEN IN INCHES

NOTE:

MATERIAL FOR BLANKING DISKS SHALL BE STEEL, ASTM A-240

THICKNESS (T) SHOWN ARE EQUAL TO, OR GREATER THAN, $0.48\,D\sqrt{P/S}$, WHEREIN D = OUTSIDE DIA OF PIPE, IN.; P = DESIGN PRESSURE, PSI, AND S = 24,750 PSI (WHICH IS 82.5 PER CENT OF YIELD POINT AND 45 PERCENT OF ULTIMATE TENSILE STRENGTH.)

PRESSURE GIVEN IN TABLE ABOVE ARE ALLOWABLE WORKING PRESSURES AT 500 F MAX TEMPERATURE. TEST PRESSURES OF TWICE THE ABOVE-LISTED WORKING PRESSURES ARE SAFE; HOWEVER, SUCH TEST PRESSURES WILL PERMANENTLY DEFORM DISKS OF CERTAIN THICKNESS-DIA COMBINATIONS GIVEN IN TABLE.

TABLE ON REVERSE SIDE OF THIS STANDARD GIVES ALLOWABLE WORKING PRESSURES FOR EACH STANDARD DISK THICKNESS WHEN USED IN VARIOUS SIZES OF PIPE.

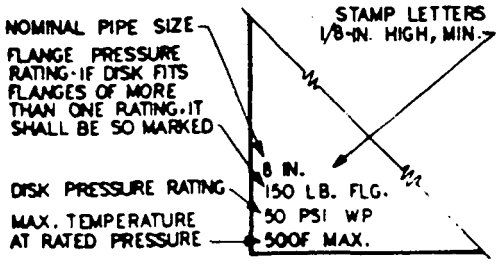
FOR CORROSIVE SERVICES, STEEL DISKS MAY BE USED WITH A THIN LINER[4] OF AN APPROPRIATE CORROSION-RESISTANT ALLOY, OR, IF PREFERRED, SOLID DISKS OF CORROSION-RESISTANT ALLOY, OR CLAD-STEEL DISKS MAY BE USED. SOLID STAINLESS STEEL DISKS SHALL BE OF SAME THICKNESSES AS SPECIFIED IN TABLE ABOVE, EXCEPT THAT .125-INCH STAINLESS SHALL BE USED INSTEAD OF .1196-INCH. THICKNESSES AND PRESSURE RATINGS SPECIFIED IN TABLE ABOVE ARE NOT APPLICABLE TO CLAD STEEL DISKS AND SOLID METAL DISKS OF ALLOYS OTHER THAN STAINLESS STEEL. IF SUCH DISKS ARE REQUIRED, THEY SHALL BE DESIGNED TO SUIT OPERATING CONDITIONS.

[1] USE THICKNESS (T) SPECIFIED FOR NEXT HIGHER DISK PRESSURE RATING.

[2] NO. 11 MANUFACTURES STANDARD GAGE (.1196-INCH THICK.)

[3] DISKS FOR FLANGES OF THIS PRESSURE RATING ARE SAME AS DISKS FOR NEXT HIGHER FLANGE RATING.

[4] LINED DISKS MAY NOT BE SATISFACTORY FOR SERVICE CONDITIONS WHERE VACUUM MAY OCCUR.

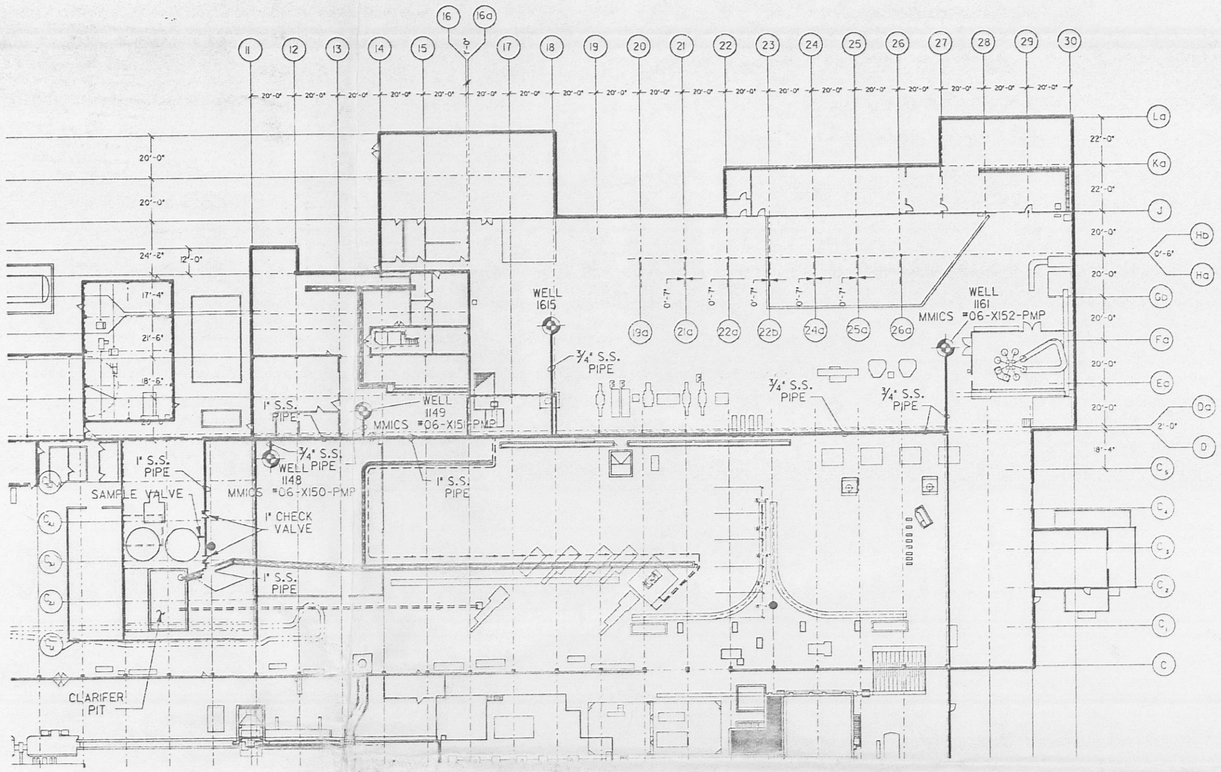


DETAIL A
EXAMPLE OF IDENTIFICATION MARKING

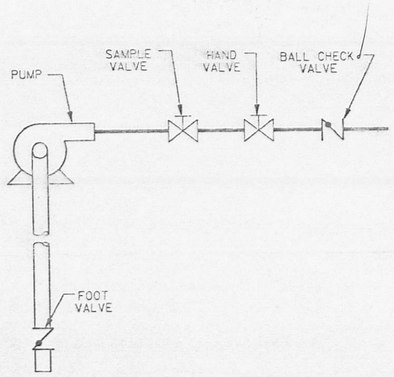
APPROVED BY

NUMBER Y-ES-4.3-5

1476



PARTIAL PLAN
PLANT #6
SCALE 1"=30'



TYPICAL PERCHED WATER PUMP
CHECK VALVE ARRANGEMENT

MAR 28 '91

19

DO NOT SCALE REDUCED DRAWING

NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± 1/16
ANGLES ± 0° - 30'
DECIMALS
.X ± 0.1
.XX ± 0.03
.XXX ± 0.005
.XXXX ± 0.0010
DWG. RELEASE DATE

APPROVALS					
CHEMICAL				I.R.S. & T.	
CIVIL & STR.				MAINTENANCE	
ELECTRICAL			3-28-91	NUL. SAFETY	
ENGINEER			3-28-91	O.A.	
INSTRUMENT				PRODUCTION	
MECHANICAL				FIRE & SAFETY	
OPER. UNIT 3			3-28-91	WASTE MANAGE	
CHECKED			3-28-91	O.O.E.	
APPROVED			3-28-91	SECURITY	

WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

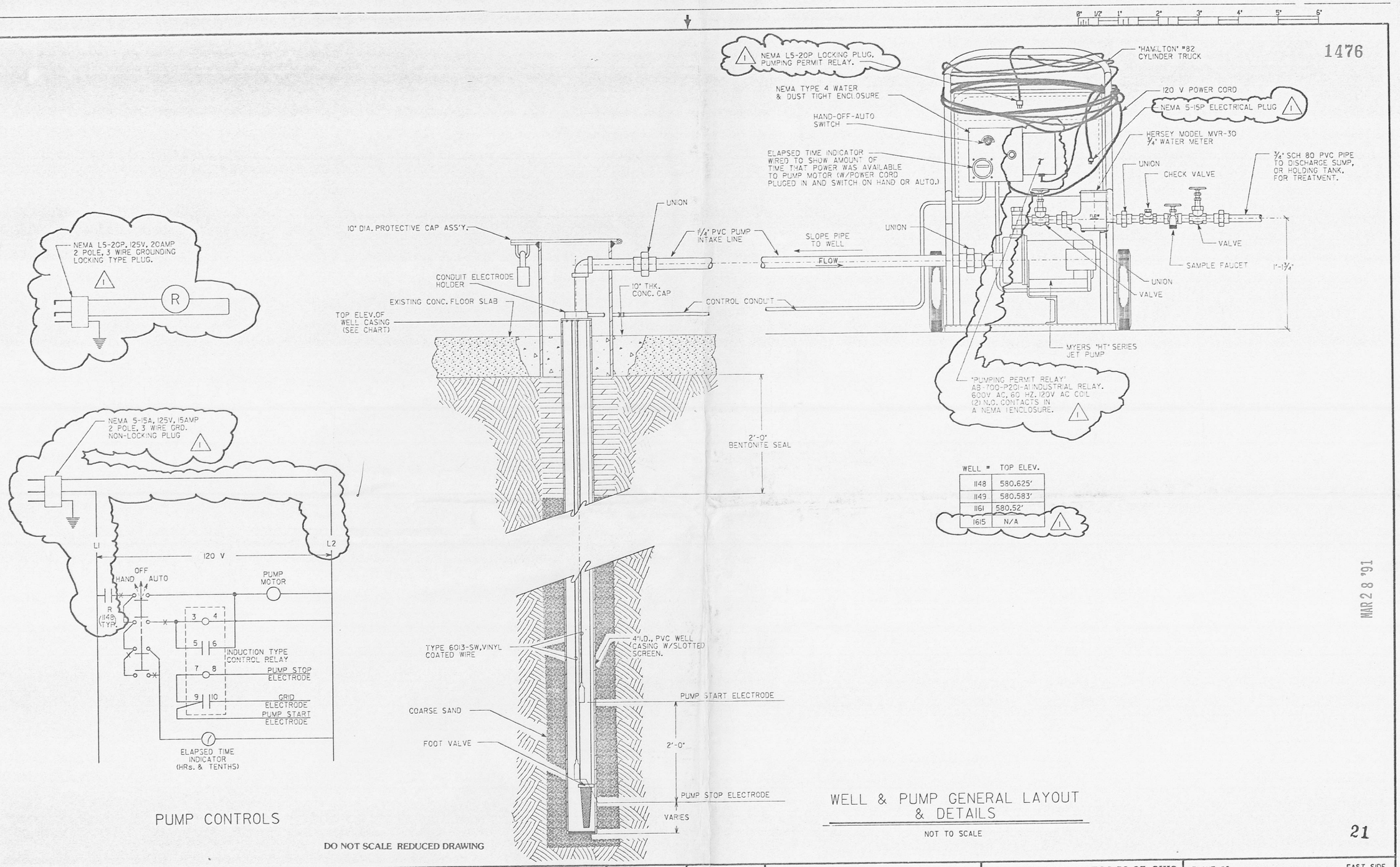
PLANT #6 GRID #6
OPERABLE UNIT No. 3
EXTRACTION PUMP DISCHARGE LINES
PERCHED WATER REMOVAL SYSTEM

R.ES. #562
DATE 3-27-91
DRAWN MIKE LOCKE

06X-5500-P-08151 | 0

107304_1

FILE NAME: ZFA1:[100,41]06XP08151.DGN TIME-10:08:34 DATE-Mar. 28, 1991



WELL #	TOP ELEV.
1148	580.625'
1149	580.583'
1161	580.52'
1615	N/A

MAR 28 '91

21

NO.	REVISIONS	DATE	DWN. BY	APPD.

NO.	REVISIONS	DATE	DWN. BY	APPD.
1	REVISED PER RES #1562	3-27-91		

REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± 1/16
ANGLES ± 0° - 30'
DECIMALS
.X ± 0.1
.XX ± 0.03
.XXX ± 0.005
.XXXX ± 0.0010
DWG. RELEASE DATE

APPROVALS					
CHEMICAL			I.R.S. & T.		
CIVIL & STR.			MAINTENANCE		2/7/89
ELECTRICAL		2/7/89	NU. SAFETY		
ENGINEER		2/7/89	O.A.		
INSTRUMENT			PRODUCTION		2/8/89
MECHANICAL			FIRE & SAFETY		
		2/7/89	WASTE MANAGE		2/7/89
CHECKED		2/7/89	D.O.E.		
APPROVED		2/14/89	SECURITY		

WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #6 EAST SIDE

PLANT No. 6
PERCHED WATER PROJECT
PUMP ASSEMBLY & DETAILS

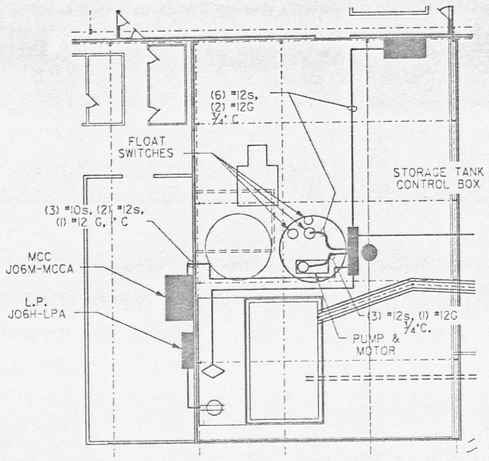
RES #1239
DATE 9/14/89
DRAWN MIKE LOCKE

06X-5500-G-08123 | 1

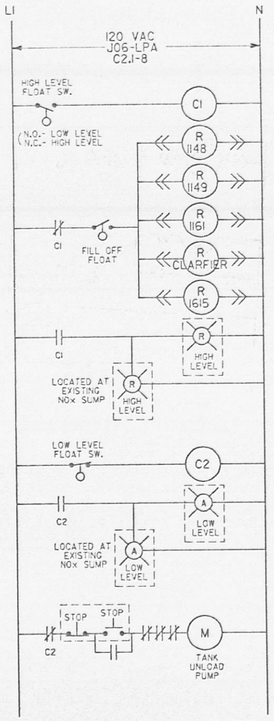
FILE NAME: ZFA1:[100,4]06XG08123.DGN TIME-10:17:31 DATE-Mar. 28, 1991

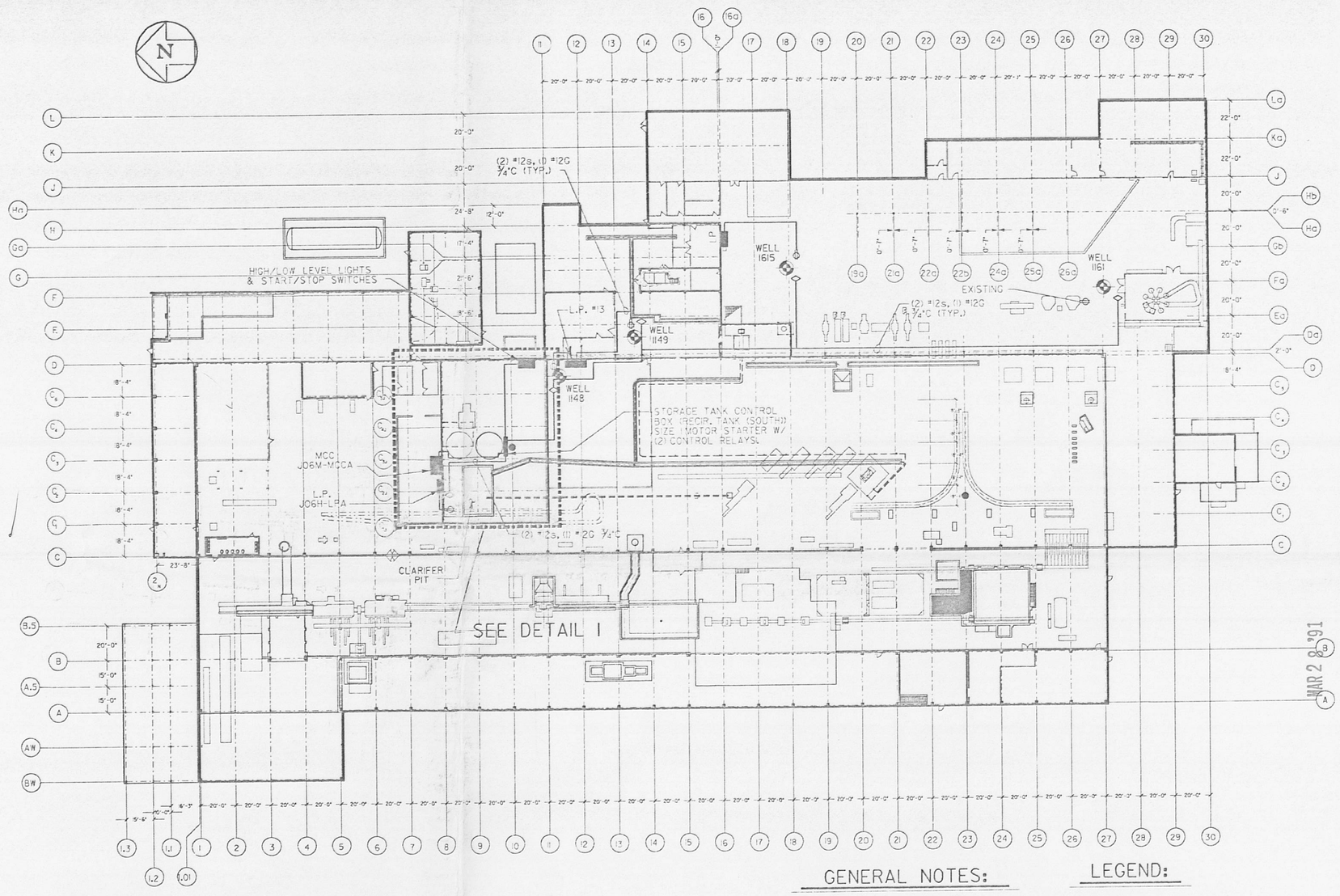
107304-2

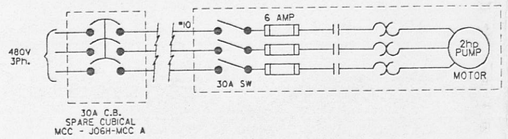
1476



DETAIL I







GENERAL NOTES:

1. ALL WIRING SHALL BE #12, & #12G UNLESS SPECIFIED.
2. ALL CONDUIT SHALL BE ¾" RGC UNLESS SPECIFIED.
3. USE 20 AMP SINGLE POLE GFCI BREAKERS UNLESS SPECIFIED OTHERWISE.

LEGEND:

- DUPLEX RECEPTICAL, NEMA 5-20R W/ APPROVED WET LOCATION COVER.
- SINGLE RECEPTICAL FOR PUMP INTERLOCKING. NEMA 5-20R W/ APPROVED WET LOCATION COVER.

DO NOT SCALE REDUCED DRAWING

20

NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± 1/16
ANGLES ± 0° - 30'
DECIMALS
.X ± 0.1
.XX ± 0.03
.XXX ± 0.005
.XXXX ± 0.0010
ORIG. RELEASE DATE

APPROVALS				
CHEMICAL			I.R.S. & T.	
CIVIL & STR.			MAINTENANCE	
ELECTRICAL	J. E. Kerl	1-28-9	NU. SAFETY	
ENGINEER	J. E. Kerl	1-28-9	O.A.	
INSTRUMENT			PRODUCTION	
MECHANICAL			FIRE & SAFETY	
OPER. UNIT 3	[illegible]	1-28-9	WASTE MANAGE	
CHECKED	[illegible]	1-28-9	D.O.E.	
APPROVED	[illegible]	1-28-9	SECURITY	

WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #6 GRID #6

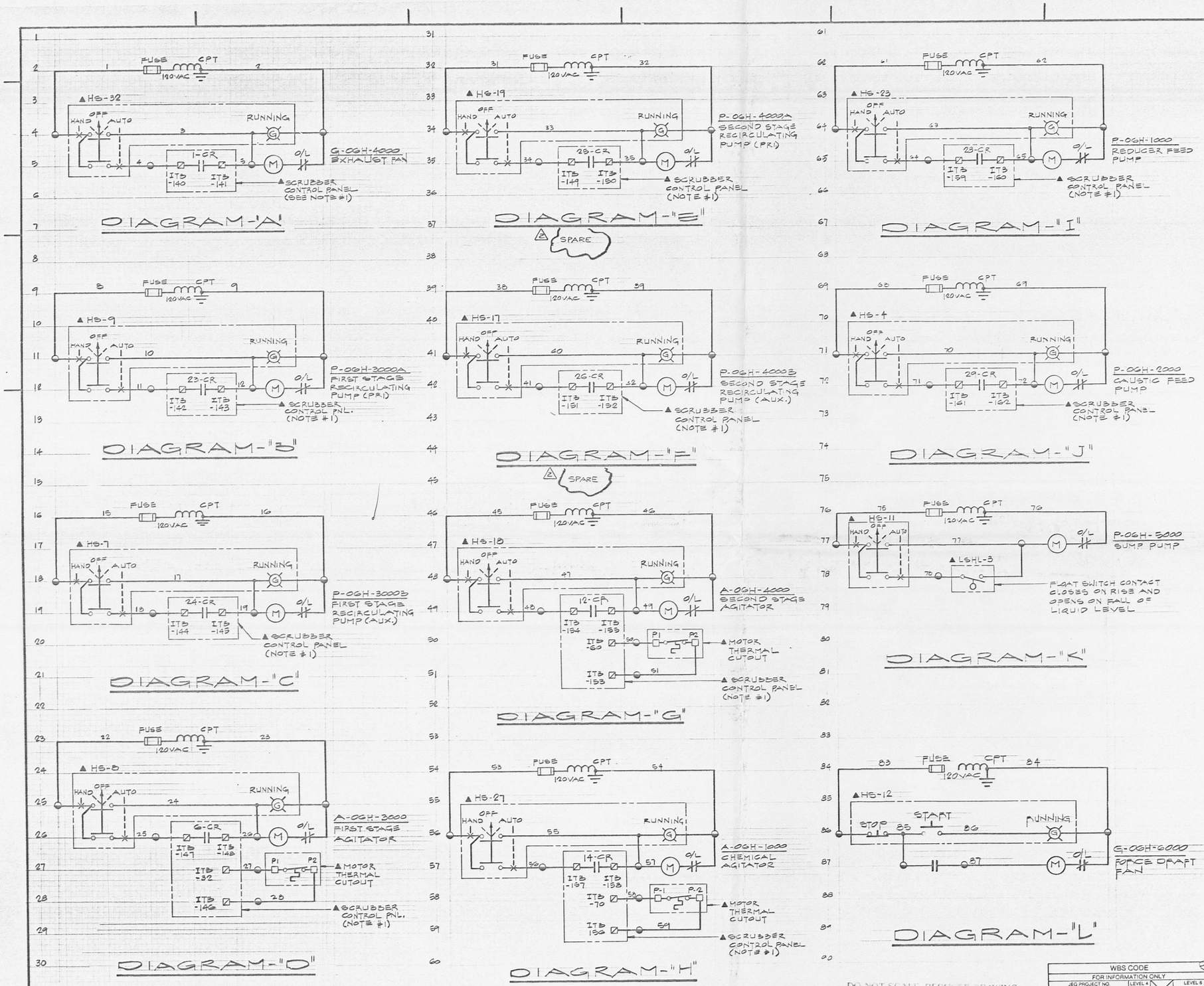
OPERABLE UNIT No. 3
POWER & CONTROL LAYOUT
PERCHED WATER REMOVAL SYSTEM

RES. #1562
DATE 3-27-91
DRAWN MIKE LOCKE

06X-5500-E-08150 | 0

FILE NAME: ZFA1:[100,4]06XE08150.DGN TIME-104:51:53 DATE-Mar. 28, 1991

107304-3



REFERENCE DRAWING	
DRAWING NO.	TITLE 1476
00X-E-0917	LEGEND & SYMBOLS
00X-F-01943	INSTRUMENTATION SYMBOLS
00X-F-01944	INSTRUMENTATION IDENTIFICATION

NOTES:

1. FOR SCRUBBER CONTROL PANEL SCHEMATICS AND WIRING DIAGRAM, SEE TRI-MER CORP. VENDOR DRAWINGS.

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MAR 28 '91

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPER	DOE
2	REVISED PER R.E.S. #1562	D.S.S. 10-17-90	REV 3/27/91	
1	REVISED PER "AS BUILT"		12/17 3/27/90	
0	CERTIFIED FOR CONSTRUCTION	SLH 2-10-88	2/10/88	

UNITED STATES DEPARTMENT OF ENERGY

JACOBS ENGINEERING GROUP INC.
PASADENA, CALIFORNIA

CONTRACT NO N-77208 A-E NO 3900

PROJECT NAME: PRODUCTIVITY RETENTION

DRAWING TITLE: NO_x DESTRUCTORS ELECTRICAL ELEMENTARY DIAGRAMS

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
L. FLORES	11-20-87	R. SINGH		R. Singh	11/17/87

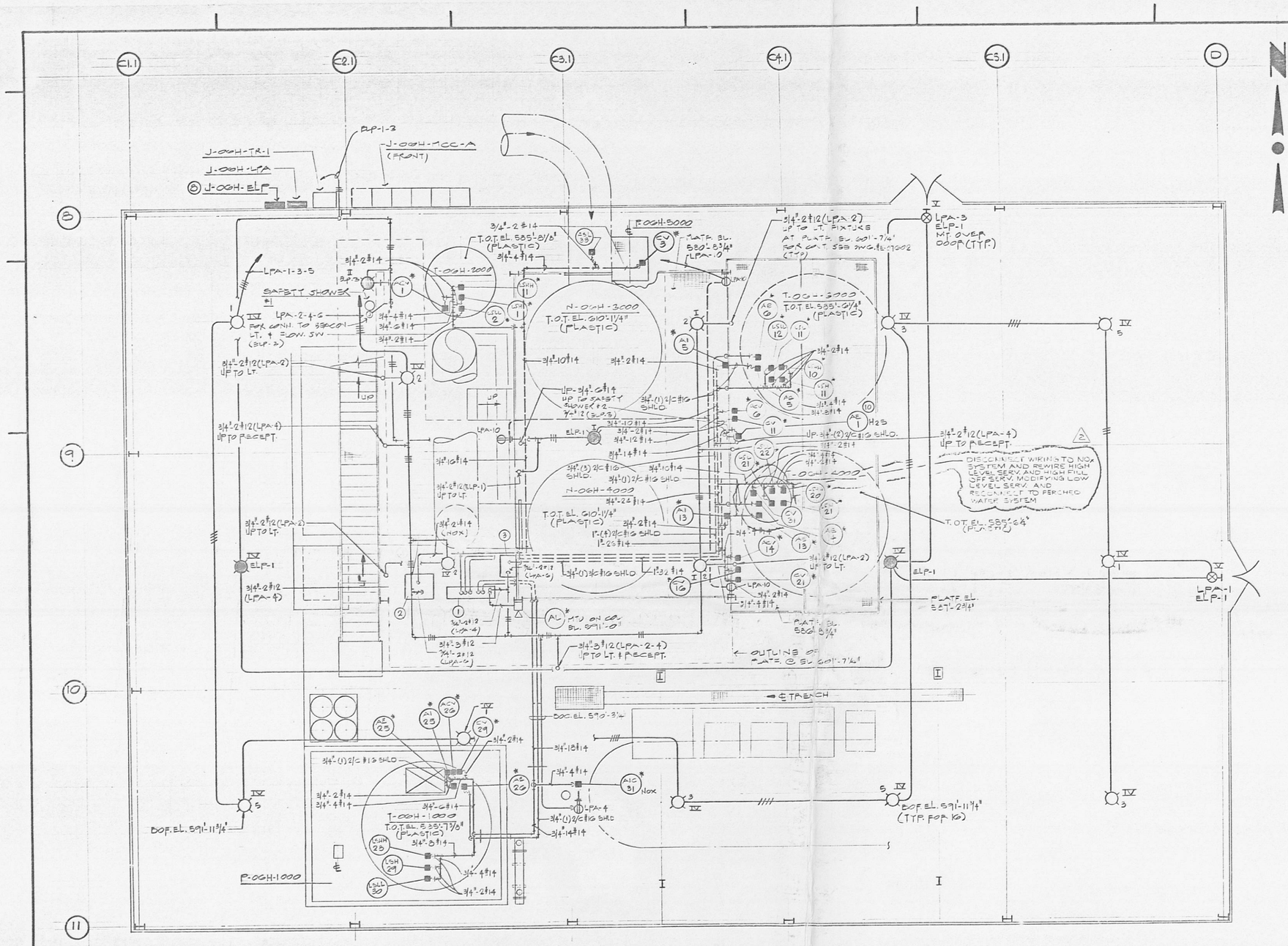
PLANT	BLDG.	FLOOR	SCALE	CLASS
FMPC			NONE	

SUBMITTED FOR APPROVAL: A-E DATE 2-10-88 — APPROVAL RECOMMENDED: OPER CONTRACTOR DATE — DRAWING APPROVED: DOE DATE 2/10/88

WBS CODE									
FOR INFORMATION ONLY				PROJECT NO.	DRAWING NUMBER				REV. NO.
JEG PROJECT NO.	LEVEL 4		LEVEL 6						
01-8355-00	05	X	E105	86-D-149	06H	3900	E	07603	2

DO NOT SCALE REDUCED DRAWING

107304-4



REFERENCE DRAWING	
DRAWING NO.	TITLE
E-07699	SINGLE LINE DIAGRAM
E-07600	POWER & GROUNDING PLAN
E-07602	MISC. DETAILS
E-07604	FIXTURE AND PANEL SCHEDULES
00X-E-01919	ELECTRICAL LEGEND & SYMBOLS
00X-E-01943	INSTRUMENTATION SYMBOLS
00X-E-01944	INSTRUMENTATION IDENTIFICATION

1476

NOTES

1. SCRUBBER CONTROL PANEL (FURNISHED BY SCRUBBER CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR.)
2. ANALYZER CABINET (FURNISHED BY SCRUBBER CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR)
3. H_2S MONITORING PANEL (20"H x 24"W x 20"D) FURNISHED & INSTALLED BY ELECTRICAL CONTRACTOR. SEE SECTION 18401
4. FIN S-ED FLOOR EL. 830'-1 1/4"
5. * DENOTES ITEM FURNISHED WITH EQUIP.
6. FIELD TO VERIFY EXACT ROUTING OF ALL CONDUITS
7. ALL CONDUITS SHALL BE RIGID STEEL PVC COATED.
8. NEW EMERG. PANEL SOURCE OF POWER SHALL BE VERIFIED IN FIELD.
9. ELECTRICAL CONTRACTOR SHALL PULL 1#12 GREEN INSULATED GROUND WIRE IN ALL LIGHTING AND RECEPTACLE CONDUITS. ALL LIGHTING & RECEPTACLE OUTLETS SHALL BE GROUNDED.
10. H_2S SENSOR FURNISHED WITH ITEM 3 ABOVE. WIRING PER NOTE #1 DWG. #E-07814
11. FOR ADDITIONAL INFORMATION SEE TN-MEP CORP. DWG. # 010187-25, 27, 28, 29, 30

23

MAR 28 '91

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPER	DOE
2	REVISED PER RFI S. #1562	J.C.K. 9-27-91	REV 3-27-91	
1	REVISED AS BUILT		RFP 4/27/90	
0	CERTIFIED FOR CONSTRUCTION	RAK	RAN	

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY

JACOBS ENGINEERING GROUP INC.
PASADENA, CALIFORNIA

CONTRACT NO. N 77208 A-E NO. 3900

PROJECT NAME: PRODUCTIVITY RETENTION

DRAWING TITLE: NOX DESTRUCTORS ELECTRICAL LIGHTING & INSTRUMENTATION PLAN

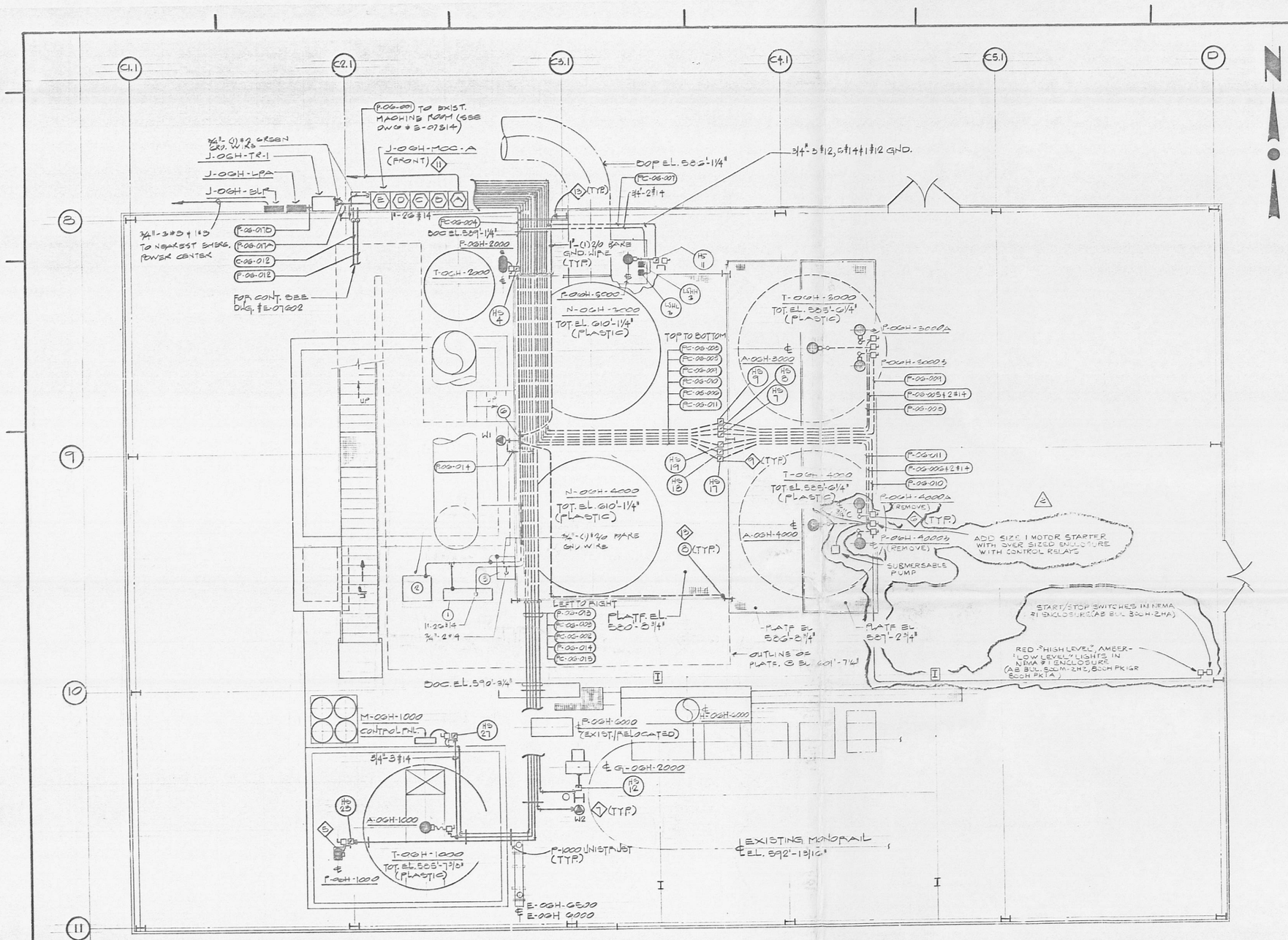
DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
E. VEGA	11-21-87	R. SINGH		R. SINGH	11-21-87

PLANT	BLDG.	FLOOR	SCALE	CLASS
FMPC			1/4"=1'-0"	

SUBMITTED FOR APPROVAL (A-E) DATE 2-10-88 — APPROVAL RECOMMENDED (OPER CONTRACTOR) DATE 3/10/88 — DRAWING APPROVED (DOE) DATE 3/10/88

WBS CODE								
FOR INFORMATION ONLY				PROJECT NO	DRAWING NUMBER			REV NO
JEG PROJECT NO	LEVEL 4		LEVEL 6					
01-8385-00	05	X	E103	86-D-149	06H	3900	E	07601	2

107304_5



TERMINATION OF CONDUITS AT J-06H-MCC-A

- (A) P-06-001, P-06-004, P-06-008
- (B) P-06-006, P-06-005, P-06-006, P-06-007, P-06-009
- (C) P-06-009, P-06-010, P-06-011
- (D) P-06-012, C-06-012, P-06-013, P-06-014, P-06-015
- (E) P-06-017A 1"-2G #14 (TO (1))

DO NOT SCALE REDUCED DRAWING

REFERENCE DRAWING 1476	
DRAWING NO.	TITLE
E-07599	SINGLE LINE DIAGRAM
E-07601	LTG & INSTR. PLAN
E-07602	MISC. DETAILS
00X-E-01919	ELECTRICAL LEGEND & SYMBOLS
00X-E-01943	INSTRUMENTATION SYMBOLS
00X-E-01944	INSTRUMENTATION IDENTIFICATION

NOTES

1. SCRUBBER CONTROL PANEL (FURNISHED BY SCRUBBER CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR.)
2. ANALYZER CABINET (FURNISHED BY SCRUBBER CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR.
3. H_2S MONITORING PANEL (30"H x 24"W x 20"D) FURNISHED & INSTALLED BY ELECTRICAL CONTRACTOR. SEE SECTION 13461
4. FINISHED FLOOR EL. 580'-1 1/4"
5. FIELD TO VERIFY EXACT ROUTING OF ALL CONDUITS.
6. COPPER GROUND PLATE SEE (12)
7. ALL CONDUITS SHALL BE RIGID STEEL PVC COATED.
8. REMOVE PVC COATING TO ATTACH GROUND CONDUCTOR TO COL'S STEEL SURFACE. AFTER ATTACHMENT IS COMPLETE RETOUCH WITH NEW PVC COATING.

24

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPER	DOE
2	REVISED PER R.C.S. #1562			
1	REVISED PER "AS BUILT"			
0	CERTIFIED FOR CONSTRUCTION			

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY

JACOBS ENGINEERING GROUP INC.
PASADENA, CALIFORNIA

CONTRACT NO. N-77208 A-E NO. 3900

PROJECT NAME: PRODUCTIVITY RETENTION

DRAWING TITLE: NOX DESTRUCTORS ELECTRICAL POWER & GROUNDING PLAN

DRAWN BY: E. VEGA | DATE: 9-16-87 | DESIGNED, CHECKED BY | DATE | CHECKED BY | DATE

PLANT: FMPC | BLDG. | FLOOR | SCALE: 1"=20'-0" | CLASS

SUBMITTED FOR APPROVAL | APPROVAL RECOMMENDED | DRAWING APPROVED

A-E DATE 2-10-88 | OPER CONTRACTOR DATE | DOE DATE 2/12/88

WBS CODE — FOR INFORMATION ONLY: JEG PROJECT NO. 01-8355-00 | LEVEL 4: 05 | LEVEL 5: E102

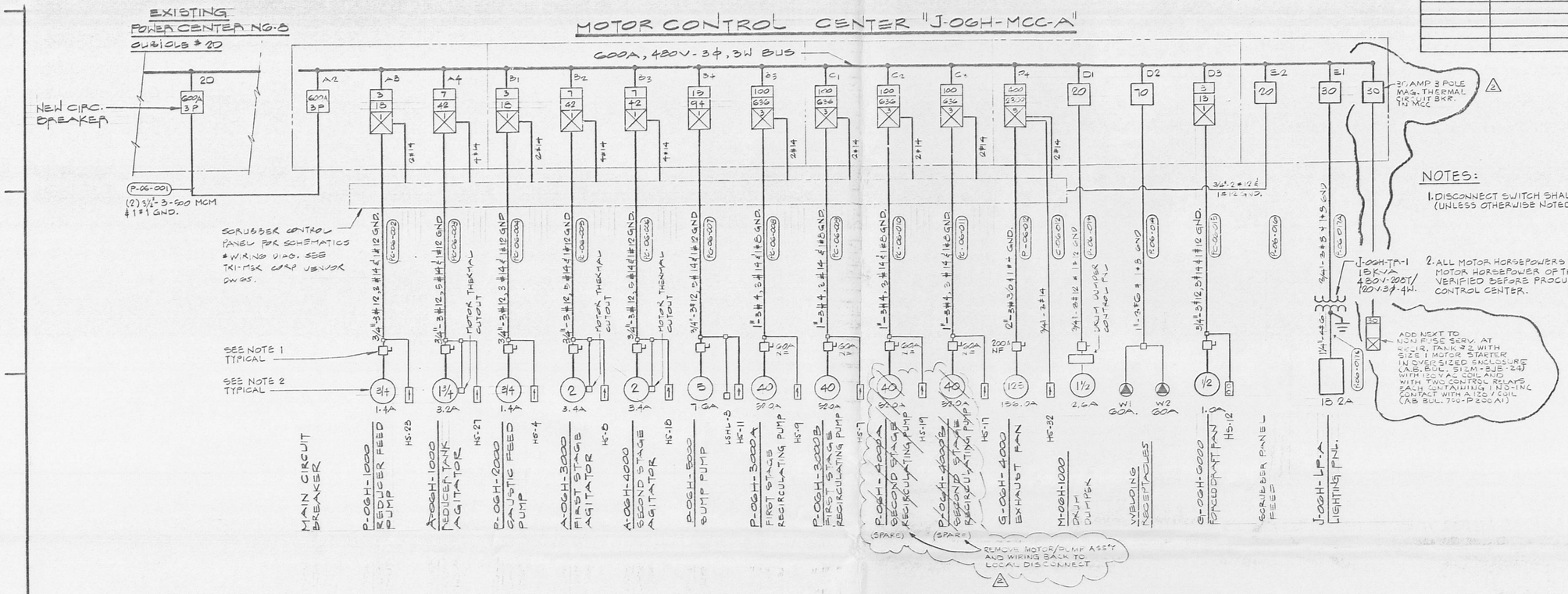
PROJECT NO. 86-D-149 | DRAWING NUMBER 06H 3900 E 07600 | REV NO. 2

107304-6

REFERENCE DRAWING	
DRAWING NO.	TITLE
00X-E-01919	LEGEND & SYMBOLS
E-07603	ELEMENTARY DIAGRAMS

1476

TOTAL = 369.9



NOTES:

1. DISCONNECT SWITCH SHALL BE 30A-3P-600V-N.F. (UNLESS OTHERWISE NOTED) IN NEMA 4 ENCLOSURE
2. ALL MOTOR HORSEPOWERS SHOWN ARE ESTIMATED. EXACT MOTOR HORSEPOWER OF THE EQUIPMENT SHALL BE VERIFIED BEFORE PROCUREMENT OF THE MOTOR CONTROL CENTER.

"J-OGH-MCC-A"

A	B	C	D	E
INCOMING LINE 1	P-OGH-2000 1	P-OGH-3000B 1	M-OGH-1000 1	J-OGH-TR-1 1
MAIN CIRCUIT BREAKER	A-OGH-3000 2		WELDING RECEPTACLES 2	SCRUBBER PANEL 2
	A-OGH-4000 3	P-OGH-4000A (SPARE) 2	G-OGH-6000 3	NEW 30A FEED TO PERCHED WATER SYS.
	P-OGH-3000 4		G-OGH-4000 4	
P-OGH-1000 3	P-OGH-3000A 5	P-OGH-4000B (SPARE) 3		
A-OGH-1000 4				

ELEVATION

"J-OGH-MCC-A"

NAMEPLATE SCHEDULE

	1st Line	2nd Line	3rd Line
A1		INCOMING LINE	
A2		MAIN CIRCUIT	BREAKER
A3	P-OGH-1000	REDUCER FEED	PUMP
A4	A-OGH-1000	REDUCER TANK	AGITATOR
B1	P-OGH-2000	CAUSTIC FEED	PUMP
B2	A-OGH-3000	FIRST STAGE	AGITATOR
B3	A-OGH-4000	SECOND STAGE	AGITATOR
B4	P-OGH-5000	SUMP PUMP	
B5	P-OGH-3000A	FIRST STAGE	RECIRCULATING PUMP
C1	P-OGH-3000B	FIRST STAGE	RECIRCULATING PUMP
C2	P-OGH-4000A	SECOND STAGE	RECIRCULATING PUMP
C3	P-OGH-4000B	SECOND STAGE	RECIRCULATING PUMP
D1	M-OGH-1000	DRUM DUMPER	
D2		WELDING	RECEPTACLES
D3	G-OGH-6000	FORCED DRAFT	FAN
D4	G-OGH-4000	EXHAUST FAN	
E1	J-OGH-TR-1	TRANSFORMER	
E2		SCRUBBER PANEL	FEED
E3		SPACE	

DO NOT SCALE REDUCED DRAWING

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPER	DOE
2	REVISED PER RES# 15602			
1	REVISED AS BUILT			
0	CERTIFIED FOR CONSTRUCTION			

INITIALS AND DATE

MAR 28 '91

25

UNITED STATES DEPARTMENT OF ENERGY

JACOBS ENGINEERING GROUP INC.
PASADENA, CALIFORNIA

CONTRACT NO. N-77208 A-E NO. 3900

PROJECT NAME: PRODUCTIVITY RETENTION

DRAWING TITLE: NOX DESTRUCTORS ELECTRICAL

SINGLE LINE DIAGRAM

DRAWN BY	DATE	DESIGNED, CHECKED BY	DATE	CHECKED BY	DATE
L. FLORES	7-9-87	M. KOVACS		K. SINGH	11/9/87

PLANT: FMPC BLDG. FLOOR SCALE: NONE CLASS

SUBMITTED FOR APPROVAL: A-E DATE 2-10-89 APPROVAL RECOMMENDED: OPER CONTRACTOR DATE DRAWING APPROVED: DOE DATE 2/10/89

WBS CODE: FOR INFORMATION ONLY — JEG PROJECT NO. 01-8355-00 LEVEL 4 05 LEVEL 6 E101

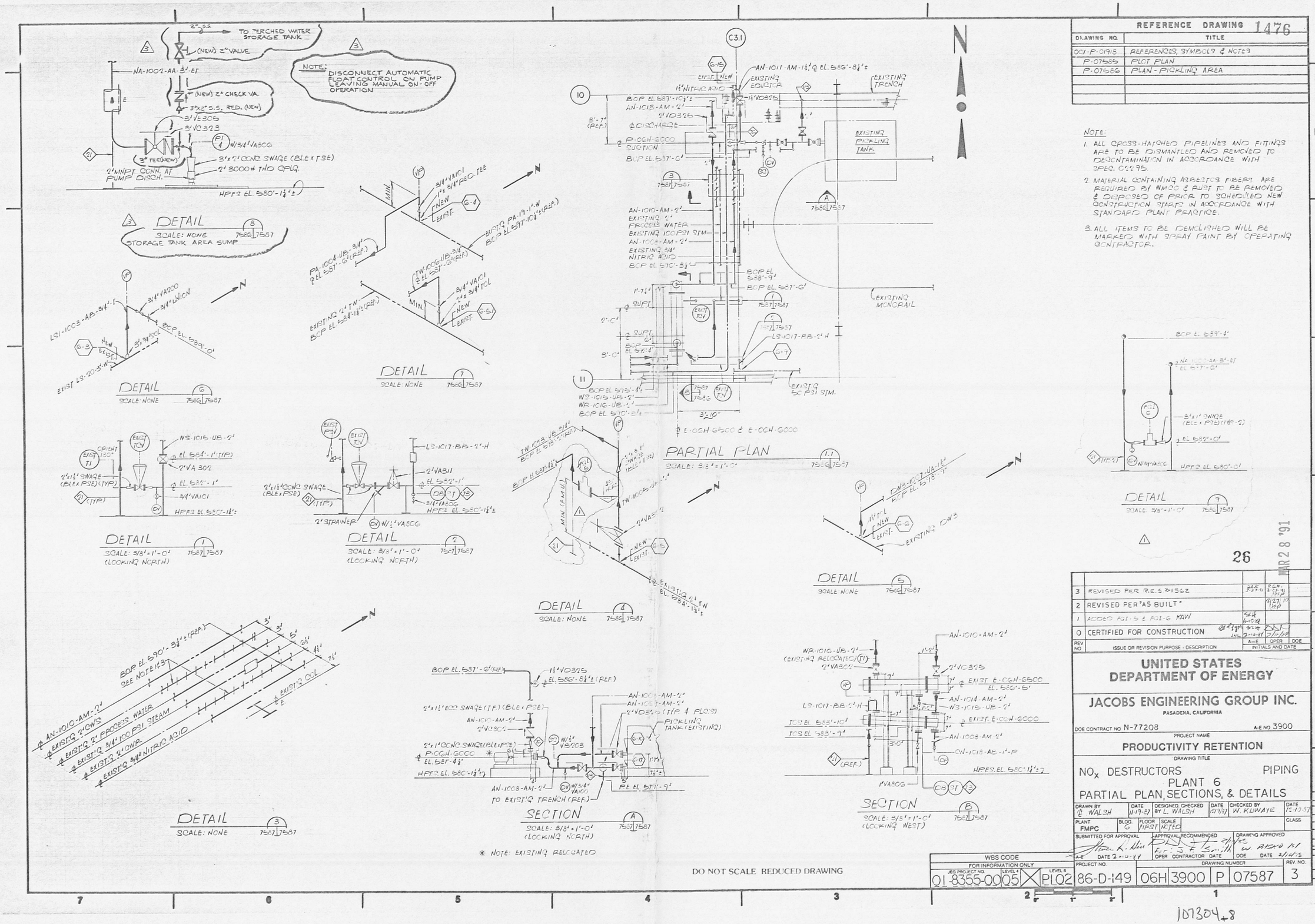
PROJECT NO. 86-D-149 DRAWING NUMBER 06H 3900 E 07599 REV. NO. 2

107304-7

REFERENCE DRAWING 1476	
DRAWING NO.	TITLE
001-P-0918	REFERENCES, SYMBOLS & NOTES
P-07585	PLOT PLAN
P-07586	PLAN - PICKLING AREA

NOTE:

1. ALL CROSS-HATCHED PIPELINES AND FITTINGS ARE TO BE DISMANTLED AND REMOVED TO DECONTAMINATION IN ACCORDANCE WITH SPEC. 01195.
2. MATERIAL CONTAINING ASBESTOS FIBERS ARE REQUIRED BY NMSO & RUST TO BE REMOVED & DISPOSED OF PRIOR TO SCHEDULED NEW CONSTRUCTION STARTS IN ACCORDANCE WITH STANDARD PLANT PRACTICE.
3. ALL ITEMS TO BE DEMOLISHED WILL BE MARKED WITH SPRAY PAINT BY OPERATING CONTRACTOR.



DO NOT SCALE REDUCED DRAWING

REV NO	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPER	DOE
3	REVISED PER R.E.S #1562			
2	REVISED PER "AS BUILT"			
1	ADDED FOI-5 & FOI-6 KAW			
0	CERTIFIED FOR CONSTRUCTION			

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY

JACOBS ENGINEERING GROUP INC.
PASADENA, CALIFORNIA

DOE CONTRACT NO N-77208 A-E NO. 3900

PROJECT NAME: **PRODUCTIVITY RETENTION**

DRAWING TITLE: NO_x DESTRUCTORS PIPING PLANT 6 PARTIAL PLAN, SECTIONS, & DETAILS

DRAWN BY	DATE	DESIGNED BY	CHECKED BY	DATE	CHECKED BY	DATE
E. WALSH	11-19-87	L. WALSH		12/7/87	W. KLUWAYE	12-17-87

PLANT	BLDG.	FLOOR	SCALE	CLASS
FMPC	6	FIRST	NOTED	

SUBMITTED FOR APPROVAL: A-E DATE 2-10-88 — APPROVAL RECOMMENDED: OPER CONTRACTOR DATE — DRAWING APPROVED: DOE DATE 2/10/88

WBS CODE FOR INFORMATION ONLY			PROJECT NO.	DRAWING NUMBER				REV NO.
JEG PROJECT NO.	LEVEL 4	LEVEL 8	86-D-149	06H	3900	P	07587	3
01-8355-00	05	P102						

MAR 28 '91

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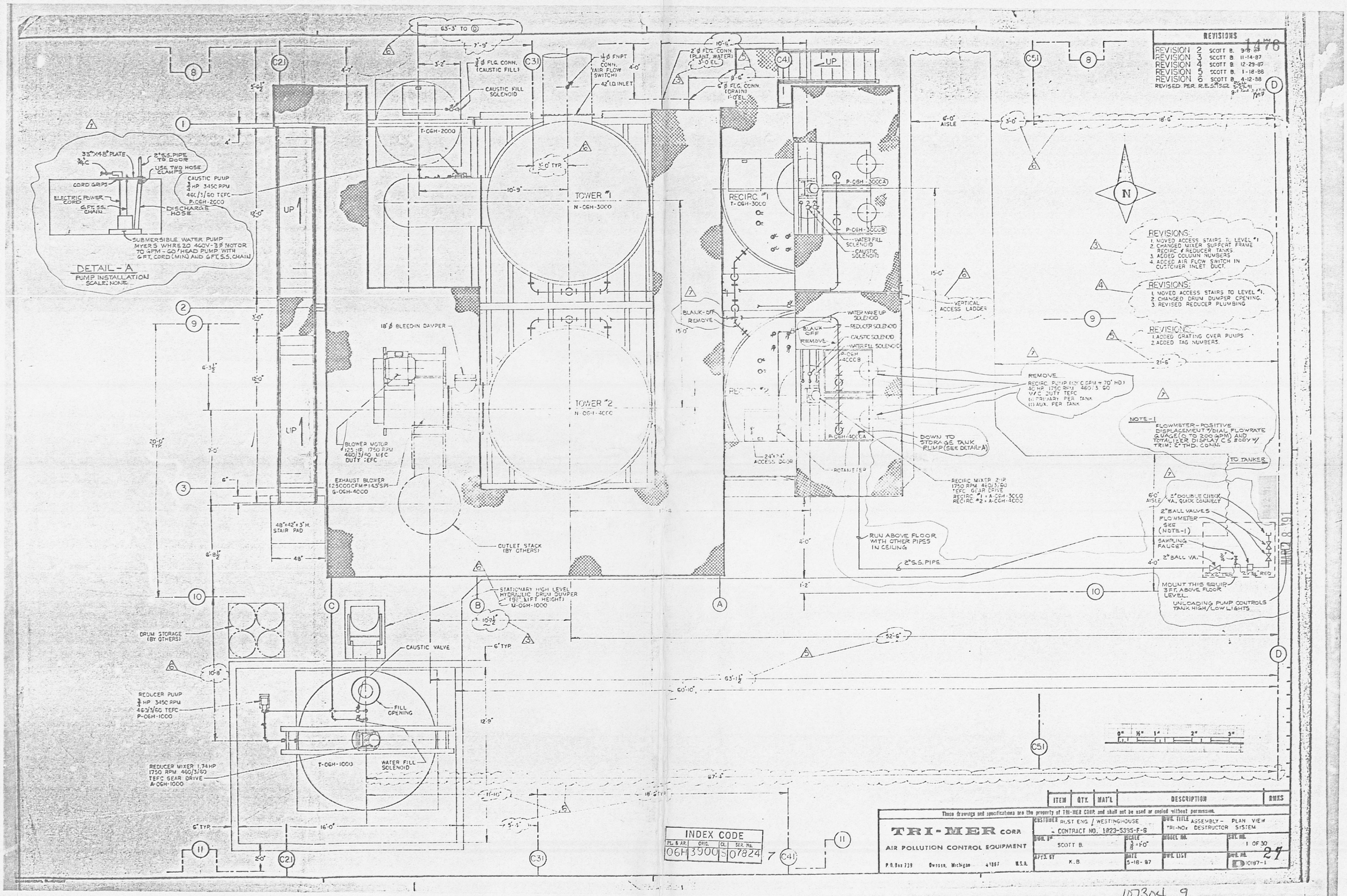
REVISIONS
REVISION 2 SCOTT B. 9-9-87
REVISION 3 SCOTT B. 11-14-87
REVISION 4 SCOTT B. 12-29-87
REVISION 5 SCOTT B. 1-18-88
REVISION 6 SCOTT B. 4-12-88
REVISED PER R.E.S. MSG2 3-27-91
1476
DETAIL - A
PUMP INSTALLATION
SCALE: NONE
33"X48" PLATE
2" S.S. PIPE TO DOOR
USE TWO HOSE CLAMPS
CORD GRIPS
ELECTRIC POWER CORD
6 FT. SS. CHAIN
DISCHARGE HOSE
CAUSTIC PUMP
3/4 HP 3450 RPM
460/3/60 TEFC
P-OGH-2000
SUBMERSIBLE WATER PUMP
MYERS WHR620 460V-3Ø MOTOR
70 GPM - 60' HEAD PUMP WITH
6 FT. CORD (MIN) AND 6 FT. S.S. CHAIN
TOWER #1
N-OGH-3000
TOWER #2
N-OGH-4000
T-OGH-2000
RECIRC #1
T-OGH-3000
RECIRC #2
P-OGH-3000A
P-OGH-3000B
WATER FILL SOLENOID
CAUSTIC SOLENOID
WATER MAKE UP SOLENOID
REDUCER SOLENOID
P-OGH-4000B
P-OGH-4000A
ROTAMETER
24"x36" ACCESS DOOR
VERTICAL ACCESS LADDER
REMOVE
RECIRC PUMP (170 GPM @ 70' HD)
30 HP 1750 RPM 460/3/60
W/C DUTY TEFC
(1) PRIMARY PER TANK
(1) AUX. PER TANK
DOWN TO STORAGE TANK PUMP (SEE DETAIL-A)
RECIRC MIXER 2 HP
1750 RPM 460/3/60
TEFC GEAR DRIVE
RECIRC #1 = A-OGH-3000
RECIRC #2 = A-OGH-4000
RUN ABOVE FLOOR WITH OTHER PIPES IN CEILING
2" S.S. PIPE
REVISIONS:
1. MOVED ACCESS STAIRS TO LEVEL #1
2. CHANGED MIXER SUPPORT FRAME
RECIRC & REDUCER TANKS
3. ADDED COLUMN NUMBERS
4. ADDED AIR FLOW SWITCH IN CUSTOMER INLET DUCT.
REVISIONS:
1. MOVED ACCESS STAIRS TO LEVEL #1.
2. CHANGED DRUM DUMPER OPENING.
3. REVISED REDUCER PLUMBING
REVISIONS:
1. ADDED GRATING OVER PUMPS
2. ADDED TAG NUMBERS.
NOTE - 1
FLOWMETER - POSITIVE DISPLACEMENT V/DIAL FLOWRATE GAUGE (0 TO 200 GPM) AND TOTALIZER DISPLAY C.S. BODY W/ TRIM, 2" THD. CONN.
TO TANKER
2" DOUBLE CHECK VA. QUICK CONNECT
2" BALL VALVES
FLOWMETER SEE (NOTE-1)
SAMPLING FAUCET
2" BALL VA.
MOUNT THIS EQUIP. 3 FT. ABOVE FLOOR LEVEL.
UNLOADING PUMP CONTROLS TANK HIGH/LOW LIGHTS.
18" Ø BLEEDIN DAMPER
BLOWER MOTOR
125 HP 1750 RPM
460/3/60 W/C
DUTY TEFC
EXHAUST BLOWER
(125000 CFM @ 14.5" SP)
G-OGH-4000
48"x42"x3" H. STAIR PAD
CUTLET STACK (BY OTHERS)
STATIONARY HIGH LEVEL HYDRAULIC DRUM DUMPER (192" LIFT HEIGHT)
M-OGH-1000
DRUM STORAGE (BY OTHERS)
CAUSTIC VALVE
REDUCER PUMP
3/4 HP 3450 RPM
460/3/60 TEFC
P-OGH-1000
FILL OPENING
T-OGH-1000
WATER FILL SOLENOID
REDUCER MIXER 1.74 HP
1750 RPM 460/3/60
TEFC GEAR DRIVE
A-OGH-1000
INDEX CODE
PL. & AR. ORIG. CL. SER. No.
06H 3900 S 07824
ITEM QTY. MAT'L DESCRIPTION REMS
These drawings and specifications are the property of TRI-MER CORP. and shall not be used or copied without permission.
TRI-MER CORP.
AIR POLLUTION CONTROL EQUIPMENT
P.O. Box 739 Owosso, Michigan 48867 U.S.A.
CUSTOMER RUST ENG. / WESTINGHOUSE
CONTRACT NO. 1223-5395-F-G
DWG. TITLE ASSEMBLY - PLAN VIEW
TRI-NOx DESTRUCTOR SYSTEM
DWN. BY SCOTT B.
SCALE 3/8" = 1'-0"
MODEL NO.
SHT. NO. 1 OF 30
APP'D. BY K.B.
DATE 5-18-87
DWG. LIST
DWG. NO. 10187-1
27

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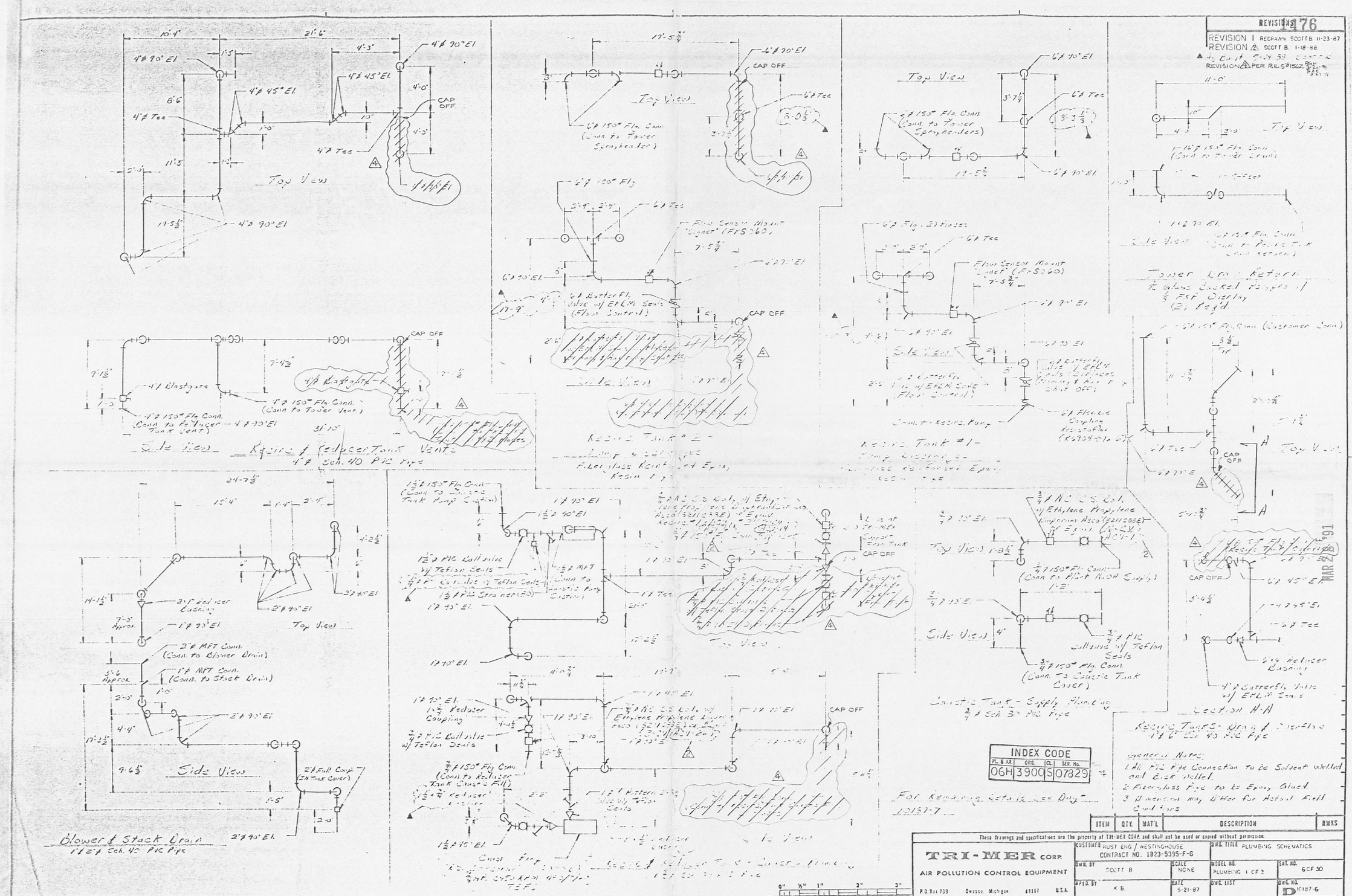
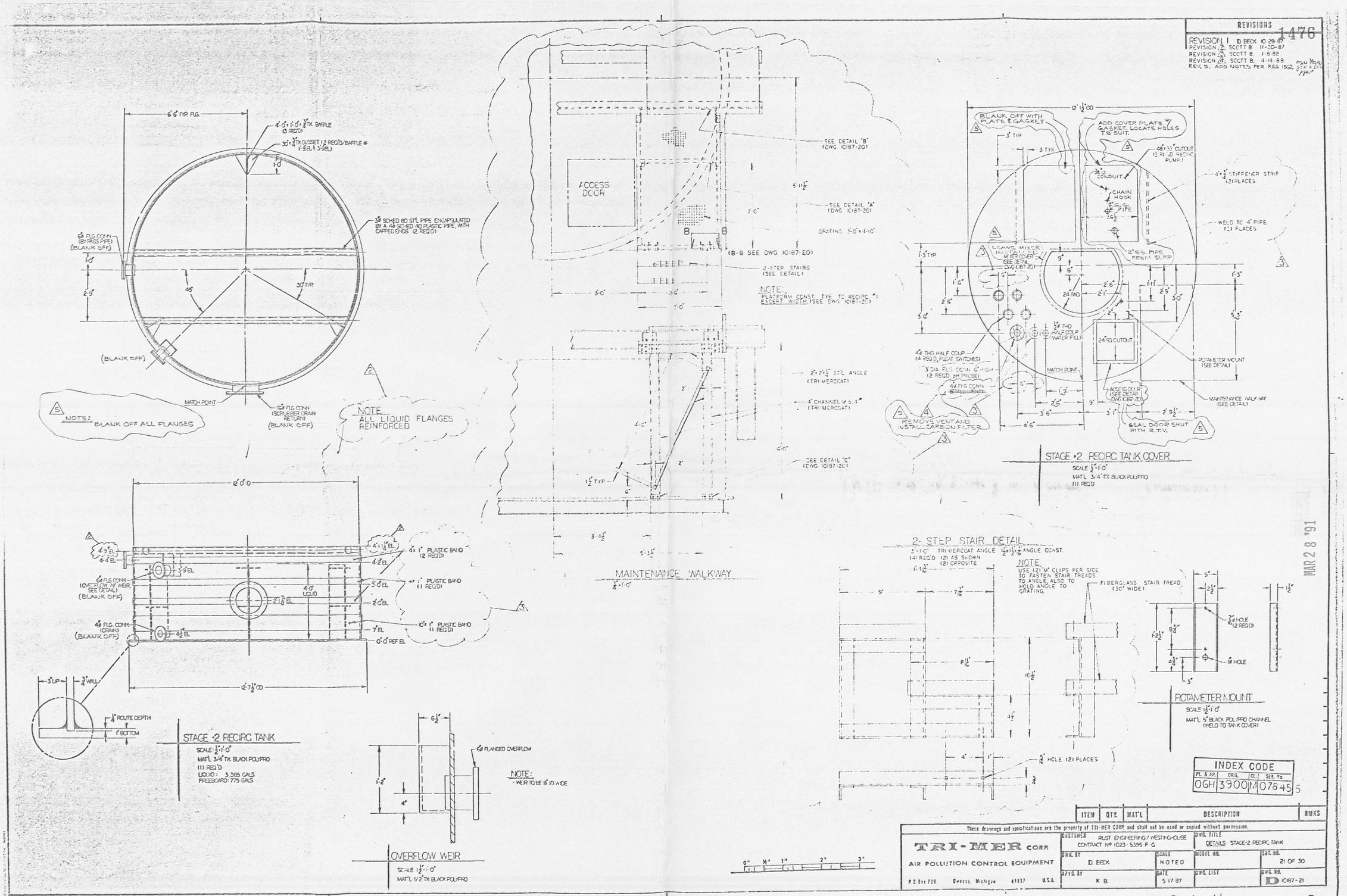
REVISIONS 1476

REVISION 1 REDRAWN SCOTT B 11-23-87
REVISION 2 SCOTT B. 1-18-88
REVISION 3 PER R.E.S. #1522




REVISIONS
1476
REVISION 1 D. BECK 10-29-87
REVISION 2 SCOTT B. 11-20-87
REVISION 3 SCOTT B. 1-8-88
REVISION 4 SCOTT B. 4-14-88
REV. 5. ADD NOTES PER RFS 1562
6'6" INP. FLG.
4'-0" x 1'-0" x 3/8" TK BAFFLE (3 REQ'D)
3/8" x 3/4" TK GUSSET (2 REQ'D/BAFFLE @ 1'-9" EL & 3'-9" EL)
3/8" SCHED 80 STL PIPE ENCAPSULATED BY A 4" SCHED 40 PLASTIC PIPE, WITH CAPPED ENDS (2 REQ'D)
4" FLG CONN (BY PASS PIPE) (BLANK OFF)
(BLANK OFF)
MATCH POINT
16" FLG CONN (SCRUBBER DRAIN RETURN) (BLANK OFF)
NOTE: BLANK OFF ALL FLANGES
NOTE ALL LIQUID FLANGES REINFORCED
STAGE #2 RECIRC TANK
SCALE: 1/2" = 1'-0"
MAT'L 3/4" TK BLACK POLYPRO
(1) REQ'D
LIQUID: 3,385 GALS
FREEBOARD: 775 GALS
2'-6" O
4'-9" EL
4'-4" EL
3'-9" EL
4'-11 1/4" EL
4'-2" EL
4" FLG CONN (OVERFLOW W/ WEIR, SEE DETAIL) (BLANK OFF)
4" FLG. CONN (CONN) (BLANK OFF)
4'-2" EL
4'-0" LIQUID
2'-11 1/8" EL
5'-0" EL
2'-0" EL
7" EL
0'-0" REF EL
4x 1" PLASTIC BAND (2 REQ'D)
4x 1" PLASTIC BAND (1 REQ'D)
10x 1" PLASTIC BAND (1 REQ'D)
12'-7 1/2" OD
3" LIP
3/4" WALL
1/4" ROUTE DEPTH
1" BOTTOM
6 1/2"
6" FLANGED OVERFLOW
1'-2"
4"
NOTE: - WEIR TO BE 6" ID WIDE
OVERFLOW WEIR
SCALE 1 1/2" = 1'-0"
MAT'L 1/2" TK BLACK POLYPRO
ACCESS DOOR
SEE DETAIL "B" (DWG. 10187-20)
SEE DETAIL "A" (DWG. 10187-20)
5'-11 1/2"
3'-0"
GRATING 3'-0" x 4'-10"
(B-B SEE DWG. 10187-20)
2-STEP STAIRS (SEE DETAIL)
NOTE: PLATFORM CONST. TYP. TO RECIRC #1 EXCEPT WIDTH. (SEE DWG. 10187-20)
2" x 2" x 1/4" STL ANGLE (TRI-MERCOAT)
4" CHANNEL @ 5.4# (TRI-MERCOAT)
SEE DETAIL "C" (DWG. 10187-20)
1 1/2" TYP
MAINTENANCE WALKWAY
1/4" = 1'-0"
2-STEP STAIR DETAIL
5'-1 1/2" TRI-MERCOAT ANGLE 1 1/2" x 1 1/2" x 1/8" ANGLE CONST. (4) REQ'D (2) AS SHOWN (2) OPPOSITE
NOTE: USE (2) "W" CLIPS PER SIDE TO FASTEN STAIR TREADS TO ANGLE, ALSO TO HOLD ANGLE TO GRATING.
FIBERGLASS STAIR TREAD (30" WIDE)
7/16" HOLE (2 REQ'D)
1/8" HOLE
5/8" HOLE (2) PLACES
ROTAMETER MOUNT
SCALE 1 1/2" = 1'-0"
MAT'L 5" BLACK POLYPRO CHANNEL (WELD TO TANK COVER)
12'-1 1/2" OD
BLANK OFF WITH PLATE & GASKET
ADD COVER PLATE W/ GASKET, LOCATE HOLES TO SUIT.
68" x 33" CUTOUT (2 REQ'D RECIRC PUMP)
3/4" CONDUIT
CHAIN HOOK
4" x 1/4" STIFFENER STRIP (2) PLACES
WELD TO 4" PIPE (2) PLACES
LEAVE MIXER INSTALLED. MIXER COVER SEE DETAIL DWG 10187-20
2" S.S. PIPE FROM SUMP
24" PAD
1 1/2" THD HALF COUP (WATER FILL)
24" SQ CUTOUT
4 1/2" THD HALF COUP (4 REQ'D, FLOAT SWITCHES)
3" DIA. FLT. CONN. 6" HIGH (2 REQ'D, pH PROBE)
4" FLG CONN
MATCH POINT
ACCESS DOOR (SEE DETAIL DWG 10187-20)
POTAMETER MOUNT (SEE DETAIL)
MAINTENANCE WALK WAY (SEE DETAIL)
REMOVE VENT AND INSTALL CARBON FILTER
SEAL DOOR SHUT WITH R.T.V.
STAGE #2 RECIRC TANK COVER
SCALE 1/2" = 1'-0"
MAT'L 3/4" TK BLACK POLYPRO
(1) REQ'D
MAR 28 '91
INDEX CODE
PL. & AR. | ORIG. | CL. | SER. No.
OGH | 3900 | M | 07645 5
ITEM | QTY. | MAT'L | DESCRIPTION | RMKS
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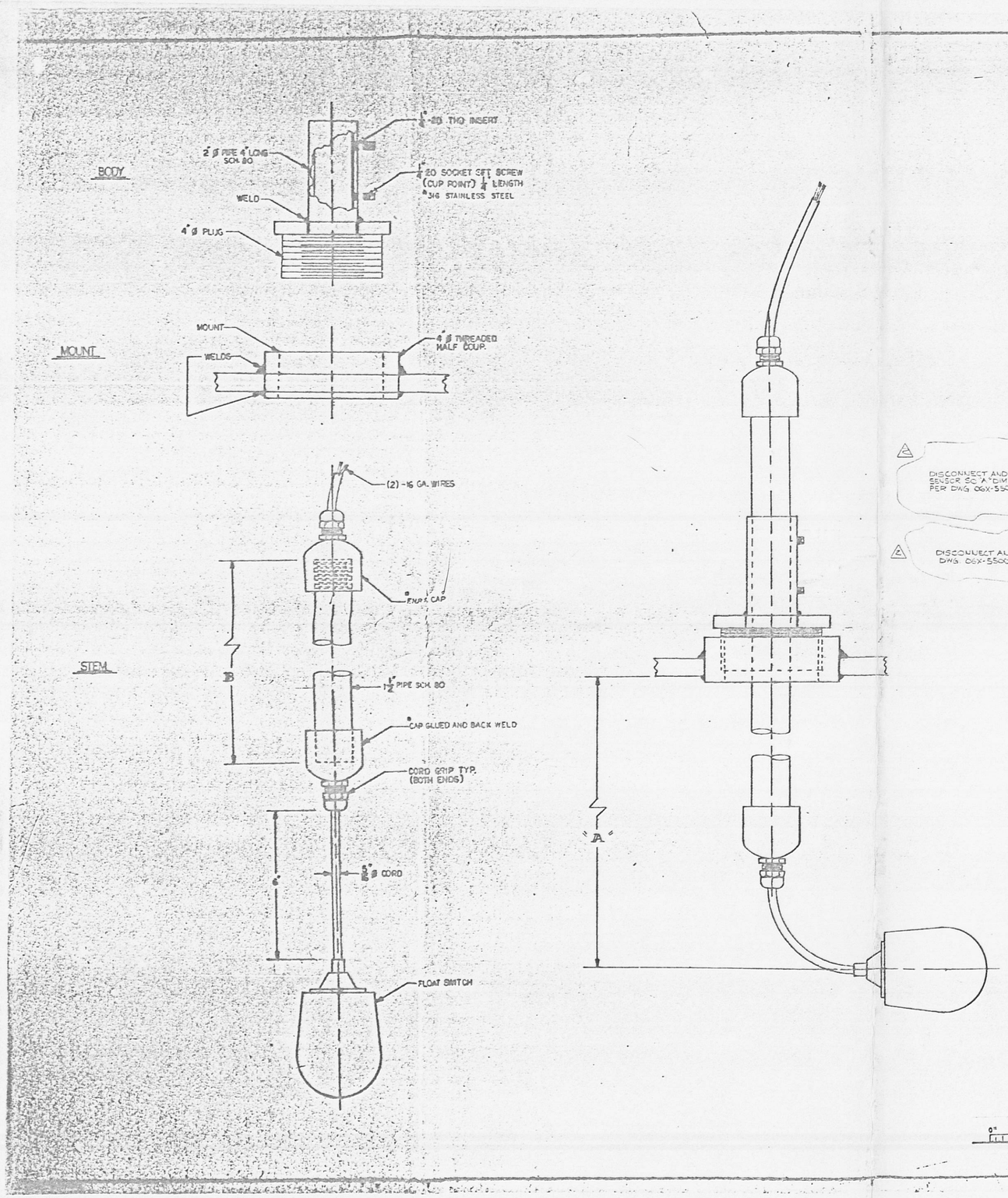
TRI-MER CORP.
AIR POLLUTION CONTROL EQUIPMENT
P.O. Box 739 Owosso, Michigan 48867 U.S.A.
CUSTOMER: RUST ENGINEERING / WESTINGHOUSE CONTRACT No 1023-5395 F.G
DWG. TITLE: DETAILS: STAGE #2 RECIRC. TANK
DWN. BY: D. BECK
SCALE: NOTED
MODEL NO.
SHT. NO.: 21 OF 30
APV'D. BY: K. B.
DATE: 5-17-87
DWG. LIST
DWG. NO.: D 10187-21
0" 1/2" 1" 2" 3"

107304_11

REVISIONS

REVISED MATERIAL CONST.	8-1-476
REVISED CAPS	9-10-97 PAUL

REVISION 0
REVISION 1 SCOTT B. 4-14-89
REV.-2 PER RES #1562 3-27-91



P&ID FLOAT NO.	A	B	POS.	DESCRIPTION	
LSLL-12	2'-0"	2'-6"	NC	LOW LEVEL	RECIRC TANK #1
LSL-11	1'-3 1/4"	1'-9 1/4"	NC	FILL ON	
LSH-11	1'-0 1/4"	1'-6 1/4"	NC	FILL OFF	
LSHH-10	3 1/4"	9 1/4"	NO	HIGH LEVEL	
LSLL-22	2'-0"	2'-6"	NC	LOW LEVEL	RECIRC TANK #2
LSL-21	8 1/4"	1'-2 1/4"	NC	FILL ON	
LSH-21	5 1/4"	11 1/4"	NC	FILL OFF	
LSHH-20	3 1/4"	9 1/4"	NO	HIGH LEVEL	
LSLL-30	4'-0"	4'-6"	NC	LOW LEVEL	REDUCER TANK
LSH-29	5 1/4"	11 1/4"	NC	FILL OFF	
LSHH-28	3 1/4"	9 1/4"	NO	HIGH LEVEL	
LSLL-2	4'-0"	4'-6"	NC	LOW LEVEL	CAUSTIC TANK
LSH-1	5 1/4"	11 1/4"	NC	FILL OFF	
LSHH-1	3 1/4"	9 1/4"	NO	HIGH LEVEL	

1 DISCONNECT AND LOWER SENSOR SCALE DIM. 15 1/2" PER DWG 06X-5500-E-08150

2 DISCONNECT AND REWIRE PER DWG 06X-5500-E-08150

NOTE:
NO — NORMALLY OPEN
NC — NORMALLY CLOSED

FLOAT SWITCH MOUNT

0" 1/4" 1" 2" 3"

INDEX CODE

PL. & AR.	ORIG.	CL.	SER. No.
06H	3900	M	07847

ITEM	QTY.	MAT'L	DESCRIPTION

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TRI-MER CORP
AIR POLLUTION CONTROL EQUIPMENT
P.O. Box 739 Owosso, Michigan 48867 U.S.A.

PROJECT: RUST ENG / WESTINGHOUSE CONTRACT NO. 1023-5595-F-G
DWN BY: D. BECK
SCALE: 1/2"=0'-1"
DATE: 11-25-87
CHK'D BY: K.B.
DWG. TITLE: STANDARD FLOAT SWITCHES
SHEET 23 OF 30
DWG. NO. 06H7-23

MAR 2 8 1991

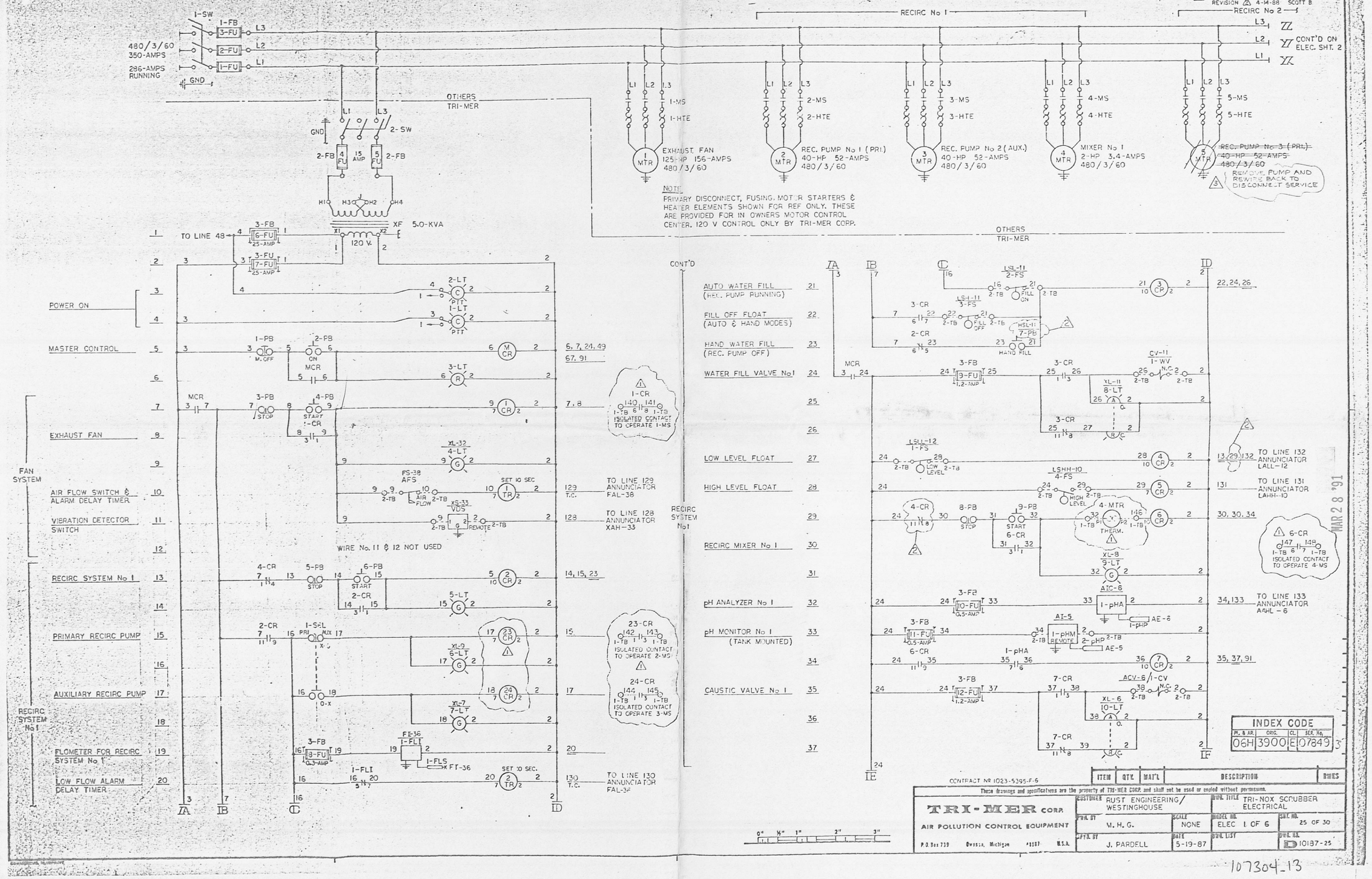
107304-12

REV-3 ADDED NOTE PER R.S.S. #1542

REVISIONS

REVISION C
REVISION B 9-11-87
REVISION A 4-14-88 SCOTT B

1476



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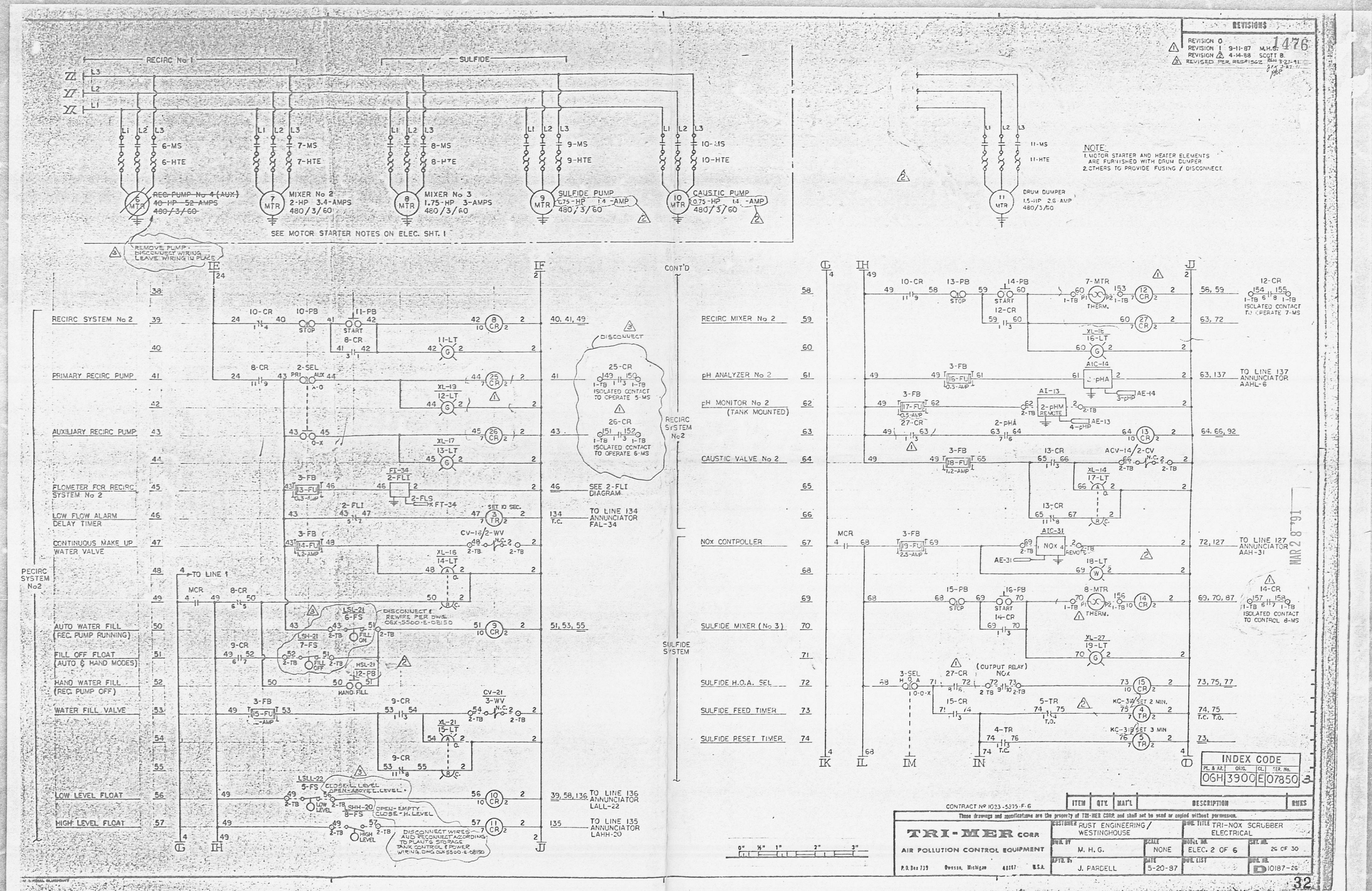
REVISIONS
REVISION 0
REVISION 1 9-11-87 M.H.G.
REVISION 2 4-14-88 SCOTT B.
REVISED PER RES#1562
RECIRC No 1
SULFIDE
6-MS
6-HTE
REC PUMP No 4 (AUX)
40-HP 52-AMPS
480/3/60
7-MS
7-HTE
MIXER No 2
2-HP 3.4-AMPS
480/3/60
8-MS
8-HTE
MIXER No 3
1.75-HP 3-AMPS
480/3/60
9-MS
9-HTE
SULFIDE PUMP
0.75-HP 1.4-AMP
480/3/60
10-MS
10-HTE
CAUSTIC PUMP
0.75-HP 1.4-AMP
480/3/60
SEE MOTOR STARTER NOTES ON ELEC. SHT. 1
REMOVE PUMP
DISCONNECT WIRING
LEAVE WIRING IN PLACE
11-MS
11-HTE
DRUM DUMPER
1.5-HP 2.6-AMP
480/3/60
NOTE:
1. MOTOR STARTER AND HEATER ELEMENTS ARE FURNISHED WITH DRUM DUMPER
2. OTHERS TO PROVIDE FUSING / DISCONNECT.
RECIRC SYSTEM No 2
PRIMARY RECIRC PUMP
AUXILIARY RECIRC PUMP
FLOMETER FOR RECIRC SYSTEM No 2
LOW FLOW ALARM DELAY TIMER
CONTINUOUS MAKE UP WATER VALVE
AUTO WATER FILL (REC. PUMP RUNNING)
FILL OFF FLOAT (AUTO & HAND MODES)
HAND WATER FILL (REC. PUMP OFF)
WATER FILL VALVE
LOW LEVEL FLOAT
HIGH LEVEL FLOAT
RECIRC SYSTEM No2
DISCONNECT
ISOLATED CONTACT TO OPERATE 5-MS
ISOLATED CONTACT TO OPERATE 6-MS
SEE 2-FLI DIAGRAM
TO LINE 134 ANNUNCIATOR FAL-34
TO LINE 136 ANNUNCIATOR LALL-22
TO LINE 135 ANNUNCIATOR LAHH-20
DISCONNECT & REWIRE PER DWG. 06X-5500-E-08150
DISCONNECT WIRES AND RECONNECT ACCORDING TO PLANT & STORAGE TANK CONTROL & POWER WIRING DWG 06X5500-E-08150
CONT'D
RECIRC MIXER No 2
pH ANALYZER No 2
pH MONITOR No 2 (TANK MOUNTED)
CAUSTIC VALVE No 2
NOx CONTROLLER
SULFIDE MIXER (No 3)
SULFIDE H.O.A. SEL
SULFIDE FEED TIMER
SULFIDE RESET TIMER
SULFIDE SYSTEM
ISOLATED CONTACT TO OPERATE 7-MS
TO LINE 137 ANNUNCIATOR AAHL-6
TO LINE 127 ANNUNCIATOR AAH-31
ISOLATED CONTACT TO CONTROL 8-MS
INDEX CODE
06H 3900 E 07850
CONTRACT No 1023-5375-F-6
TRI-MER CORP
AIR POLLUTION CONTROL EQUIPMENT
P.O. Box 739 Owosso, Michigan 48867 U.S.A.
CUSTOMER RUST ENGINEERING / WESTINGHOUSE
DWG. TITLE TRI-NOX SCRUBBER ELECTRICAL
DWN. BY M. H. G.
SCALE NONE
MODEL NO. ELEC. 2 OF 6
SHT. NO. 26 OF 30
APVD. BY J. PARDELL
DATE 5-20-87
DWG. LIST
DWG. NO. D 10187-26
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107304_14