Feb 5, 1987
(Rec'd 2-12-87)

Ground Water Treatment Facilities Plans and Specifications

E.I. Du Pont De Nemours & Co.
Niagara Plant

Stearns Catalytic

932013

DUPONT

G.W Treat. Facilities

Plans + Specs.

(5711E)
PROJECT 39950

E. I. DU PONT DE NEMOURS & CO.

NIAGARA PLANT

GROUND WATER TREATMENT FACILITIES

PLANS AND SPECIFICATIONS

1-29-87

V. S. Wróniewicz, P. E.
Project Manager
Stearns Catalytic Div. of UE&C
New York License No. 45654

TABLE OF CONTENTS

PROJECT DESCRIPTION

Introduction

The philosophy put forth in this project description is defined in a Block Flow Diagram and four Process and Instrumentation (P&I) Diagrams included in the Attachments to this report. To facilitate interpretation of the P&I Diagrams, the Du Pont Engineering Standard for Instrument Symbols and the Piping Material Specifications (P103B and P101E) are included with the diagrams.

A summary of the design basis for all major equipment included in the treatment facilities follows this project description. Specifications for major equipment are also presented in the Attachments.

Project Objective

The remediation objective is to contain the migration of contaminated ground water in the overburden zone and subsequently treat collected water to reduce the concentration of volatile organics migrating offsite to an acceptable level. Ground water in the overburden zone will be collected by a pumping well system to be installed in both the east and west areas of the plant. The location and flow rates of the pumping wells were determined based on calibrated ground water modeling performed by Woodward-Clyde Consultants. A monitoring program utilizing piezometers within the plant boundaries and around the perimeter will confirm an effective hydraulic gradient to control migration.

Process Description

Ground water from each pumping well will be collected in an aboveground header system and conveyed to the treatment facilities which will utilize steam stripping as the primary method of treatment to remove organic pollutants. The treatment facilities will have a design capacity of 270 gpm. Normal flow to the facilities is estimated to be about 90 gpm. A Block Flow Diagram depicting the treatment system is presented as Drawing No. W965159.

Collection System

Thirty-four (34) pumping wells will be installed to collect ground water and maintain a hydraulic gradient. A diagram for a typical well installation and associated above grade piping and instrumentation is presented as Drawing No. W951176.

On the east plant, 15 pumping wells will be installed along Du Pont Road starting 100 feet east of Gill creek and running eastward at intervals of not more than 90 feet. Each well pump will have a capacity of 10 gpm and discharge into a header running westward along Du Pont Road on existing pipe racks. The header will collect and convey ground water to the treatment facilities located about 700 feet west of Gill Creek on Du Pont Road. Plot Plan Drawing Nos. W941614 and W941615 show the general location of these pumping wells.

On the west plant, 19 pumping wells will be installed generally between new and existing railroad spurs south of Riverside Avenue. The well locations will start near the property line at the west end of the plant and run

eastward at intervals of not more than 90 feet to Gill Creek then turning north paralleling the creek for 400 feet. Again, each well pump will have a capacity of 10 gpm.

The collection header on the west side will generally run on existing pipe racks to the treatment area. In some areas, new pipe supports will be provided to bridge spans to existing racks. Refer to the aforementioned drawings for well locations on the west side.

Installation of the pumping wells will be in accordance with Specification No. 39950-2100-2101 as part of the Scope of Work for Pumping and Monitor Well Installation. Each well will be 36 inches in overall diameter with an inside casing diameter of 20 inches and drilled to bedrock. A level control system in each well will maintain a level sufficient to achieve a hydraulic drawdown to contain ground water. Each well will be equipped with a centrifugal submersible pump in accordance with Specification No. 39950-0900-0902.

Treatment Facilities

Ground water from the 34 pumping wells will be collected in a 140,000 gallon equalization tank. This tank shall be a closed-top vessel vented to atmosphere through carbon canisters. Following equalization, antifoam agent and a scale inhibitor will be metered with the ground water which shall be subsequently preheated and fed to the top of the stripping column. A static mixer will provide in-line mixing of the ground water with the antifoam and scale inhibitor. Equalization and chemical addition facilities are shown on P&I Diagram No. W951177.

The steam stripping process has been sized by computer modeling and augmented by a pilot study. A 3.5 feet diameter packed column with a 30 feet straight-side has been specified. Results of computer modeling indicated that 5 theoretical stages shall be required to adequately reduce the least strippable organic. The height of each theoretical stage has been determined from pilot testing. A packing height of 16 feet of one-inch Pall rings is recommended. The expected influent and effluent characteristics for this steam stripping facility are summarized in the Engineering Report for the Niagara Plant Ground Water Treatment Facilities.

The stripper feed will be contacted countercurrently with low pressure steam. The process shall be controlled by proportioning steam to feed flow rate. Part of the stripper steam along with the stripped organics will go overhead of the column to a condenser specified for a heat duty of 131,000 BTU per hour. Niagara River water shall be utilized as the cooling medium for condensing column overheads. The liquid exiting the condenser will consist of two phases. The heavy organic phase will be decanted and flow to a 300 gallon organics storage tank. This closed-top storage tank will continuously discharge by gravity to a 3,400 gallon tank truck for offsite incineration every 2 to 3 months. The maximum rate of accumulation of organics is expected to be 70 gallons per day. The aqueous phase will flow by gravity to the equalization tank for reprocessing. Any vapor from the condenser and decanter will vent to a secondary condenser and be cooled from 86 to 41°F. Condensibles from the secondary condenser will discharge to the organics storage tank. The stripping column and organics storage facilities are depicted on P&I diagrams numbered W951178 and W951179.

Results of pilot testing indicated the condensed organic phase will be categorized as a Class IB flammable liquid. To minimize any possibility for ignition of the organic vapors, the headspace of the organics storage tank and the tank truck shall be blanketed with nitrogen. As organics are accumulated in the tank truck, the inerted atmosphere will be vented on pressure control to the secondary condenser. Chilled water at 35°F will be supplied to the secondary condenser. Non-condensibles will vent through a flame arrester to a stack 100 feet high.

Secondary containment of the organics will be provided around the stripper, decanter, storage tank and tank truck by curbing. The curbed organics loading area will contain a sump equipped with a vertical centrifugal pump. A portable foam system for fire protection will be provided.

The hot stripper column bottoms will be pumped through the 21 million BTU per hour plate and frame type preheater for heat recovery with the column feed stream. The stripped bottom water will subsequently flow to an existing sewer for release to the Niagara Falls municipal wastewater treatment authority for further treatment of cyanides. The projected effluent concentrations for all organics specified in the Engineering Report were determined by computer simulation to be less than 50 ppb, except tetrahydrothiophene which is less than 350 ppb. This constitutes 90 percent removal for all indicator volatile organics. In the event that treated effluent characteristics do not consistently comply with discharge requirements, the capability to recycle off-spec effluent to the equalization tank will be provided.

Other than non-contact cooling water from the overhead condenser and secondary condenser, no process effluents shall be discharged to any receiving steams or other water bodies. The design cooling water discharge will be approximately 12,500 pounds per hour or 25 gpm released to Gill Creek through existing outfall number 006.

Specifications for all major equipment defined in this description are included in the Attachments. An Equipment Arrangement Plan is also presented as Drawing No. W957143.

Monitoring Program

Thirty-five (35) new piezometers will be installed for use in conjunction with existing monitoring and utility wells to monitor the effective hydraulic gradient within the Niagara plant site. Relative locations of these piezometers are shown on Drawing Nos. W941614 and W941615.

Treated stripper effluent will be continuously monitored for indicator volatile organics via an on-line gas chromatograph prior to release to the municipal wastewater treatment authority. A composite sampler will also be specified for subsequent analyses of the treated effluent stream.

SUMMARY OF DESIGN BASIS FOR TREATMENT FACILITIES

Submersible Well Pumps (EN 880-101-1-1 through 880-134-1-1)

Number:	34
Capacity:	10 gpm
TDH:	107 ft.
Horsepower:	1 1/2
Construction:	Cast Iron

Equalization Tank (EN 880-1-1)

Volume:	140,000 USG
Dimensions:	35 ft. dia. x 22 ft. high
Construction:	Carbon Steel

Feed Pumps (EN 880-3-1, 880-6-1, 880-13-1)

Number:	3
Capacity:	270 gpm
TDH:	159 ft.
Horsepower:	20
Construction:	Ductile Iron

Metering Pumps (EN 880-7-1 and 880-8-1)

Number:	2
Capacity:	2 gph
TDH:	155 ft.
Horsepower:	1/4
Construction:	Stainless Steel

Stripper Column (EN 880-12-1)

Dimensions:	3 1/2 ft. dia. x 30 ft. S.S.
Construction:	Carbon Steel
Operating Temperature:	217°F
Operating Pressure:	1.3 psig
Packing:	16 ft. deep bed of 1 inch slotted 304 SS Pall rings (170 cu.ft.)

Overhead Condenser (EN 880-14-1)

Duty:	131,220 BTU/Hr.
Area:	30 sq. ft. @ 42.77 BTU/Hr. Sq.Ft.-F
Operating Temperature:	Hot Side: 217 → 86°F
	Cold Side: 78 → 90°F
Construction:	Cupronickel tubes/Carbon Steel shell

Decanter (EN 880-14-2)

Volume:	13 USG
Dimensions:	1.5 ft. dia. x 1.5 ft. high
Construction:	Titanium

Organics Storage Tank (EN 880-20-1)

Volume:	300 USG
Dimensions:	4 ft. dia. x 3.5 ft. high
Construction:	Carbon Steel/Epoxy Lined

Organics Storage Tank Tailer

Volume:	3,400 USG
Dimensions:	4 ft. dia. x 37 ft. long
Construction:	300 psig ASME code vessel,
	Carbon Steel/Epoxy Lined
Comment:	Surplus Du Pont Truck Trailer

Feed Preheaters (EN 880-10-1, 880-11-1)

Duty:	10,538,600 BTU/Hr.
Operating Temperature:	Hot Side: 217 → 58°F
	Cold Side: 50 → 208°F
Construction:	Titanium and 316 SS plate/ Carbon Steel frame

Secondary Condenser (EN 880-20-2)

Duty:	2,000 BTU/Hr.
Area:	15 sq. ft.
Operating Temperature:	Hot Side: 86 → 41°F
	Cold Side: 35 → 37°F
Construction:	Carbon Steel shell and tubes

Ice Builder Package (EN 880-20-2-1)

Process Load:	2,000 BTU/Hr.
Outlet Water Temperature:	35°F (max.)

Sump Pump (EN 880-21-1)

Number:	1
Capacity:	100 gpm
TDH:	40 ft.
Horsepower:	2
Construction:	Carbon Steel

ATTACHMENTS

STEARNS CATALYTIC CORPORATION
PHILADELPHIA, PA

PLANT: NIAGARA
PROJECT: DU PONT 113592/SCC 39950
DATE: 4 DECEMBER 1986

SCOPE OF WORK

FOR

PUMPING AND MONITOR WELL INSTALLATION

CONSISTING OF

PACKAGE "RA"

APPROVED BY DU PONT _____ _____

APPROVED BY DU PONT _____ 5 Dec 86

APPROVED BY SCC _____ 12/4/86

PREPARED BY SCC _____ Dec. 4 1986

SCOPE OF WORK

CONTRACT PACKAGE "RA"
PAGE 1 of 4

TABLE OF CONTENTS

1.00 IDENTIFICATION

1.01 Pumping Wells: EN 880-101-1 through 880-134-1.

1.02 Monitor Wells: EN 880-202-1 through 880-235-1.

2.00 GENERAL

2.01 Contractor shall furnish all labor, supervision, materials, tools, equipment and services necessary for or incidental to the installation of 34 pumping wells and 34 monitor wells in accordance with the attached drawings, specifications, and standards. The general scope of the work follows:

2.02 Thirty-four (34) pumping wells installed to top of bedrock. A schedule of well elevations is included as Attachment A to Specification No. 39950-2100-2101.

2.03 Thirty-four (34) monitor wells (piezometers) installed to top of bedrock. A schedule of piezometer elevations is included as Attachment B to Specification No. 39950-2100-2101.

2.04 Locations for all pumping wells and piezometers are indicated on Drawings Nos. W941614 and W941615 Niagara Remediation Project Plot Plans.

3.00 PUMPING WELLS

3.01 Contractor shall construct 34 well shafts as described in Specification No. 39950-2100-2101 and shown on Detail 1 of Drawing No. W942188 Well Shaft and Piezometer Details.

3.02 Coordinate locations of each well are indicated on Du Pont Drawings Nos. W941614 and W941615.

3.03 Interferences within a 25 ft. by 30 ft. area of each well location are shown on Well Detail Drawings Nos. W951156 through W951161.

3.04 The Contractor is referred to test boring logs included as an attachment to Specification No. 39950-2100-2101 for a generalized nature of the soils encountered at the plant site.

3.05 Each pumping well shall be complete with concrete cap and well cover plate in accordance with Drawing No. W942188.

3.06 Contractor shall install barricades around those wells designated as "guardrail required" in Well Schedule, Attachment A to Specification No. 39950-2100-2101, with guardrails as detailed on Drawing No. W942188.

3.07 Submersible pump within each well and associated piping and instrumentation shall be furnished by Others.

4.00 MONITOR WELLS (PIEZOMETERS)

4.01 Contractor shall construct 34 drilled monitor wells (piezometers) described in Specification No. 39950-2100-2101 and shown on Drawing No. W942188 Well Shaft and Piezometer Details.

4.02 Coordinate locations of each piezometer are indicated on Du Pont Drawings Nos. W941614 and W941615.

4.03 Contractor shall install those wells designated as "flush mount top" in Piezometer Schedule, Attachment B to Specification No. 39950-2100-2101, with cover flush with existing grade as detailed on Drawing No. W942188.

4.04 Piezometer designated WPP-1 (EN 880-201-1) shall be installed by Others.

5.00 ATTACHMENTS

5.01 Contract Drawings

Drawing No.	Title
W941615	Niagara Plant Remediation Project Plot Plan, Sheet No. 1
W941614	Niagara Plant Remediation Project Plot Plan, Sheet No. 2
W951156	Niagara Plant Remediation Project Well Details 1 through 6, Sheet No. 1
W951157	Niagara Plant Remediation Project Well Details 7 through 12, Sheet No. 2
W951158	Niagara Plant Remediation Project Well Details 13 through 18, Sheet No. 3
W951159	Niagara Plant Remediation Project Well Details 19 through 24, Sheet No. 4
W951160	Niagara Plant Remediation Project Well Details 25 through 30, Sheet No. 5
W951161	Niagara Plant Remediation Project Well Details 31 through 36, Sheet No. 6

W942188	Niagara Plant Remediation Project Well Shaft and Piezometer Details, Civil
W902297	Caustic Process Area Equipment Arrangement
W918903	Caustic Chlorine Facilities Underground Piping Plan, Sheet 4
W940269	Caustic Chlorine Facilities Yard Piping Process Drains Details & Schedules, Civil
W918901	Caustic Chlorine Facilities Underground Piping Plan, Sheet 1
W918120	Outside Overhead Lines Building 86 to Chlorine Building Piping Arrangement Plan & Sections
EE-40-2744 Sheet 4	Map East Plant South of Adams Avenue Building & Track Locations

5.02 Contract Specifications

Spec. No.	Description
39950-2100-2101	Installation of Well Shafts and Piezometers

5.03 Reference Attachments to Specification

Designation	Description
Attachment "A"	Pumping Well Elevation Schedule
Attachment "B"	Piezometer Elevation Schedule
Attachment "C"	Niagara Plant Soil Boring Log
Attachment "D"	Section 703-07 of the New York State Department of Transportation Standard Specifications, Construction and Materials, January 2, 1985

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(4591E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-2100-2101

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

INSTALLATION OF WELL SHAFTS AND PIEZOMETERS

CONSISTING OF

Reference Attachments:

A. Pumping Well Elevation Schedule.
B. Piezometer Elevation Schedule.
C. Niagara Plant Soil Boring Log, Pages C-1 through C-40.
D. Section 703-07 of the New York State Department of Transportation Standard Specifications, Construction and Materials, January 2, 1985.

Item No.	Description
EN 880-101-1 through 880-134-1	Well Shafts
EN 880-202-1 through 880-235-1	Piezometers

Approved _____ Date Dec 1986
CLIENT

Approved _____ Date 5 Dec 86
CLIENT

Approved _____ Date 12/4/86
STEARNS CATALYTIC

Prepared By _____
STEARNS CATALYTIC

Amendment	Approved (CLIENT)	Date	Approved (CLIENT)	Date	Approved (STEARNS CATALYTIC)	Approved	Approved	Approved	Date
1		1/6/87		6 Jan 87					12-23-86

INSTALLATION OF WELL SHAFTS AND PIEZOMETERS

SPECIFICATION NO. 39950-2100-2101

TABLE OF CONTENTS

INSTALLATION OF WELL SHAFTS AND PIEZOMETERS

SPECIFICATION NO. 39950-2100-2101
PAGE 1 of 8

1.00 GENERAL

1.01 Scope

This specification covers the technical requirements in the furnishing of all labor, supervision, materials, tools, equipment and services necessary for and incidental to the construction of the well shafts and installation of piezometers, including routine inspection and testing, in accordance with the drawings, the requirements of this specification and subject to the general requirements of the contract documents. Work includes the following:

1.01.1 For thirty-four (34) pumping wells:

A. Layout of lines and grades as required to locate and orient the wells.

B. Machine drilling of well shaft excavations through soil/shotrock to bedrock including placing of temporary steel casings.

C. Furnish and place stainless steel well screen and riser pipe.

D. Furnish and place filter material around riser pipe section to elevations shown.

E. Cast-in-place concrete cap and pad, including well cover.

1.01.2 For thirty-four (34) piezometers:

A. Layout of lines and grades as required to locate the piezometers.

B. Machine drilling of piezometer shaft excavations through soil/shotrock to bedrock.

C. Furnish and place stainless steel well screen and riser pipe.

D. Furnish and place sand around well screen and riser pipe to elevations shown.

E. Furnish and place cement and bentonite seal to elevations shown.

F. Cap with concrete plug.

1.02 Definitions

1.02.1 Pumping Well

A 20-inch diameter well utilized to withdraw groundwater.

1.02.2 Piezometer (Monitoring Well)

A 2-inch diameter well utilized to determine the level of the groundwater.

2.00 QUALITY ASSURANCE

2.01 Referenced Standards

Codes, specifications and standards of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto. In the event of conflicts or discrepancies between this specification and the referenced codes, specifications or standards, the more stringent applicable requirements, as determined by the Owner's representative, shall govern. Subsequent issues or revisions of these documents in effect on the date of the invitation for bids shall apply.

American Welding Society (AWS)

D1.1-82 Structural Welding Code - Steel.

2.02 Subcontractor Qualifications

The work shall be performed by a company experienced in the drilling and installation of well shafts, and who shall furnish evidence of having successfully executed installations of similar systems under similar subsurface conditions. This company shall be referred to hereinafter as the Subcontractor.

2.03 Allowable Tolerances

Any shaft out of center or plumb beyond the tolerance specified shall be corrected as necessary to comply with the tolerances and the Subcontractor shall bear any cost of correction.

A. Cross section of shafts shall be not less than the design drawing dimensions.

B. Pumping well shafts shall be installed with the top location deviating no more than six inches from the design centerline location, but shall be centered within the 36" diameter hole ± 2 inches.

C. Shafts shall be installed plumb within a maximum deviation from vertical of 0.8°.

3.00 JOB CONDITIONS

3.01 Examination of Jobsite

The Subcontractor shall be held to have visited and examined the jobsite to have ascertained the state thereof and any restrictions thereon and taken into consideration all conditions which may affect the completion of the work.

3.02 Subsurface Data

The Subcontractor is referred to available test boring data including boring logs and the nature of soils encountered at the plant site. This report is included as Attachment C and available as a reference to the Subcontractor for use as supplementary information only, and any conclusions drawn therefrom without regard to its limitations shall be at the risk of the Subcontractor.

Boring Logs
Final Report
Geotechnical Investigation
Du Pont Niachlor Facilities
Niagara Falls, New York
Prepared by Woodward-Clyde Consultants
Dated February 26, 1985

4.00 PROTECTION OF EXISTING SERVICE LINES, UTILITIES AND STRUCTURES

4.01 The Subcontractor shall perform the work of the specification in a manner so as to avoid damage to existing plant structures and utilities. Existing utility lines that are to be retained and that are shown on the drawings or otherwise brought to the attention of the Subcontractor prior to commencement of operations shall be protected from damage during excavation and drilling operations, and if damaged shall be repaired by the Subcontractor at no cost to the Owner. In the event that the Subcontractor damages or uncovers any existing utility lines that are not shown, or the locations of which have not been made known to the Subcontractor, report thereof shall be made to the

Owner's representative. If determined that repairs are to be made by the Subcontractor, such repairs will be made by the Subcontractor and paid for by the Owner.

5.00 EQUIPMENT

5.01 Equipment and tools required for the work shall be acceptable to the Owner's representative for the mechanical condition and capacity. Equipment shall be brought to the jobsite in sufficient time to be examined and approved. Equipment shall be maintained in satisfactory working condition until completion of the work and shall be provided in sufficient quantity and capacity to maintain the schedule of the work. Tools and equipment shall be steam cleaned before being brought to the site. Equipment must be cleaned of all soil, water or any excavated material after completing each well, before moving on to the next well.

6.00 MATERIALS OF CONSTRUCTION OF PUMPING WELL SHAFTS

6.01 Temporary Casings

6.01.1 Steel casings having a minimum wall thickness of 1/4". Casings shall be pulled during construction as specified in Sections 7.02.2 and 7.06.3.

6.02 Well Shaft

6.02.1 Well shafts shall consist of Schedule 5 Type 304 stainless steel pipe with stainless steel well screen at bottom. Inside diameter of well screen shall be the same as the pipe ID.

6.03 Filter Material

6.03.1 Filter material shall consist of concrete sand conforming to Section 703-07 of the New York State Department of Transportation Standard Specifications, Construction and Materials, January 2, 1985, which specifies the following gradation:

Sieve Size	Percent Passing By Weight Minimum	Maximum
3/8 inch	100	
No. 4	90	100
No. 8	75	100
No. 16	50	85
No. 30	25	60
No. 50	10	30
No. 100	1	10
No. 200 (Wet)	0	3

6.04 Well Screen

6.04.1 A slotted stainless steel screen, as specified on Drawing No. W942188.

7.00 INSTALLATION OF PUMPING WELL SHAFTS

7.01 General Description

Well shafts shall be produced by any combination of machine drilling, hand excavation and removal of rock at the bottom of each shaft.

7.02 Excavation in Soil

7.02.1 Excavate shafts of the diameter indicated on the drawings into the soil to the bedrock surface at whichever depth encountered.

7.02.2 In drilling shafts, the surrounding soil and earth walls shall be adequately and securely protected against cave-ins, displacement of the surrounding earth and retention of groundwater by means of a 36 inch diameter steel casing. Casings shall be withdrawn as filter material is being placed.

7.03 Disposal of Excavated Material

7.03.1 The Subcontractor shall effectively manage containment of excavated soil and associated groundwater brought to the surface by excavation devices.

7.03.2 Disposal of excavated material shall be as specified in E. I. du Pont de Nemours Site Conditions.

7.04 Water Containment

7.04.1 All groundwater, and wash or cooling water used for drilling shall be contained in the drilling area and returned to the well or removed in accordance with the Du Pont Site Conditions. All water used for drilling shall be clean potable water obtained from an on-plant source designated by Du Pont. The Subcontractor shall be responsible for transporting the water to the drill site in clean containers. Drilling water shall not be recirculated back into the storage container.

Drilling fluids (drilling lubricants) other than water shall not be used.

Controlling and containing run-off from material removed during drilling is also the responsibility of the Subcontractor.

7.05 Removal of Obstructions

1 7.05.1 All rocks, boulders, concrete and masonry substructures or other obstructions below grade which are indicated or suggested on or in reference information available to the Subcontractor at the site, and which interfere with the work, shall be demolished and removed from within the excavation as part of the work under the base bid. Care shall be taken to ensure that the bottom of the well shaft is clear of all excavated rock or other obstructions.

7.05.2 Underground utilities encountered during excavation shall be protected until proper identification is made. If the utilities are abandoned, the interfering positions shall be removed. If the utilities are to remain in service, the Owner's representative will provide for relocation as required at no cost to the Subcontractor.

1 7.05.3 In locations that are close to existing utilities, the Subcontractor shall excavate by hand prior to beginning drilling operations in order to minimize the possibility of damage to the lines. Locations known to be in close proximity to existing service lines are identified with a note in Detail Drawings No. W951156 through W951161 to hand excavate. In no event, shall drilling begin if utility is not visible.

7.05.4 If during the process of excavating shafts any unforeseen obstructions, such as concrete or masonry substructures, or underground utility lines are encountered which are not shown on the drawings or in information available to the Subcontractor, the Subcontractor shall cease work immediately and so inform the Owner's representative.

7.06 Construction of Well Shaft

7.06.1 Bidders shall furnish with their bids a proposed procedure and sequence for excavation and installation of the well.

7.06.2 Filter material, in accordance with Section 6.04 of this specification, shall be placed around the outside of the well screen and riser pipe. Care shall be taken to ensure that the material is brought up equally around the riser pipe, without overspillage inside the pipe. The riser pipe shall be covered while filter material is being placed. Compact the surface of the filter material by gently tamping before casting the concrete cap.

7.06.3 Withdraw the outer temporary casing. As the casing is being withdrawn, at least two (2) feet of filter material shall be maintained above the bottom of the temporary steel casing at all times.

Measure the elevation of top of riser pipe before starting to withdraw the temporary casing. Special care must be taken to assure that the well screen and riser pipe are not lifted as the temporary casing is withdrawn. The maximum allowable tolerance in the vertical upward movement of the top of riser pipe shall be one (1) inch.

As the filter material is placed it shall be probed, as required, to assure that it does not arch between the casing and the riser pipe. (Note: As the casing is being pulled the filter material level may drop rapidly, if there are voids outside of the temporary casing).

7.06.4 The steel casing shall be thoroughly cleaned, inside and out, before re-use.

7.06.5 Complete the well shaft with a cast-in-place concrete cap in accordance with Drawing No. W942188, Detail 5.

7.06.6 Furnish and place a well cover plate in accordance with Drawing No. W942188, Detail 2. Clearly stencil the well number on the cover plate to the well.

7.06.7 Furnish and install well guardrails in accordance with Drawing No. W942188, Detail 6, in locations shown on Drawing Nos. W951156 through W951161 and where indicated on Attachment A to this specification.

8.00 INSTALLATION OF PIEZOMETERS

8.01 An 8" OD x 3 3/4" hollow shaft auger shall be used to bore a well to bedrock. The 2" well screen and riser pipe shall be centered in the hollow shaft and filter sand, etc. poured in as auger is withdrawn, to produce a piezometer as shown on Drawing No. W942188.

8.02 Install 5 feet of 2-inch Schedule 40 stainless steel (Type 304) slotted well screen pipe attached to sufficient 2-inch Schedule 40 carbon steel riser pipe to reach a point 3 feet above ground surface. All steel pipe shall have threaded joints. The slots in the well screen shall be 0.020 inch wide.

8.03 A mixture of cement and bentonite (one part bentonite to 25 parts cement by volume) shall then be tremied around the casing pipe to fill the hole from the top of the bentonite pellets to 8 inches below ground surface.

8.04 Install the concrete plug. Furnish and install a lockable well cap. Bore a 1/8-inch breather hole through the side of the pipe cap. Paint the riser pipe with Dulux® 96Y23663 High Visibility Yellow Machinery Enamel.

8.05 Clearly stencil the well number on the riser pipe and cap.

9.00 INSTALLATION OF PIEZOMETERS - FLUSH MOUNT TOP

9.01 General Description

Piezometers in predetermined locations near roadway or access areas shall be installed with the top flush with grade. These installations are identified in the Piezometer Schedule, Attachment B to this specification, by the remark "flush mount top".

9.02 Construction of Flush Mount Top Piezometers

9.02.1 Furnish and set a 12-inch ID cast iron manhole with watertight, vented lid (by Emco Wheaton) in a concrete seal as indicated on Drawing No. W942188, Detail 4.

9.02.2 Complete the installation by furnishing and installing a lockable well cap for the stainless steel riser pipe and clearly stenciling the well number on the well cap and manhole lid. Bore a 1/8-inch breather hole through the side of the pipe cap.

10.00 INSPECTION

10.01 An inspection program shall be established by the Owner's representative and shall include the following items:

A. Location of riser within shaft.

B. Vertical alignment of riser.

C. Elevation of bedrock and elevation of bottom of well screen and length of screen.

D. Elevation of top of filter sand and volume of sand used.

E. Elevation of top of riser pipe before starting to pull temporary casing.

F. Elevation of top of riser pipe after temporary casing has been removed.

G. Note any problems in removing temporary casing.

H. Actual coordinate location of well.

I. Elevation of ground surface.

J. Witness cleanout of rock or other excavation debris from the bottom of the well shaft.

ATTACHMENT "A"

SPEC. NO. 39950-2100-2101

WELL SCHEDULE

Well No.	EN	Location North	Location East	Elev. "A"	Elev. "B"	Elev. "C"	Remarks
1	880-101-1	1405.40	1335.00	569.00	557.5	563.0	Guardrail Required
2	880-102-1	1438.57	1413.00	569.20	557.5	563.5	Guardrail Required
3	880-103-1	1465.00	1445.00	568.30	557.5	564.2	Guardrail Required
4	880-104-1	1409.00	1515.00	569.70	557.8	564.5	
5	880-105-1	1414.00	1600.00	568.90	558.0	565.0	
6	880-106-1	1414.00	1675.00	568.70	559.0	565.5	
7	880-107-1	1414.00	1750.00	568.80	559.0	565.5	
8	880-108-1	1414.00	1825.00	568.90	559.0	565.3	
9	880-109-1	1400.00	1905.00	568.85	558.7	565.0	
10	880-110-1	1414.00	1967.00	568.40	558.7	564.5	
11	880-111-1	1414.00	2050.00	568.80	558.5	564.0	
12	880-112-1	1414.80	2135.00	568.80	559.0	563.8	
13	880-113-1	1438.00	2220.00	569.00	559.0	563.5	
14	880-114-1	1438.00	2285.00	569.00	559.0	563.5	
15	880-115-1	1500.00	2311.00	573.65	559.0	563.5	Guardrail Required
16	880-116-1	1572.42	2322.00	573.65	559.0	563.5	
17	880-117-1	1621.00	2354.00	573.50	560.0	564.5	Exist. 15" Conc. Slab
18	880-118-1	1700.00	2314.00	569.40	560.0	564.0	Guardrail Required
19	880-119-1	1780.00	2300.00	573.00	560.5	564.0	
20	880-120-1	1675.00	2648.00	569.00	557.0	561.5	Guardrail Required

Notes: Elevations A, B, and C are referenced to Drawing No. W942188, Detail 1.

(1) Elevations shown are approximate to ± 1 ft.

ATTACHMENT "A"

SPEC. NO. 39950-2100-2101

WELL SCHEDULE

Well No.	EN	Location North	Location East	Elev. "A"	Elev. "B"	Elev. "C"	Remarks
21	880-121-1	1674.00	2709.00	569.00	558.2	561.0	Guardrail Required
22	880-122-1	1723.00	2779.39	569.00	557.0	561.5	Guardrail Required
23	880-123-1	1723.00	2850.00	569.00	558.0	561.5	
24	880-124-1	1723.00	2925.00	569.00	559.5	563.5	
25	880-125-1	1673.00	3000.00	569.00	558.5	562.8	Guardrail Required
26	880-126-1	1723.00	3070.00	569.00	559.0	562.5	
27	880-127-1	1723.00	3140.00	568.50	559.0	562.4	
28	880-128-1	1672.00	3215.00	568.50	559.0	562.4	Guardrail Required
29	880-129-1	1723.00	3290.00	568.00	559.5	562.3	
30	880-130-1	1723.00	3365.00	568.00	559.5	562.1	
31	880-131-1	1726.00	3455.00	568.00	560.0	562.0	
32	880-132-1	1714.50	3532.00	568.00	560.0	562.0	
33	880-133-1	1728.00	3620.00	568.00	560.0	561.8	Guardrail Required
34	880-134-1	1728.00	3688.00	568.00	560.0	561.4	

ATTACHMENT "B" SPEC. NO. 39950-2100-2101

PIEZOMETER SCHEDULE

Piez. No.	EN	Location North	Location East	Grade Elev.	Top of Rock Elev.	Remarks
WPP-1	880-201-1	1421.00	1360.00	569.00	-	N.I.C. Installed by Others
WPP-2	880-202-1	1414.00	1562.00	569.00	558.00	
WPP-3	880-203-1	1414.00	1787.00	568.85	559.00	
WPP-4	880-204-1	1414.00	2012.00	568.60	558.60	
WPP-5	880-205-1	1438.00	2247.00	569.00	559.00	
WPP-6	880-206-1	1597.00	2335.00	573.50	559.50	Flush Mount Top
WP-1	880-207-1	1275.00	1318.00	569.80	557.00	
WP-2	880-208-1	1265.00	1500.00	569.00	557.00	Flush Mount Top
WP-3	880-209-1	1265.00	1750.00	569.00	557.00	Flush Mount Top
WP-4	880-210-1	1265.00	1900.00	569.00	557.00	Flush Mount Top
WP-5	880-211-1	1270.00	2104.00	570.20	557.00	Flush Mount Top
WP-6	880-212-1	1490.00	2440.00	571.00	558.75	
WP-7	880-213-1	1856.00	2400.00	568.50	560.50	
WP-8	880-214-1	1800.00	2075.00	569.10	562.00	
WP-9	880-215-1	1656.00	2108.00	569.00	560.50	Flush Mount Top
WP-10	880-216-1	1667.00	1900.00	569.30	561.00	
WP-11	880-217-1	1920.00	1900.00	568.00	562.50	
WP-12	880-218-1	1660.00	1718.00	569.25	560.00	Flush Mount Top
WP-13	880-219-1	1645.00	1504.00	569.00	558.75	

1 Note: Elevations shown are approximate to ± 1 ft.

ATTACHMENT "B"

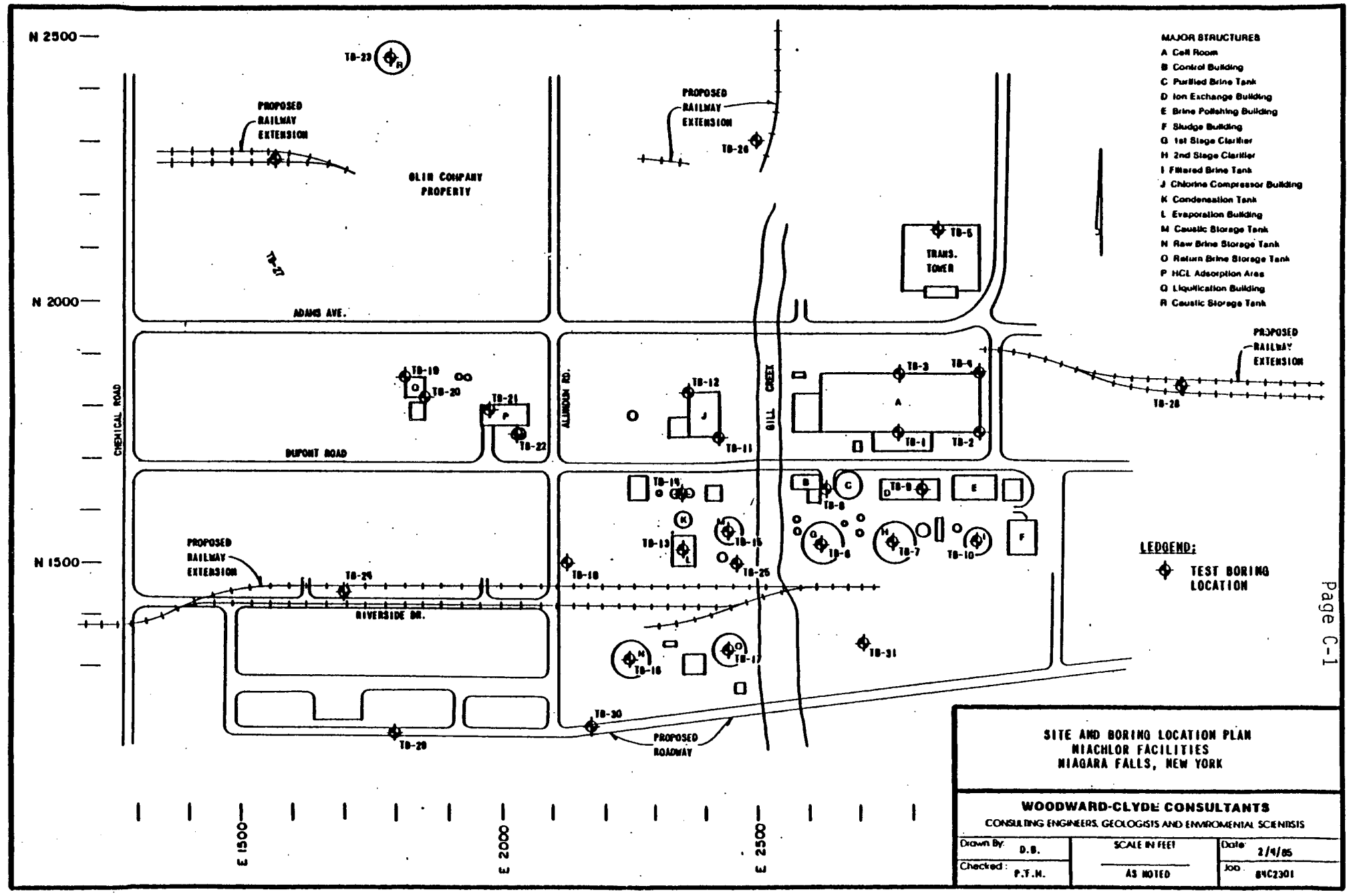
SPEC. NO. 39950-2100-2101

PIEZOMETER SCHEDULE

Piez. No.	EN	Location North	Location East	Grade Elev.	Top of Rock Elev.	Remarks
EPP-1	880-220-1	1676.00	2680.00	569.00	557.50	Flush Mount Top
EPP-2	880-221-1	1723.00	2888.00	569.00	559.00	
EPP-3	880-222-1	1714.50	3105.00	569.00	559.00	Flush Mount Top
EPP-4	880-223-1	1723.00	3326.00	568.00	560.00	
EPP-5	880-224-1	1722.00	3580.00	568.00	560.00	
EP-1	880-225-1	1490.00	2600.00	569.00	559.00	
EP-2	880-226-1	1490.00	2800.00	569.00	559.50	
EP-3	880-227-1	1490.00	3000.00	569.00	560.25	
EP-4	880-228-1	1490.00	3200.00	569.00	560.00	
EP-5	880-229-1	1932.00	3800.00	568.00	560.50	
EP-6	880-230-1	1932.00	3600.00	567.50	560.50	
EP-7	880-231-1	1932.00	3400.00	568.00	560.50	
EP-8	880-232-1	1932.00	3200.00	568.00	560.75	
EP-9	880-233-1	1932.00	3000.00	568.00	561.25	
EP-10	800-234-1	1932.00	2800.00	568.00	560.75	
EP-11	800-235-1	1932.00	2600.00	568.00	560.40	

ATTACHMENT "C"

Note: Plate 1 has been intentionally omitted.

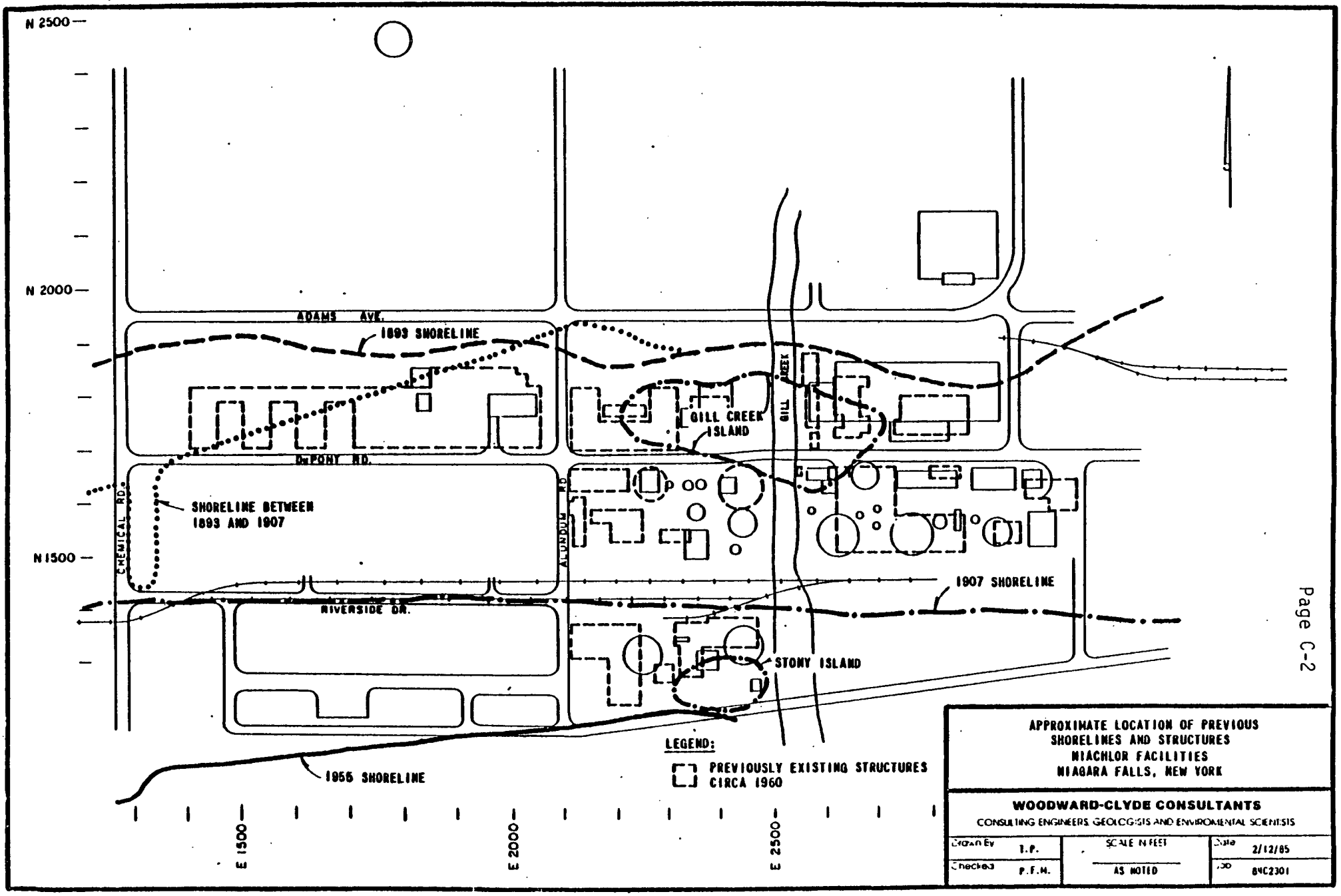


SITE AND BORING LOCATION PLAN
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By: D.B.	SCALE IN FEET — AS NOTED	Date: 2/4/85
Checked: P.T.H.		Job: 84C2301

PLATE 2

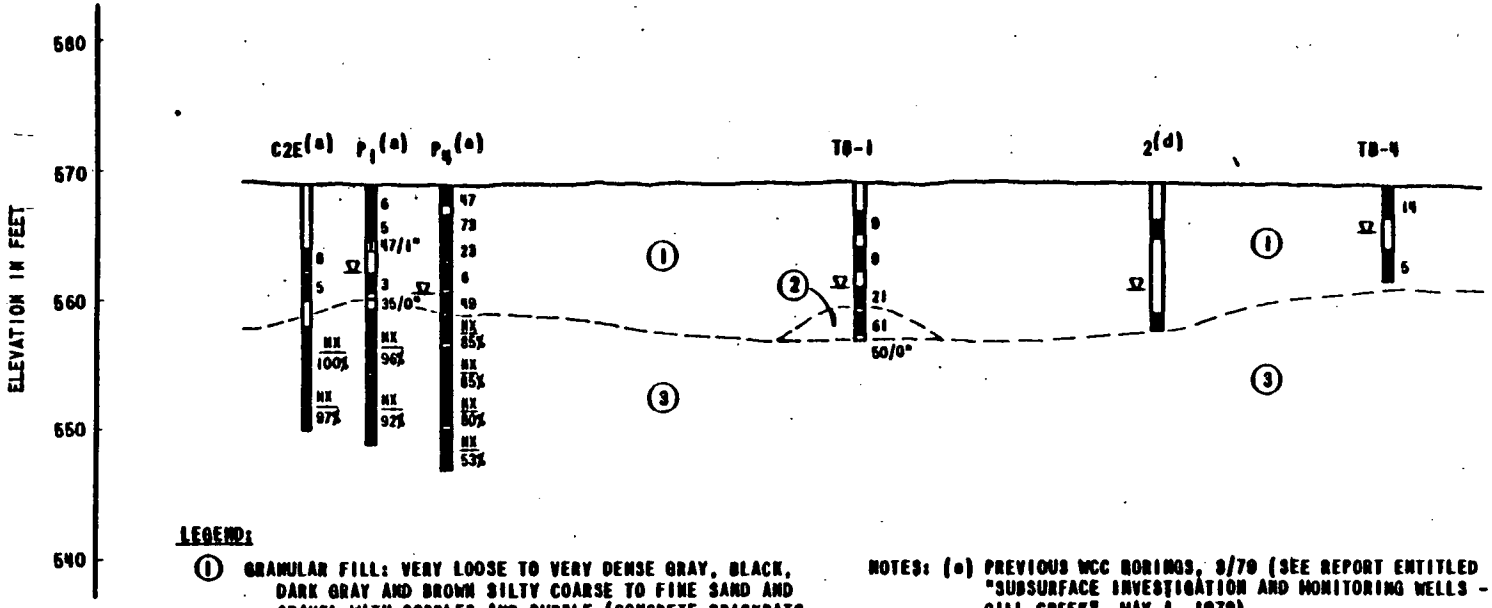


APPROXIMATE LOCATION OF PREVIOUS SHORELINES AND STRUCTURES
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By	T.P.	SCALE IN FEET	Date 2/12/85
Checked	P.F.M.	AS NOTED	Job 84C2301

PLATE 3



LEGEND:

① GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

①A FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

② GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

③ BEDROCK: GRAY LOCKPORT DOLOMITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 8/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 8, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 8/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

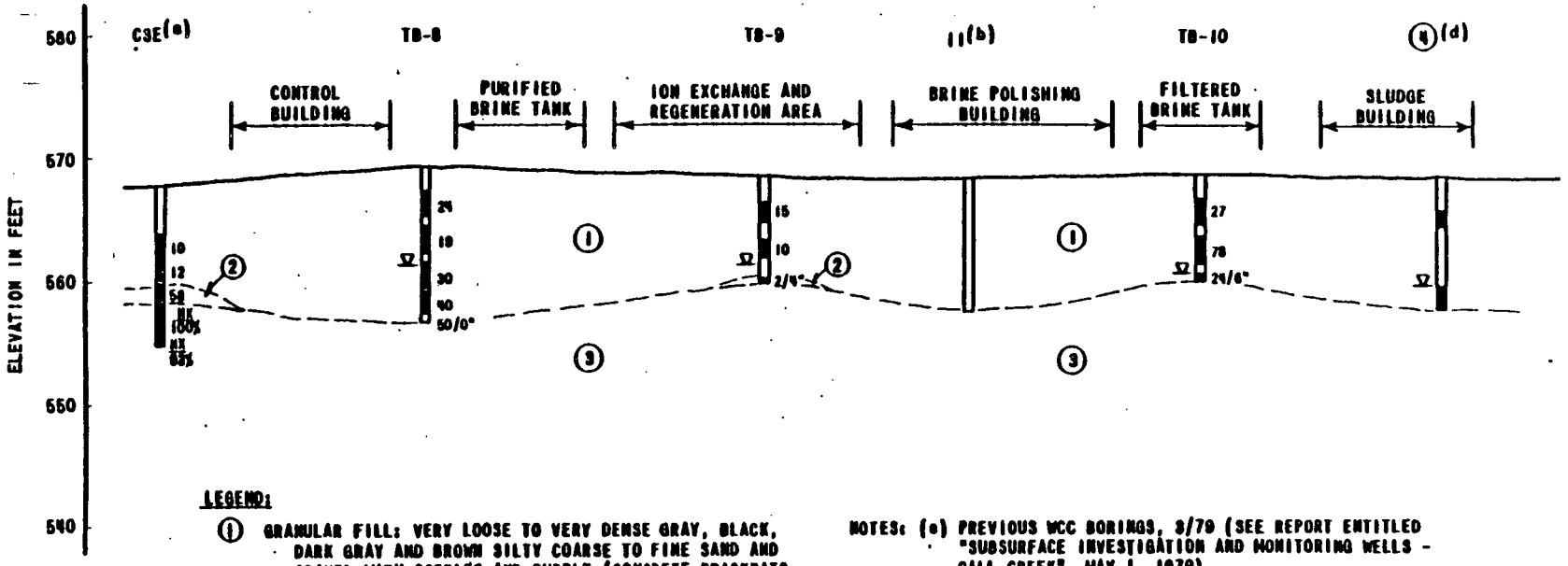
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILE
CELL ROOM AREA
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By	SCALE IN FEET	Date
D.W.B.	0 10 25 50	1/16/85
Checked: P.F.M.		Job 84C2301

PLATE 4



LEGEND:

(1) GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

(1A) FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

(2) GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

(3) BEDROCK: GRAY LOCKPORT DOLOHITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 3/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 1, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 3/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

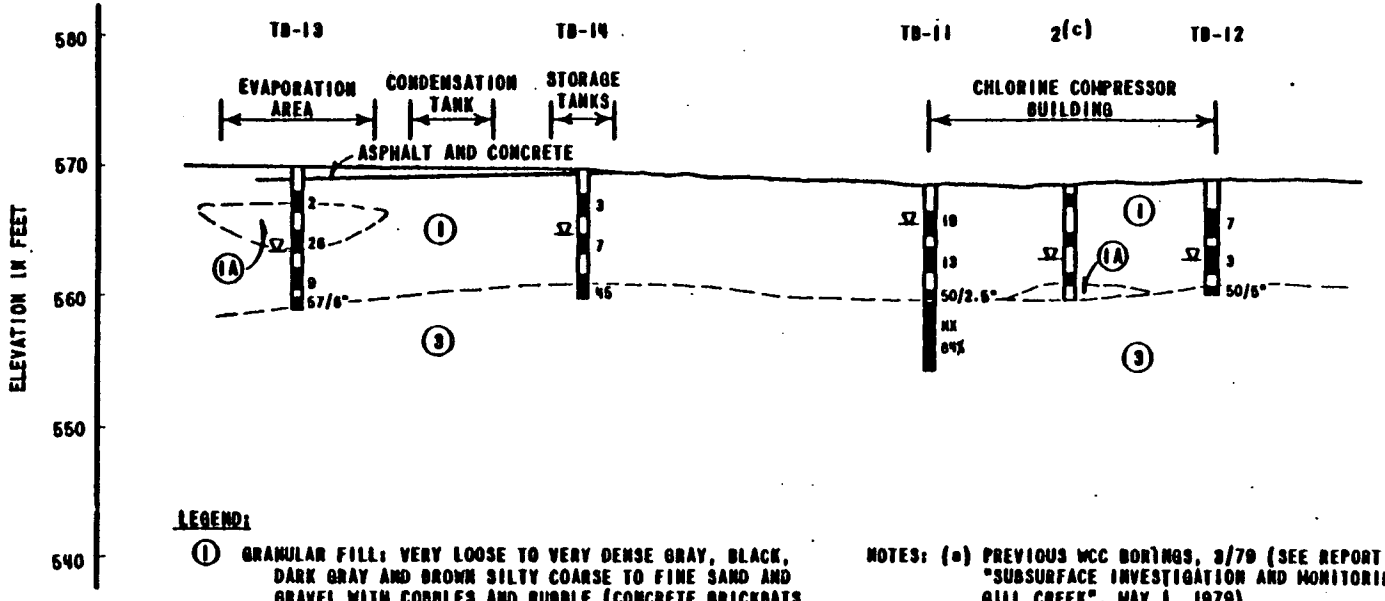
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILE
ION EXCHANGE AND BRINE POLISHING AREA
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By: D.W.B.	SCALE IN FEET: 0 10 25 50	Date: 1/16/85
Checked: P.F.H.		Job: 84C2301

PLATE 5



LEGEND:

(1) GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

(1A) FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

(2) GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

(3) BEDROCK: GRAY LOCKPORT DOLOMITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 3/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 1, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 3/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

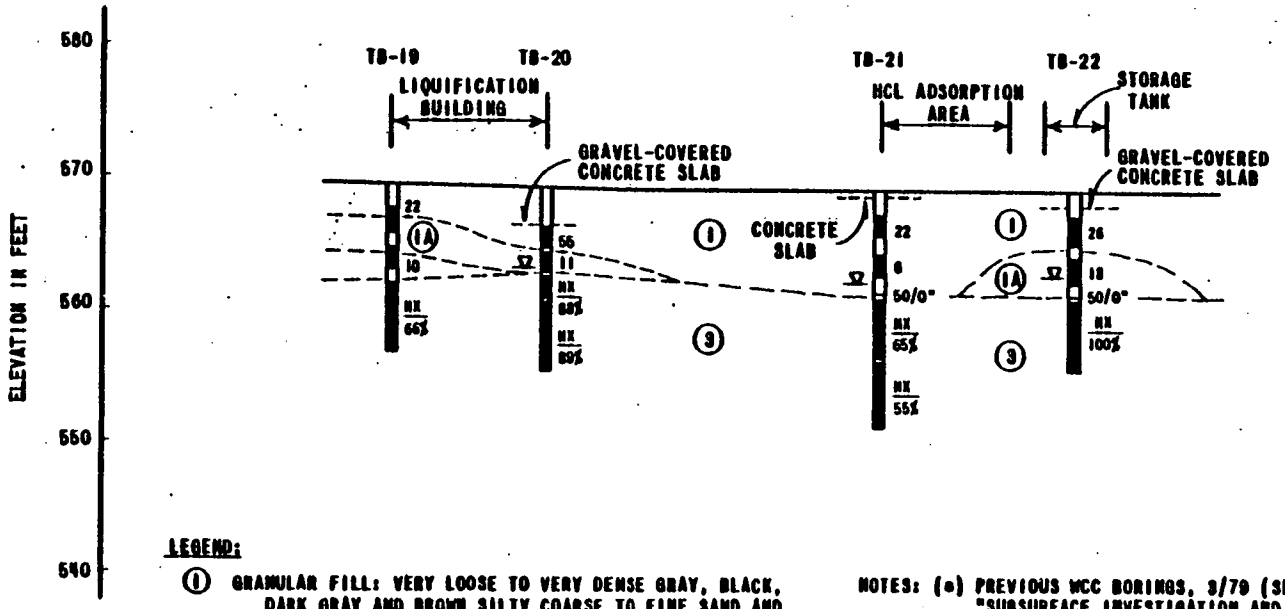
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILE
EVAPORATION AND CHLORINE COMPRESSOR AREA
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn by: D.W.B.	SCALE IN FEET: 0 10 25 50	Date: 1/16/85
Checked: P.F.H.		Job: 84C2301

PLATE 6



LEGEND:

(1) GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

(1A) FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

(2) GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

(3) BEDROCK: GRAY LOCKPORT DOLOMITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 3/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 1, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 3/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

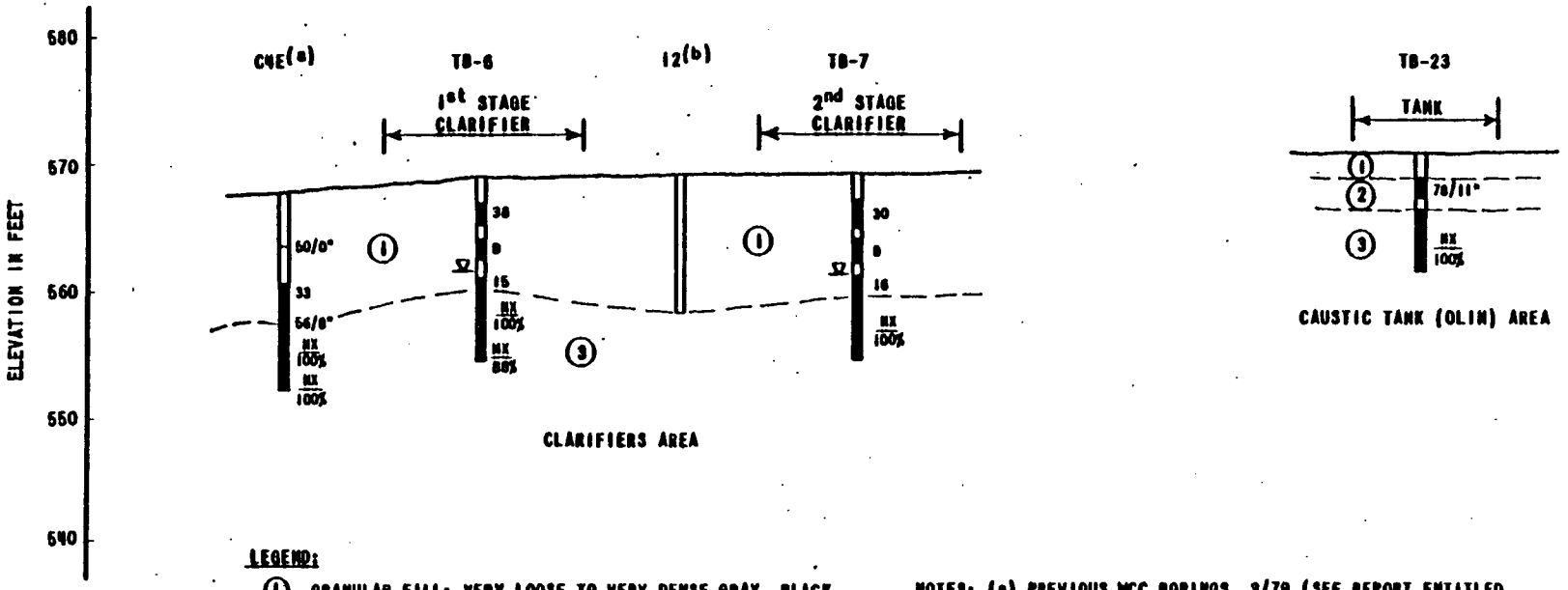
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILE
LIQUIFICATION BUILDING AND HCL ADSORPTION AREA
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn by: D.W.B.	SCALE IN FEET 0 10 25 50	Date 1/16/85
Checked: P.F.H.		Job 84C2301

PLATE 7



LEGEND:

(1) GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

(1A) FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

(2) GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

(3) BEDROCK: GRAY LOCKPORT DOLOMITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 9/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 1, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 9/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

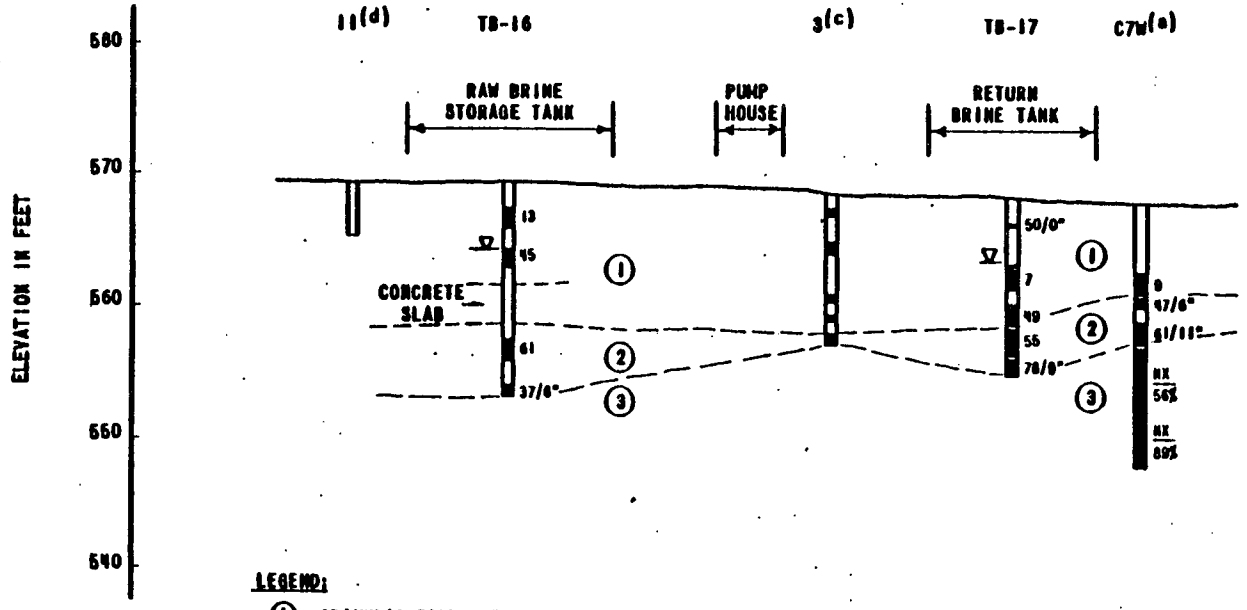
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILES
CLARIFIER AND OLIN COMPANY AREAS
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By	D.W.B.	SCALE IN FEET	Date	1/16/85
Checked	P.F.M.	0 10 25 50	Job	84C2301

PLATE 8



LEGEND:

(1) GRANULAR FILL: VERY LOOSE TO VERY DENSE GRAY, BLACK, DARK GRAY AND BROWN SILTY COARSE TO FINE SAND AND GRAVEL WITH COBBLES AND RUBBLE (CONCRETE, BRICKBATS, CINDERS AND WOOD)

(1A) FINE GRAINED FILL: SOFT TO HARD RED-BROWN, GRAY, LIGHT GRAY AND BLACK COARSE TO FINE GRAVELLY SANDY SILTY CLAY OR CLAYEY SILT

(2) GLACIAL TILL: STIFF TO HARD RED-BROWN, GRAY AND BROWN COARSE TO FINE SANDY GRAVELLY SILTY CLAY/CLAYEY SILT

(3) BEDROCK: GRAY LOCKPORT DOLOMITE, GENERALLY INTACT, WITH FRACTURED AND PITTED ZONES, SLIGHTLY WEATHERED TO UNWEATHERED

NOTES: (a) PREVIOUS WCC BORINGS, 3/79 (SEE REPORT ENTITLED "SUBSURFACE INVESTIGATION AND MONITORING WELLS - GILL CREEK", MAY 1, 1979)

(b) PREVIOUS CONOCO BORINGS, 8/83

(c) PREVIOUS WCC TEST PITS, 3/84 (SEE DRAFT REPORT "GEOPHYSICAL INVESTIGATIONS", MARCH 15, 1984)

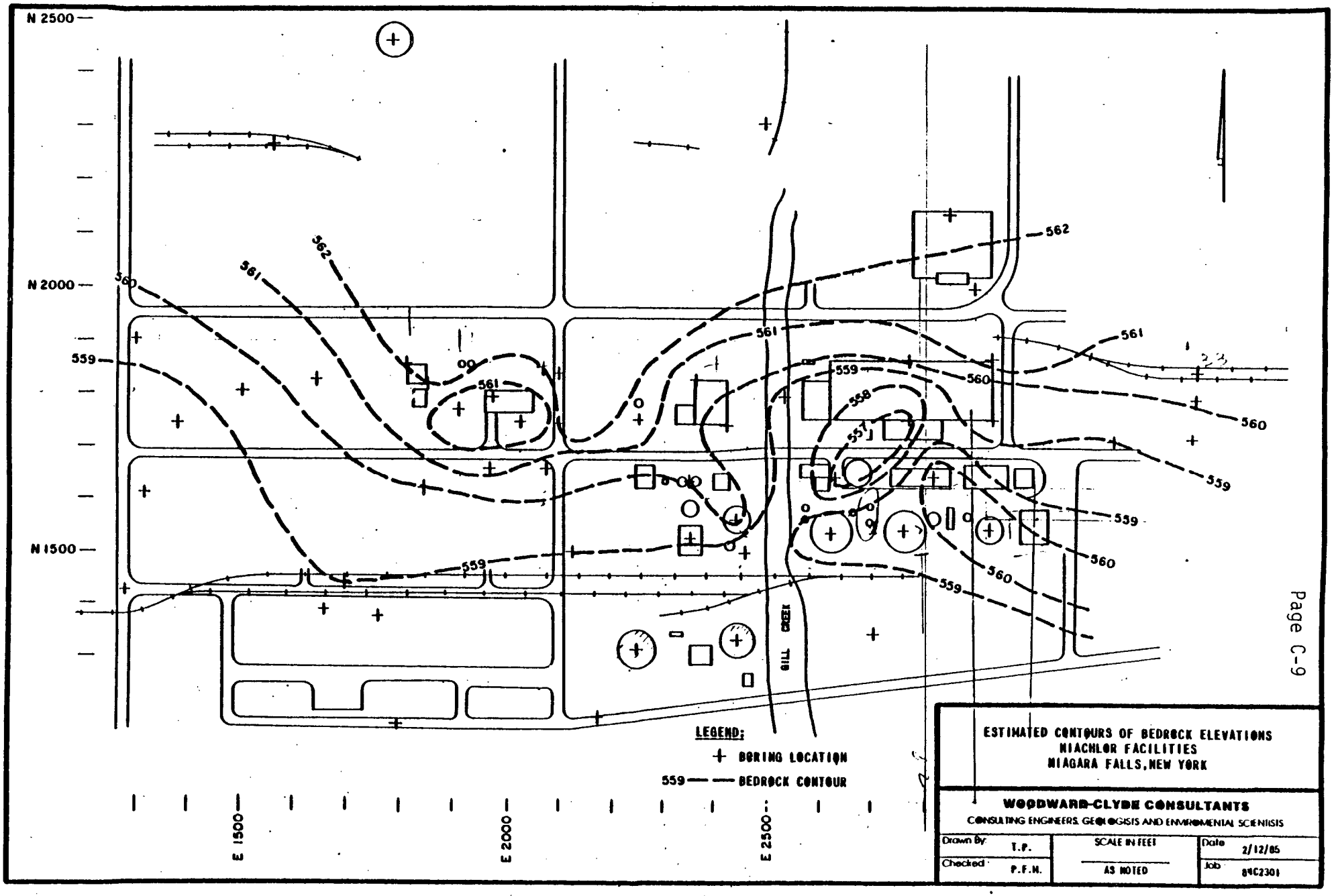
(d) PREVIOUS WCC TEST PITS, 12/84, TO BE INCLUDED IN THE FORTHCOMING PHASE I SOIL SAMPLING REPORT FOR NIACHLOR, FEB., 1985

SUBSURFACE PROFILE
BRINE STORAGE TANK AREA
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By D.W.B.	SCALE IN FEET 0 10 25 50	Date 1/16/85
Checked P.F.H.		Job 84C2301

PLATE 9



ESTIMATED CONTOURS OF BEDROCK ELEVATIONS
NIACHLOR FACILITIES
NIAGARA FALLS, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By: T.P.	SCALE IN FEET	Date 2/12/85
Checked P.F.N.	AS NOTED	Job 84C2301

PLATE 10

LOG of BORING No. TB-1

DATE 1/3/85 SURFACE ELEVATION 569.0 LOCATION N 1750 E 2755

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS (1)
0		9	Fill: loose to dense to brown and gray silty coarse to fine SAND and GRAVEL (SW)					
5		9			7.0			M
		21	Glacial Till: very stiff to hard red-brown and gray sandy gravelly silty CLAY with rock fragments (CL)	559.5				
10		61						3.5
		50/0		557.0				
			Auger refusal at 12.0 feet					
15								

(1) Numbers listed under "Other Tests" are pocket penetrometer values, in tsf.

Completion Depth 12.0 Feet Water Depth enc. @ 8.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-2

DATE 1/3-4/85 SURFACE ELEVATION 568.5 LOCATION N 1750 E 2910

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	40	Fill: very dense gray silty coarse to fine sandy coarse to fine GRAVEL with rubble, rock fragments and trace of organics (GW)		5.0			M
5	52						
	50/0"		559.5				
10		Auger refusal at 9.0 feet					

Completion Depth 9.0 Feet Water Depth 5.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-3

DATE 1/2/85 SURFACE ELEVATION 569.0 LOCATION N 1865 E 2755

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		24	Fill: loose to dense black and brown silty coarse to fine sandy coarse to fine GRAVEL (GM)		10.3			M
5		10	with rock fragments at 8.0 feet					
		34/6"		560.5				
10			Auger refusal at 8.5 feet					

Completion Depth 8.5 Feet Water Depth enc. @ 2.0 Feet Date 1/2/85

Project Name Niachlor Facilities Project Number 84C2301

Woodward-Clyde Consultants

LOG of BORING No. TB-4

DATE 1/2/85 SURFACE ELEVATION 568.5 LOCATION N 1865 E 2910

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	14	Fill: loose to medium dense black silty coarse to fine sandy coarse to fine GRAVEL, trace organics (GP-GM)		19.6			
5	5	with rock fragments at 6.6 feet	561.5	13.5			M
		Auger refusal at 7.0 feet					
10							

Completion Depth 7.0 Feet Water Depth 3.3 Feet Date 1/2/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-5

DATE 1/4/85 SURFACE ELEVATION 570.0 LOCATION N 2140 E 2850

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	10	Fill: medium dense gray and brown silty coarse to fine SAND (SM) with brick fragments					
5	54/11"		563.5				
	NX 100%	Gray DOLOMITE, fractured, slightly weathered (RQD=56%)					
10			557.8				
		Auger refusal at 6.5 feet					
15							

Completion Depth 12.2 Feet Water Depth enc. @ 4.5 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-6

DATE 1/2-3/85 SURFACE ELEVATION 569.0 LOCATION N 1540 E 2625

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		38*	Fill: loose to medium dense black and dark gray coarse to fine gravelly silty coarse to fine SAND (SM) with rubble at 3.5 feet					
5		9						pH
		15		559.9				
10		NX 100%	Gray DOLOMITE, intact, with a fractured and pitted zone from 12.8 to 13.5 feet (RQD=51%)					U,X
		NX 88%		554.9				
15			Auger refusal at 9.0 feet					

* split spoon bouncing

Completion Depth 14.1 Feet Water Depth enc. @ 7.5 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-7

DATE 1/3/85 SURFACE ELEVATION 569.0 LOCATION N 1540 E 2763

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Crushed Stone	568.5				
5		30 9	Fill: loose to dense black coarse to fine SAND and GRAVEL, trace silt (SP) with rubble at 3.5 feet					pH
10		16		559.5				
15		NX 100%	Gray DOLOMITE, intact, with a fractured and pitted zone from 11.5 to 13.4 feet (RQD=47%)	554.5				U,X
			Auger refusal at 9.5 feet					

Completion Depth 14.5 Feet Water Depth enc. @ 8.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-8

DATE 1/2/85 SURFACE ELEVATION 569.5 LOCATION N 1645 E 2660

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Shot rock and gravel	567.5				
5		24 19	Fill: medium dense to dense black and gray silty coarse to fine sandy coarse to fine GRAVEL (GM)		13.9			M
10		30 40	fractured dolomite fragments at 10.0 to 12.5 feet		6.7 12.0			
		50/0"		557.0				
15			Auger refusal at 12.5 feet					

Completion Depth 12.5 Feet Water Depth enc. @ 8.0 Feet Date 1/2/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-9

DATE 1/2-3/85 SURFACE ELEVATION 568.5 LOCATION N 1640 E 2800

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt	568.2				
		15	Fill: medium dense gray, brown and black silty coarse to fine gravelly coarse to fine SAND (SW-SM)					
5		10			8.7			M
		2/4"	Firm red-brown and gray coarse to fine sandy silty CLAY, trace gravel (CL)	560.5 560.2				
10			Auger refusal at 8.3 feet					

Completion Depth 8.3 Feet Water Depth enc. @ 7.0 Feet Date 1/2/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-10

DATE 1/3/85 SURFACE ELEVATION 568.5 LOCATION N 1545 E 2925

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt	568.0				
		27	Fill: dense to very dense brown-black and gray silty coarse to fine sandy coarse to fine GRAVEL (GP-GM)					
5		78						
		24/6"		560.0	12.6			M
10			Auger refusal at 8.5 feet					

Completion Depth 8.5 Feet Water Depth enc. @ 8.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-11

DATE 1/3/85 SURFACE ELEVATION 568.5 LOCATION N 1740 E 2453

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Slag-gravel drive	568.3				
		19	Fill: medium dense black, dark gray and brown silty coarse to fine sandy coarse to fine GRAVEL (GP-GM)					
5		13			8.7			M
		50/2.5"	rock fragments at 9.0 feet	559.5				
10		NX 84%	Gray DOLOMITE, fractured, slightly weathered and pitted Broken zone from 12.5 to 13.0 feet (RQD = 38%)	554.5				U,X
15			Auger refusal at 9.0 feet					

Completion Depth 14.0 Feet Water Depth enc. @ 3.0 Feet Date

Project Name Niachlor Facilities Project Number 84

LOG of BORING No. TB-12

DATE 1/3/85 SURFACE ELEVATION 569.0 LOCATION N 1825 E 2392

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		7	Fill: very loose to loose black and gray fine gravelly coarse to fine SAND, trace silt (SP)					
5		3						pH
		50/5"	rock fragments at 8.0 feet	560.5				
10			Auger refusal at 8.5 feet					

Completion Depth 8.5 Feet Water Depth enc. @ 6.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-13

DATE 1/3/85 SURFACE ELEVATION 570.0 LOCATION N 1525 E 2350

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt and concrete	569.0				
		2	Fill: black silty SAND and cinders (SM)	567.0				pH
5		26	Fill: soft light gray and black silty CLAY, trace sand (CL)	564.5				
		9	Fill: loose to dense dark gray silty coarse to fine SAND and GRAVEL (SM)					
10		57/6"	rock fragments at 10.5 feet	559.0				
			Auger refusal at 11.0 feet					
15								

Completion Depth 11.0 Feet Water Depth enc. @ 6.5 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-14

DATE 1/3/85 SURFACE ELEVATION 569.5 LOCATION N 1635 E 2375

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt	569.3				
		3	Fill: very loose to loose gray, brown and black silty coarse to fine SAND and GRAVEL (GM)		26.4			M
5		7			34.5			
		45	rock fragments at 8.0 feet	560.0	7.9			
10			Auger refusal at 9.5 feet					

Completion Depth 9.5 Feet Water Depth enc. @ 5.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-15

DATE 1/3/85 SURFACE ELEVATION 569.5 LOCATION N 1565 E 2441

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt	569.3				
			Black cinder fill	567.5				
		2	Fill: very soft light gray, yellow and white coarse to fine sandy silty CLAY (CL)					
5		2						pH
		33	Glacial Till: very stiff coarse to fine sandy silty CLAY, trace gravel (CL)	561.0				
				560.0				
10			Auger refusal at 9.5 feet					

+6

569.5
9.5
560

Completion Depth 9.5 Feet Water Depth 5.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-16

DATE 1/3/85 SURFACE ELEVATION 569.5 LOCATION N 1315 E 2250

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		13	Fill: medium dense to very dense brown and dark gray silty coarse to fine sandy coarse to fine GRAVEL (GP)					
5		45			13.6			M
				561.5				
			Concrete slab					
10				558.5				
		61	Glacial Till: very dense red-brown silty clayey coarse to fine SAND and GRAVEL (SM)					
15		37/6"		553.5				
			Auger refusal at 16.0 feet					
20								

Completion Depth 16.0 Feet Water Depth enc. @ 5.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-17

DATE 1/3-4/85 SURFACE ELEVATION 568.5 LOCATION N 1333 E 2442

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	50/0"	Fill: loose to very dense gray, black and brown coarse to fine sandy silty coarse to fine GRAVEL with cobbles (GM)		6.5			
5	7						
	49		558.5	8.9			M
10	55	Glacial Till: hard red-brown coarse to fine sandy silty CLAY, trace gravel (CL)		12.9			
	78/9"		555.3				
15		Auger refusal at 13.2 feet					

Completion Depth 13.2 Feet Water Depth enc. @ 5.0 Feet Date 1/3/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-18

DATE 1/4-5/85 SURFACE ELEVATION 568.5 LOCATION N 1470 E 2135

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		3	Fill: very loose dark gray silty coarse to fine SAND and GRAVEL (SM)					
5		4	with rock fragments at lower depths					
		8/6"		559.0				
10		NX 100%	Gray DOLOMITE, intact, with a fractured, pitted zone from 12.0 to 13.0 feet (RQD = 50%)	554.0				
15			Auger refusal at 9.5 feet					

Completion Depth 14.5 Feet Water Depth enc. @ 5.5 Feet Date 1/5/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-19

DATE 1/5/85 SURFACE ELEVATION 569.5 LOCATION N 1855 E 1810

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	(1) OTHER TESTS
0			Fill: brown and black silty coarse to fine gravelly coarse to fine SAND (SM)	567.0				
		22	Fill: hard gray coarse to fine sandy silty CLAY (CL)	564.0				4.0+
5		10	Fill: loose gray and red-brown silty coarse to fine gravelly coarse to fine SAND (SM)	562.0	11.9			
10		NX 66%	Gray DOLOMITE, fractured, slightly weathered to unweathered (RQD = 8%)	557.0				
			Auger refusal at 7.5 feet					
15								

(1) Numbers listed under "Other Tests" are pocket penetrometer values, in tsf.

Completion Depth 12.5 Feet Water Depth enc. @ 5.0 Feet Date 1/5/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-20

DATE 1/4-5/85 SURFACE ELEVATION 569.0 LOCATION N 1815 E 1850

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Gravel covered concrete slab	566.0				
		55*	Fill: medium dense gray, black and brown coarse to fine gravelly silty coarse to fine SAND (SM)	564.0				pH
5		11	Fill: stiff brown coarse to fine gravelly coarse to fine sandy clayey SILT(ML)	562.2				
		NX 88%						U,X
10		NX 89%	Gray DOLOMITE, fractured to intact, slightly weathered (RQD = 33%)	555.2				
15			Auger refusal at 6.8 feet					

* Split spoon bouncing

Completion Depth 13.8 Feet Water Depth enc. @ 6.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-21

DATE 1/4/85 SURFACE ELEVATION 569.0 LOCATION N 1800 E 1980

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Concrete slab	568.3				
		22	Fill: loose to dense gray and brown fine gravelly silty coarse to fine SAND (SM)					pH
5		6			16.3			M
		50/0"		561.0				
10		NX 65%	Gray DOLOMITE, fractured and pitted from 8.0 to 12.0 and from 15.0 to 18.0 feet (RQD = 7%)					
15		NX 55%	(RQD = 25%)	551.0				
20			Auger refusal at 8.0 feet					

Completion Depth 18.0 Feet Water Depth enc. @ 7.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-22

DATE 1/4/85 SURFACE ELEVATION 569.0 LOCATION N 1745 E 2030

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		Gravel covered concrete slab*	568.0				
	26	Fill: dense red-brown and gray coarse to fine SAND and GRAVEL, trace silt (SP)	564.5				
5	13	Fill: stiff tan and gray fine gravelly coarse to fine sandy silty CLAY with organics (CL)		9.4	27	17	M
	50/0"		560.5				
10	NX 100%	Gray DOLOMITE, pitted, slightly weathered (RQD = 49%)	555.5				
15		Auger refusal at 8.5 feet					

* 4 in. gravel
8 in. concrete

Completion Depth 13.5 Feet Water Depth 6.5 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-23

DATE 1/4/85 SURFACE ELEVATION 571.0 LOCATION N 2462 E 1785

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		Medium dense gray silty SLAG and GRAVEL	569.0				
	78/11"	Hard gray coarse to fine sandy clayey SILT (ML)	566.5				
5	50/0"						
	NX 100%	Gray DOLOMITE, fractured, slightly weathered (RQD = 49%)	561.4				
10		Auger refusal at 4.5 feet					

Completion Depth 9.6 Feet Water Depth dry Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-24

DATE 1/4/85 SURFACE ELEVATION 568.5 LOCATION N 1470 E 1700

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	5	Fill: loose brown fine gravelly coarse to fine sandy clayey SILT (ML)	563.0	7.4			M
5		Fill: loose silty coarse to fine sandy GRAVEL, COBBLES and ROCK FRAGMENTS (GP)	559.0				
10		Auger refusal at 9.5 feet					

Completion Depth 9.5 Feet Water Depth enc. @ 3.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-25

DATE 1/4/85 SURFACE ELEVATION 569.5 LOCATION N 1475 E 2450

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		5	Fill: very loose dark gray and red-brown silty clayey coarse to fine SAND and GRAVEL (SM)	563.5	14.5			
5								
			Fill: loose gray silty coarse to fine sandy GRAVEL, with rock and brick fragments (GP-GM)	558.0				
10								
			Auger refusal at 11.5 feet					
15								

569.1
11.5
557

Completion Depth 11.5 Feet Water Depth 4.8 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-26

DATE 1/4/85 SURFACE ELEVATION 570.0 LOCATION N 2300 E 2465

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	12	Fill: medium dense black and gray silty coarse to fine SAND and GRAVEL with cinders, cobbles and brick fragments (SM)	561.5				
5							
10		Auger refusal at 8.5 feet					

Completion Depth 8.5 Feet Water Depth enc. @ 4.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-27

DATE 1/4/85 SURFACE ELEVATION 570.0 LOCATION N 2275 E 1540

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
5		2	Fill: very loose gray and brown silty coarse to fine SAND and GRAVEL (slag) (SP)	562.0				
10			Auger refusal at 8.0 feet					

Completion Depth 8.0 Feet Water Depth enc. @ 6.0 Feet Date 1/4/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-28

DATE 1/2/85 SURFACE ELEVATION 567.5 LOCATION N 1870 E 3300

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	30	Fill: very dense dark gray and black silty coarse to fine SAND, trace gravel (SM)	562.5	16.5			
5		Boring ended at 5.0 feet					

Completion Depth 5.0 Feet Water Depth dry Feet Date 1/2/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-29

DATE 1/5/85 SURFACE ELEVATION 569.5 LOCATION N 1182 E 1800

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Ashpalt	569.3				
			Fill: loose silty coarse to fine SAND and GRAVEL (SM)	567.0				
		18			6.6	21	14	
5			Fill: very stiff red-brown coarse to fine sandy silty CLAY, trace gravel (CL-ML)					
				559.5				
10			Fill: loose gray silty coarse to fine sandy GRAVEL and COBBLES (GP)	556.1				
15			Auger refusal at 13.4 feet					

Completion Depth 13.4 Feet Water Depth 8.3 Feet Date 1/5/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-30

DATE 1/5/85 SURFACE ELEVATION 569.5 LOCATION N 1223 E 2174

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Concrete slab	569.0				
		14			8.8			
5			Fill: loose to medium dense light gray silty clayey coarse to fine SAND and GRAVEL with rubble (SP)					
10				556.5				
			Fill: gray sandy silty CLAY (CL)	555.0				
15			Auger refusal at 14.5 feet					

Completion Depth 14.5 Feet Water Depth 7.5 Feet Date 1/5/85

Project Name Niachlor Facilities Project Number 84C2301

LOG of BORING No. TB-31

DATE 1/5/85 SURFACE ELEVATION 569.5 LOCATION N 1342 E 2700

DEPTH, ft. / SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		Fill: loose gray coarse to fine GRAVEL and COBBLES (shot rock) (GP)		10.3			
5							
10			557.5				
		Auger refusal at 12.0 feet					
15							

Completion Depth 12.0 Feet Water Depth enc. @ 8.0 Feet Date 1/5/85

Project Name Niachlor Facilities Project Number 84C2301

ATTACHMENT "D"

703-07 CONCRETE SAND

SCOPE. This specification contains the requirements for sand used in Portland Cement concrete.

GENERAL. Materials Specification 703-01, Fine Aggregate, shall apply except as modified herein.

MATERIAL REQUIREMENTS. When dry, the fine aggregate for Portland Cement concrete shall conform to the following gradation requirements:

Sieve Size	Percent Passing By Weight Minimum	Maximum
3/8 inch	100	
No. 4	90	100
No. 8	75	100
No. 16	50	85
No. 30	25	60
No. 50	10	30
No. 100	1	10
No. 200 (Wet)	0	3

Sand manufactured from a carbonate rock, either a limestone or dolomite, by itself will not be permitted in concrete pavement or concrete bridge deck wearing surfaces. However, a blend of manufactured carbonate sand with another sand will be permitted provided that the blended mixture contains at least 40 percent non-carbonate particles in each size fraction coarser than the No. 30 sieve. Non-carbonate particles are defined as those having an acid insoluble content not less than 80 percent.

Test. Test methods may be obtained from the Materials Bureau.

BASIS OF ACCEPTANCE. The provisions of Materials Specification 703-01, Fine Aggregates, shall apply.

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(5034E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0900-0902

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

SUBMERSIBLE PUMPS

CONSISTING OF

Reference Attachments:

Item Number	Description
EN 880-101/135-1-1	Submersible Well Pumps

Approved _____ Date _____

Approved _____ Date _____

Approved _____ CLIENT Date 1-22-87

Prepared By _____ STEARNS CATALYTIC

STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

SUBMERSIBLE PUMPS

SPECIFICATION NO. 39950-0900-0902

TABLE OF CONTENTS

SUBMERSIBLE PUMPS

SPECIFICATION NO. 39950-0900-0902
Page 1 of 1

1.00 SCOPE

1.01 This specification describes the minimum requirements for the design, manufacture, testing, inspection and delivery of submersible sump pumps.

2.00 REFERENCE STANDARDS

2.01 The following industry, association and government codes and standards shall be followed as applicable to the design, fabrication, assembly and testing of all equipment furnished under this specification:

ANSI - American National Standards Institute.
OSHA - Occupational Safety and Health Act.
NEMA - National Electrical Manufacturers Association.
NEC - National Electric Code.

2.02 The issues or revisions of these documents in effect on the date of inquiry shall apply.

3.00 PERFORMANCE CRITERIA

3.01 Performance of the pumps shall be in accordance with the requirements of the data sheets.

3.02 Pumps shall be non-overloading.

4.00 DESIGN DETAILS

4.01 Pumps shall be submersible type to be located within a 20 inch diameter well along with level instrument stilling tube (supplied by Others) to pump contaminated ground water.

4.02 Impeller shall be threaded on shaft with impeller locknut to prevent backoff. Shaft shall be 300 series stainless steel.

4.03 Casing shall have 300 series stainless steel fasteners.

4.04 Pump shall have single mechanical seal with materials as specified on data sheet.

4.05 Motor shall be provided fully submerged in high grade turbine oil chamber for permanent lubrication of bearings and mechanical seal and efficient heat dissipation. Motor shall have 15 feet of Teflon covered power cord, water and oil resistant with epoxy seal and gland nut at motor end.

4.06 Pumps shall be equipped with permanent lifting eye or similar device.

Stearns Catalytic Corporation
Engineering Department

Submersible Type Pumps

Contract Number 39950 Item Number 880-101-1-1 to 880-135-1-1 Specification No. 3995D-0900-0902
Client E.I. DUPONT Requisition Number
Location NIAGARA FALLS, N.Y. Number Required THIRTY FIVE (35)
Unit or Area By TGL Date 9/24/86
Status For: Approval ☐; Inquiry ☐; Purchase ☐; As Bought ☐ Revision By Date

Reference Spec: / Item Nos.: / Service SUBMERSIBLE WELL PUMPS	Vendor / Date / Proposal No. / Requirements	Offered	Alternate (optional) Offered
Pump Size/Pump Model No.	* *		
Pumpage- GROUND WATER Solids- 50 mg/L MAX %/Dia.-			
Sp.Gr. 1.0 /Temp./Visc. 50°F / 1.25cp			
Capacity:GPM @ TDH (Suct. Press.@ 0.4 PSIG)	15 GPM @ 107 FT.		
NPSH, Available/Required (Feet)	34 / *		
Materials: Casing	C.I.		
Impeller	C.I. - 3/4" SOLIDS HANDLING CAPABILITY.		
Shaft	S.S.		
Sleeve	—		
Mech. Seal-Mfr./Type	SINGLE - HARDFACED		
Mech. Seal-Rot./Stat./Gask.	SILICONE COATED		
~~Set Seal Coding~~	CARBIDE FACES,		
Electrical Cable W/Arc Tite Connector	W/SS SPRING, BUNA N		
Impeller Diameter: Min/Design/Max.	ELASTOMERS. *		
B.H.P.-Des./Max./Corrected for Viscosity?	* * —		
Motor—HP/RPM	* *		
Enclosure/Frame No.	OIL SUBMERGED		
Volts/Phase/Cycles	460/3/60		
Tests Required	STD.		
Level Switch - Type	BY OTHERS		
Materials - Float/Rod	—		
NEMA Class/Group/Volts	SUBMERSIBLE		
LIFTING LUG	REQ'D.		
POWER CORD: WATER & OIL	RESISTANT,		
EPOXY SEALED AT MOTOR;	15 FT of		
	14/3 STO		
0-10 GPM FORWARD FLOW - CONTROL VALVE			
5 GPM MINIMUM flow thru RECIRC ORIFICE			
CONTINUAL RUNNING WITH	12" SUMP LEVEL.		
PUMPAGE CONTAINS LOW LEVELS of TOXIC VOLATILE			
CHLORINATED HYDROCARBONS; pH 6-9			
* TO BE COMPLETED	BY VENDOR		
Unit Price (Incl. Pump, Motor, Cplg., Base, etc.)			
Estimated Weight			
Delivery			
Freight			
Total Price Frt. Alwd. (Unit pr. x No. of Pumps)			

Note: Use Check "✓" to Show Compliance.

1.0 IDENTIFICATION

EN Number	Quantity	Description
880-1-1	1	Tank, Equalization/Surge

2.0 SCOPE

This specification defines requirements for the design, fabrication and erection of one field erected storage tank.

3.0 DESCRIPTION

Vertical storage tank, 35'-0" O.D. x 22'-0" high with flat bottom, conical supported roof and constructed of carbon steel. Tank to be furnished complete with all nozzles, internal dip pipes, ladder, platform, etc. all in accordance with Drawing F-25001 and references thereon.

4.0 GENERAL

4.1 All notes, instructions, etc., included on the drawing are made part of this specification. Design, fabrication and inspection shall be in accordance with the current API 650 Standard and Du Pont standards and specifications.

4.2 Design calculations, weld procedures (WSP), and welder qualifications (PQR) shall be furnished along with initial submission of drawings for approval. All thicknesses, reinforcements, supports, etc. shall be verified by calculations. Thickness shown on control drawings shall be considered as minimum.

4.3 Vendor is released to purchase all materials on placement of order.

4.4 Gaskets, bolts and nuts for shell, head, manhole and blind flanges for testing and final shipment shall be furnished and installed by the Vendor.

4.5 Vendor shall identify all subcontractor supplied parts and accessories with manufacturer's name and address and shall submit documentation for Stearns Catalytic and/or Du Pont approval.

4.6 Handrails, cages, ladders and guards to be painted in accordance with Painting System 213X. All coats to be applied at the fabricator's shop. Top coat to be High Vis. Yellow 326-Y-23663.

4.7 Platform support steel to be painted in accordance with Painting System 207V. All coats to be applied at the fabricator's shop. Top coat to be Shale Gray 326-Y-67633.

4.8 Platform grating to be galvanized in accordance with System 170W.

4.9 Water for test and disposal of same shall be the responsibility of others. Test water shall be furnished 700 ft. from the tank(s). Vendor shall run hoses to fill tank from this point. Blanking of all nozzles and test shall be the responsibility of the Vendor. After hydrostatic testing (4 hours) and a suitable time for preload settlement (1 to 6 months), the tank shall be drained to Gill Creek, approximately 700 ft. No water shall be left in tank.

4.10 Tank(s) shall be erected on foundations supplied by others. It shall be the Vendor's responsibility to visit the site and familiarize himself with all conditions prior to submitting proposal.

4.11 Access roads for getting materials and equipment to jobsite will be provided by others.

4.12 Vendor shall furnish all data and drawings as indicated in Paragraph 7.0 and as indicated on the attached "Vendor Data Requirements".

4.13 All tanks are to be tagged with a stainless steel nameplate permanently attached to each tank; data to include: Du Pont EN number, Du Pont order number, tank size and gallonage, and tank materials of construction. This is in addition to any tags required by API codes.

4.14 Exterior surfaces of storage tank to be painted in accordance with Painting System 213X (except the underside of bottom). Prime coat and intermediate coat to be applied at the fabricator's shop. Disregard the reference made in attached SCC Spec. SP-2500-01, Item 12.02, which states sections of field erected tanks shall not be shop primed. Top coat to be applied in the field after tank erection (White 326-Y-67632).

4.15 Tank to be insulated by fabricator after hydrostatic testing.

5.0 STANDARDS AND SPECIFICATIONS

Du Pont Std. C1K	- Flexible Base Foundations
Du Pont Std. G15.1C	- Manway Davit
Du Pont Spec. SG11.4S	- Design Procedures
Du Pont Std. G12D	- Insulation Supports
Du Pont Spec. SU2A	- Gaskets
Du Pont Std. G1C	- Nozzle Construction

SCC Std. S-0800-112	- Grounding Lugs
SCC Spec. SP-2500-01	- Fabrication
Du Pont Spec. 8572 (Sheet #16)	- Painting System 213X
Du Pont Spec. 8572 (Sheet #13)	- Painting System 170W
Du Pont Spec. 8572 (Sheet #18)	- Painting System 207V
Du Pont Spec. 8575 Rev. 4	- Insulation Specification
Du Pont Std. B6Y	- Grating Anchors
Du Pont Std. B9Y	- Platforms
Du Pont Std. B2W	- Ladder Details
Du Pont Std. B3W	- Ladder Cages
Du Pont Std. B3V	- Handrail
Du Pont Spec. SB4X	- Grating

Drawings

SCC Dwg. F-25001, Rev. ●

6.0 INSPECTION

Inspection will be made by Du Pont Quality Assurance Field Representative (QAFR) and inspection procedures are given in the Inspection Planning Data Sheets attached for each vessel. Some of the inspection items that will be checked are noted for each visit. Visit requests are not necessarily in chronological order.

7.0 YOUR QUOTATION MUST STATE YOUR SCHEDULE FOR SUBMITTING DRAWINGS AS FOLLOWS:

Design Approval Drawings in weeks after receipt of order.
Final Drawings in weeks after return of all Design Approval Drawings.

7.1 One reproducible* of Design Approval Drawings required.
One reproducible* of Final Drawings required.

*Two legible copies may be submitted for 8-1/2" x 11" or 11" x 17" drawing.

7.2 All drawings, drawing transmittal letters and correspondence must show the following identification:

Plant:	Niagara
Project:	113592
Du Pont Order No.:	
EN Numbers:	

7.3 The following information is required for approval:

Layout and orientation.	Connection locations and types.
Overall dimensions, weights and materials.	Weld details (WP/PQR).
	Seam locations.
Mounting or foundation dimensions.	Internal details.
	Calculations.
Critical tolerances and finishes.	Nameplate data.

7.4 Design Approval Drawings

These drawings must be submitted before we will release start of fabrication. One print of each drawing will be returned stamped "Approved", "Approved as Noted", or "Not Approved". Fabrication will be released according to a note on the transmittal letter covering the returned prints. Upon receipt of all "Approved" and "Approved as Noted" drawings, vendor shall revise to include all changes and return for our use as Final Drawings. "Not Approved" drawings must be corrected and re-submitted for approval.

7.5 Final Drawings

These drawings are for Du Pont design and construction purposes.

CLIENT DuPont

FOR INQUIRY NO.

39950-2500-2501

FOR PURCHASE ORDER NO.

VENDOR DATA REQUIREMENTS

CLIENT REFERENCE NO.

DRAWINGS AND DATA REQUIRED	Copies with Bid	REPRO Copies for Appr'l.	Date Due	After Approval: Cer. Cop. of Prts.	After Approval: Repro. Tracing	Date Due	Copies Reqd w/o App'l.	Date Due	NOTES
1. DIMENSIONED OUTLINE DRAWINGS		1		2*	1				
2. CROSS SECTIONAL DRAWINGS		1		2*	1				
3. COMPONENT AND/OR DETAIL DRAWINGS		1		2*	1				
4. ASSEMBLY AND/OR ERECTION DRAWINGS		1		2*	1				
5. FOUNDATION DIAGRAMS AND LOADING REQUIREMENTS									
6. SCHEMATIC PIPING DRAWINGS									
7. SCHEMATIC WIRING DIAGRAMS									
8. DETAILED PARTS LIST									
9. RECOMMENDED SPARE PARTS FOR ONE YEAR'S NORMAL MAINTENANCE WITH PRICES									
10. INSTALLATION, OPERATION, MAINTENANCE AND LUBRICATION MANUALS									
11. COMPLETED EQUIPMENT DATA SHEETS, AS NOTED									
12. RIVET AND BOLT ERECTOR'S LIST									
13. RIVET AND BOLT SUMMARY LIST									
14. PERFORMANCE CURVES									
15. CATALOG INFORMATION, CUTS, ETC.									
16. MANUFACTURER'S INSPECTION AND DATA REPORTS							3		f
17. MILL TEST CERTIFICATES							3		f
18. WELDING PROCEDURES AND PROCEDURE QUALIFICATION TEST RECORDS		2*		2*					f
19. FACSIMILE OR RUB-OFF OF STAMPING							5		f
20. SHIPPING SCHEDULE, SHIPPING MEMORANDUM AND/OR PACKING LIST							3		f
21. WEIGHT LIST OF FABRICATED PARTS AND/OR UNIT SHIPPING WEIGHT									
22. VENDOR'S CALCULATIONS		2*		2*					
23.									
24. * TWO LEGIBLE COPIES MAY BE SUBMITTED FOR 8½"x11" OR 11"x17" DRAWINGS.									

f Date indicated must be furnished when material or equipment is ready for inspection or shipment.

GENERAL NOTES:
1. Drawings and data "For Approval" are required within two weeks after order is placed.
2. "Certified Correct" data and drawings are required within two weeks after return of "For Approval" data and drawing
3. Cost of above data must be included in quotation.

Approval and certified vendor prints be forwarded to:

Stearns Catalytic Corporation, Centre Square West, 1500 Market St., Phila., PA 19102 Attn: E. D. Baldi

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(4980E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. SP-2500-01, Rev. 2

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

FABRICATION OF C.S. ATMOSPHERIC STORAGE TANKS

CONSISTING OF

Reference Attachments:

Item Number	Description

Approved _____ Date _____

Approved [signature] 1/11/87 Date 1/7/87
CLIENT

Approved [signature] Date 10/23/86
STEARNS CATALYTIC

Prepared By Don Hufford
STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

PREPARED BY	DATE	SPECIFICATION NO. SP-2500-01 PAGE 1 of 7	
B. L. Lubliner	8/7/78		
APPROVED BY J. LeCoff	DATE 8/7/78	FABRICATION OF C.S. ATMOSPHERIC STORAGE TANKS	REV. 2

1.00 SCOPE

1.01 This specification, supplemented by tank and standard drawings, covers the design, material, construction, field erection where required, workmanship, fabrication shop procedures, inspection, testing, shop drawings, data reports, etc. for C.S. atmospheric storage tanks to be used for above ground service.

1.02 The tank control drawing and documents referred to thereon are hereby made a part of this specification.

1.03 Where discrepancies exist between the tank control drawings(s) and this specification, the tank control drawing(s) shall be considered as being correct. Where regulatory or industry standard requirements are more stringent than these instructions, the standards shall govern. In any event, all conflicts shall be referred to Purchaser for clarification before proceeding with the procurement or fabrication of the affected parts.

1.04 Deviations from tank control drawing(s) and this specification are permitted only if the Vendor outlines in full detail all such deviations and the reasons therefore in his quotation. Written acceptance of said deviations in the Purchase Order will constitute approval.

2.00 CONSTRUCTION

2.01 Tanks shall be of welded construction.

2.02 All tanks shall be designed, constructed and tested in accordance with the regulatory and industry standards specified on the drawings, specifications, purchase order and any state or local governing laws.

2.03 References to ASME, ANSI, ASTM, API, AWWA or regulatory standards shall mean the latest edition including addenda, supplements and revisions.

2.04 Design criteria for tanks shall comply with the following:

Hydrostatic head due to operating liquid at the high capacity level plus the vapor space design pressure specified on the drawing. Specific gravity of the liquid used for design purposes shall be as noted on the drawing, but not less than 1.0.

2.05 Tank roofs shall be conical where practical. If the Vendor proposes to substitute another type of roof, his quotation shall describe the configuration and reasons for the substitution.

3.00 NOZZLES AND MANWAYS

3.01 All connections are to be flanged unless otherwise specified.

3.02 Flange facing and drilling shall conform to ANSI B16.5. Manways shall conform to API 650.

3.03 When screwed connections are specified, 3000 lb. forged steel full couplings shall be used.

3.04 Nozzles of lined tanks, or vent connections, shall be flush with inside of shell or head.

3.05 Nozzle bolt holes shall straddle the tank 0° - 180° center line or its parallel.

3.06 All manholes, handholes, blanked connections, etc., shall be furnished complete with studs, nuts, gaskets, etc.

4.00 BOLTING

4.01 Manhole and handholes shall have hex head machine bolts and nuts conforming to ASTM A307, Grade B.

4.02 Permanent studs, bolts and nuts shall not be in place during stress relief.

5.00 INSULATION SUPPORTS

5.01 Insulation supports shall be furnished and installed in accordance with the documents listed on the tank control drawing.

5.02 When the tank is to be stress relieved, insulation supports must be welded to the tank prior to stress relieving.

6.00 CORROSION ALLOWANCE

Corrosion allowances specified for various parts of a tank shall be added to the calculated or minimum thickness of the base metal of shells, roofs, roof rafters, bottoms, internal columns, nozzles, manhole necks, manhole covers, handhole covers, blind flanges and on each exposed surface of nonremovable parts including welds. The minimum corroded thickness of nozzle necks shall not be less than the lesser of Schedule 40 pipe thickness or the minimum corroded thickness of the shell or head to which it is attached. In no case shall the uncorroded thickness of flanged nozzle necks be less than specified in API 650.

7.00 WELDING

7.01 The Fabricator shall show evidence that all procedures and welders for work covered by this specification have been qualified in accordance with requirements of ASME Code, Section IX, latest edition. An up-to-date certificate for each welder shall be on file at the work site and available to the Purchaser's Inspector upon request. All weld procedures with qualification test records shall be submitted to the Purchaser and approved prior to the start of any work.

7.02 Impact testing, when necessary, will be identified on the drawing or purchase order.

7.03 Weld seam construction shall be in accordance with API 650 and API 650 Appendix J for field and shop fabrication respectively, except that backing strips, other than those used at seams in flat bottoms of field erected tanks, shall be subsequently removed. If they cannot be removed, approval must be obtained from Purchaser to leave them in place.

7.04 Postweld heat treatment and/or radiographing shall be in accordance with the industry standard or as specified on the drawings.

7.05 Postweld heat treatment procedures shall be submitted to the Purchaser for approval prior to being used.

7.06 Location of spot radiographing will be selected by Purchaser's Inspector.

7.07 The gas metal arc and flux cored arc welding processes shall not be used to weld tanks for low temperature service (below -20°F).

7.08 Machined bevels to form the welding groove are preferred, but smooth, clean, slag-free flame-cut, powder-cut, or arc-scarfed bevels are acceptable.

7.09 Tack welds shall be of the same quality and made by the same process as the rest of the weld or they shall be removed from the weld prior to the completion of the weld.

7.10 Small, sound tack welds which penetrate to the bottom of the welding groove, for a single welded groove, may become a part of the finished weld. Tack welds lacking penetration are not acceptable and must be chipped or ground out. Large tack welds which almost fill the welding groove are not acceptable and must be chipped or ground out.

7.11 The slag shall be cleaned from each weld layer and any visual defects chipped or ground out before the next layer is applied, and the completed weld shall be cleaned of slag.

7.12 Arc-strikes and weld starts shall not be made purposely on the base metal outside the weld groove nor outside an area which will be encompassed by a fillet or socket weld.

7.13 When inadvertent arc-strikes are made on the base metal surface outside the weld area, the arc-strikes shall be removed by grinding or filing and the arc-strike area will be visually examined under 5X magnification or by liquid penetrant examination.

8.00 PREPARATION AND LAYOUT OF PLATES

8.01 The practice of using wide welds to overcome poor fit is not permissible. Accordingly, poor fit-up shall be remedied by suitable means (regrooving, etc.). Except for small cavities, the Vendor shall not correct a plate edge deficiency unless approved by the Purchaser and such welding may be subject to radiographic or other approved methods of examination.

8.02 Fit-up shall be done with jacks and clamps and the Vendor shall not use sledge hammers in fitting-up work except where unavoidable, and then only with flatteners.

9.00 INSPECTION, TESTING AND STAMPING

9.01 Inspection may be made by a representative of Purchaser whose decision as to rejection of material or workmanship for noncompliance with the specification and/or purchase order requirements shall be final.

9.02 Acceptance by the Purchaser's representative shall not relieve the Vendor of his responsibility for such workmanship and materials conforming with the specification and/or purchase order requirements.

9.03 Tanks shall be tested in accordance with the regulatory and industry standards and the test conditions specified on the drawings.

9.04 Radiographic examination, as required by the tank control drawing, shall be accomplished by personnel qualified in accordance with ASME Boiler and Pressure Vessel Code Section V, Article 1. Review of results will be by personnel qualified to levels II or III of STN-TC-1A, Recommended Practice for Nondestructive Testing Personnel Qualification and Certification, Supplement A, Radiographic Testing Method.

10.00 SHOP DETAIL DRAWINGS

10.01 Detail drawings, submitted to Purchaser for approval, shall show the following:

10.01.1 All information given on tank control drawing(s) and applicable parts of documents referenced thereon.

10.01.2 Material specifications (ASTM, etc.) including welding electrodes.

10.01.3 Location and details of all seams and nozzle attachments.

10.01.4 Nozzle identification, using control drawing assigned identification.

10.01.5 Test procedures for tank and lining (if any).

10.01.6 Shipping and/or erected weight.

10.02 Following Purchaser's approval, certified shop drawings shall be submitted. These drawings shall be stamped or labeled on the face of each drawing near the title block with the word "Certified", and with the date and signature of the Fabricator's authorized representative.

10.03 Quantity of approval and certified prints required will be indicated on the purchase order.

11.00 DATA REPORTS

Vendor shall furnish a stress relief graph (where applicable).

12.00 CLEANING AND PAINTING

12.01 Inside and outside of tanks shall be cleaned of rust, loose scale, grease, spatter, etc.

12.02 Tanks shall be painted in accordance with the painting specification referenced on the control drawing. On field erected tanks, the shop fabricated sections shall not be primed. After field welding is completed, the Vendor shall clean all areas, except the underside of flat bottom plates.

12.03 On shop fabricated tanks, the following protective measures shall be observed.

12.03.1 Machined surfaces and threads shall be protected during shipment by application of grease or other suitable compound.

12.03.2 Flange faces shall be protected by wood, masonite, or other commercial type hard cover plates.

12.03.3 Couplings shall be protected by plugs of compatible materials.

12.04 Item number, 0° - 180° center line, shipping weight, and north arrow shall be painted on shop built tanks.

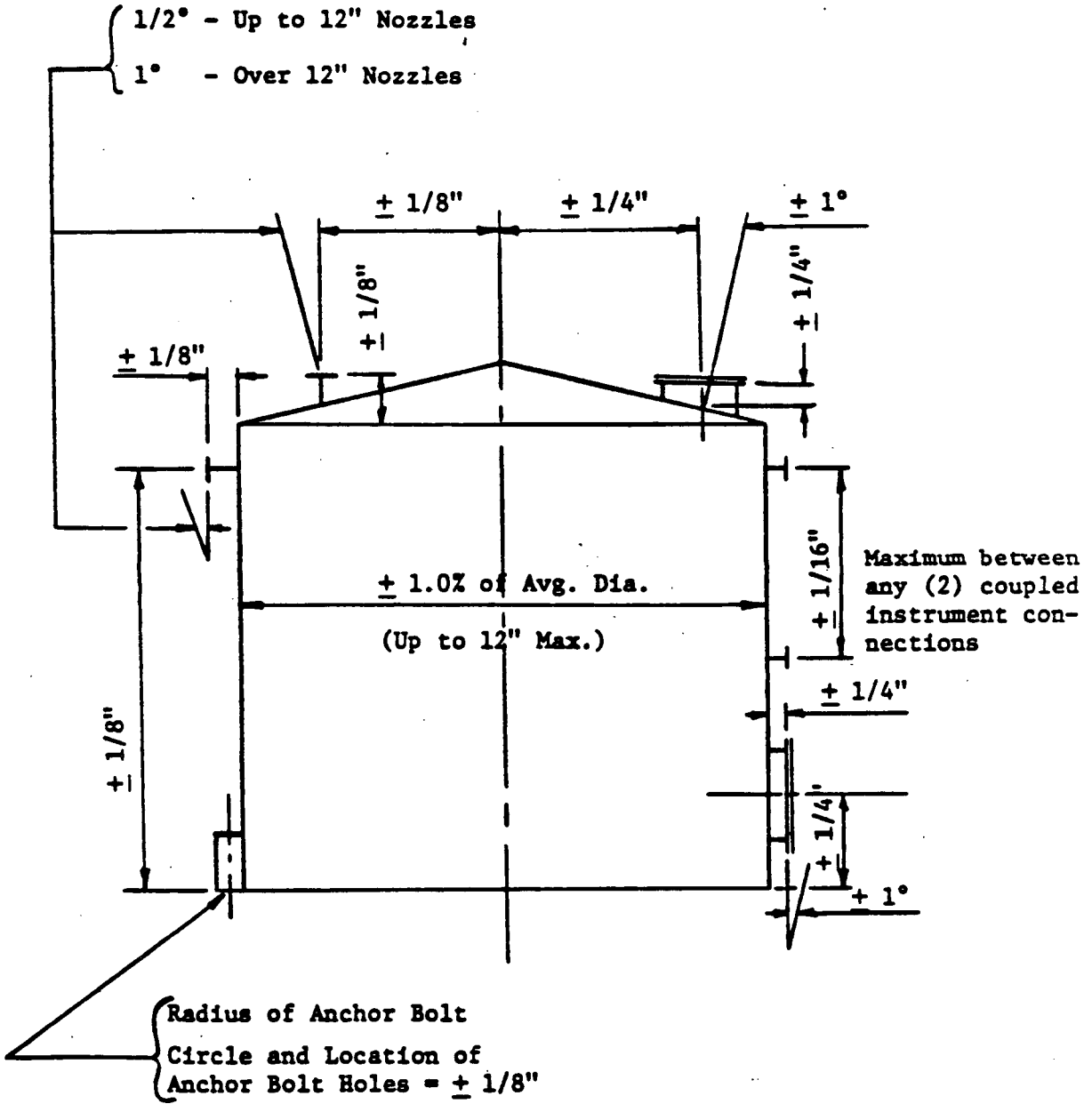
13.00 EXTERNAL CLIPS

13.01 Platform and ladder clips shall be furnished and installed as required by the control drawing.

13.02 When a tank is to be stress relieved, clips must be welded to the tank prior to stress relieving.

13.03 Clips which have a reinforcing pad welded to the shell shall have at least one 1/8" diameter drilled vent hole in the reinforcing pad.

14.00 TOLERANCES



Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 5 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-2500-2501
Item or Service See Below

Inspection Activity	Instruction
Qty-Item-No One (1) NOTES: 1.	Tank - Equalization/Surge EN 880-1-1 Inspection

DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed.

When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders.

The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608.

The Vendor shall assure that applicable documents that require SCC/DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: W. Lehner Date 29 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 2 of 5 Control No. Rev. 1

☒ Source Inspection

Inspection Level 1

P.O. Number

Project/Spec. No. 113592/02 39950-2500-2501

Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers. The following documentation is to be provided by the Vendor: 1. Mill Test Report(s) 2. Weld and Welder Qualification Procedure(s) 3. Weld Sample(s)/Coupon(s) 4. NDE Data and Report(s) 5. Hydrostatic Data and Report(s) 6. Nameplate Facsimile
2.	Pre-Fabrication Inspection Meeting The prefab meeting will be initiated by W. Lehner, QAE at (215) 864-1608. The inspection and specification requirements will be reviewed with the vendor's manufacturing and Quality Control personnel. A tentative schedule of future inspection visits will be established.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 5.
4.	Field Weather Condition(s) No welding below 0° fahrenheit in the rain or in high winds unless adequate protection from the elements is provided. Preheat material when required per the API Code and Vendor's welding procedure(s).
5.	Equalization/Surge Tank Preliminary - Prior to Ship Fabrication
1. Verify	Welding procedure(s) is approved by SCC.
2. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item in accordance with the SCC approved Vendor's qualification procedure(s).

Prepared by: W. Lehner Date 29 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 5 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-2500-2501
Item or Service See Sheet 1

Inspection Activity	Instruction
3. Verify	Quality control and inspection procedure(s) are employed to assure strong welds.
4. Verify	In-process materials are controlled and identified to provide traceability to the Mill Test Report(s).
5. Verify	Mill Test Report(s), heat number(s) and material for conformance to drawing and specification requirements.
	Intermediate - In Shop Progress
6. Inspect	Weld edge preparation for required weld geometry and are free of grease, grime and paint.
7. Inspect	The general surface(s) for laminations, pits, gouges and undesirable conditions.
8. Verify	Heat number(s) appear on the development shell plate drawing supplied for radiograph record.
9. Inspect	Prefab weldments for weld quality and general workmanship.
10. Verify	Galvanized platform grating is in accordance with the SCC Spec., the DuPont St'd and the DuPont drawing.
11. Witness	Ferrous metal exterior surface(s) preparation, prime and intermediate painting per the DuPont procedure(s) for vessel: cage, guard(s), handrail(s) and ladder; and platform support. Final coat on all except vessel.
	Intermediate - In Progress
12. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's qualification and welding procedure(s).
13. Inspect	Plate edges for gouges or damage from handling, plate thickness and floor plates for flatness.
14. Verify	Plate alignment and fit is in accordance with the applicable code and drawing allowances. Plate offsets must meet the API Code for circumferential and vertical seams as a minimum.

Prepared by: W. Lehner Date 29 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 4 of 5 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-2500-2501
Item or Service See Sheet 1

Inspection Activity	Instruction
15. Witness	A fit-up for a circumferential joint. Tack welds shall be of sound quality.
16. Witness	A fit-up of a nozzle attachment and a dip tube. Tack welds shall be of sound quality.
17. Inspect	Fit-up of the cage, guard(s), handrail(s), ladder and platform with grating. Damaged galvanize shall be resurfaced using galvacon.
18. Inspect	The following in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s): 1. All connection(s) including all dip tube(s) 2. Overall dimension(s) 3. All weld(s)
19. Witness	Fabrication is in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
20. Inspect	General quality of workmanship - no burrs, no sharp edges, clean welds, etc.
21. Witness	Radiography, as required: 1. Spot procedure shall be acceptable to the QAFR. 2. Spot X-ray as soon as possible after welding has started; first ten feet of each operator and the balance of the vessel per API Code. 3. Vendor shall locate film on the Vendor shell plate drawing and copy the QAFR when complete.
22. Verify	All film is reviewed and approved immediately and retained by the QAFR when tank is complete.
23. Witness	Nondestructive testing-magnetic particle, vacuum box, liquid and/or dye penetrant-where required.
24. Verify	Nondestructive test data and reports are in accordance with the SCC Spec., the API Code.

Prepared by: W. Lehner Date 29 December 1986

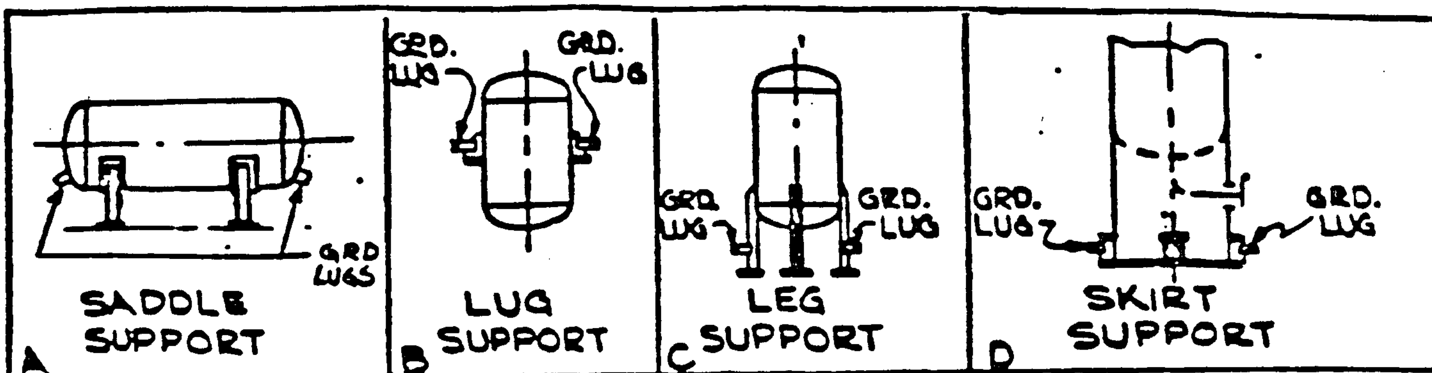
Steams Catalytic	Inspection Planning Data Sheet	Sheet 5 of 5 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-2500-2501
Item or Service See Sheet 1

Inspection Activity	Instruction
	Final - In Field Prior to Acceptance
25. Witness	The hydrostatic test in accordance with the SCC Spec., the API Code and the SCC approved Vendor's drawing(s).
26. Verify	The hydrostatic test data and report are in accordance with the SCC Spec., the API Code.
27. Inspect	The insulation for uniform thickness and general quality of workmanship.
28. Verify	Gasket(s) conform to the SCC Spec. and the SCC approved Vendor's drawing(s).
29. Verify	Vendor nameplate facsimiles.
30. Verify	Interior surfaces are smooth, dry, clean and free of all debris before closure.
31. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventative in accordance with the SCC Spec.
32. Witness	Ferrous metal exterior surface preparation and final painting per the DuPont procedure(s) for vessel.

Prepared by: W. Lehner Date 29 December 1986

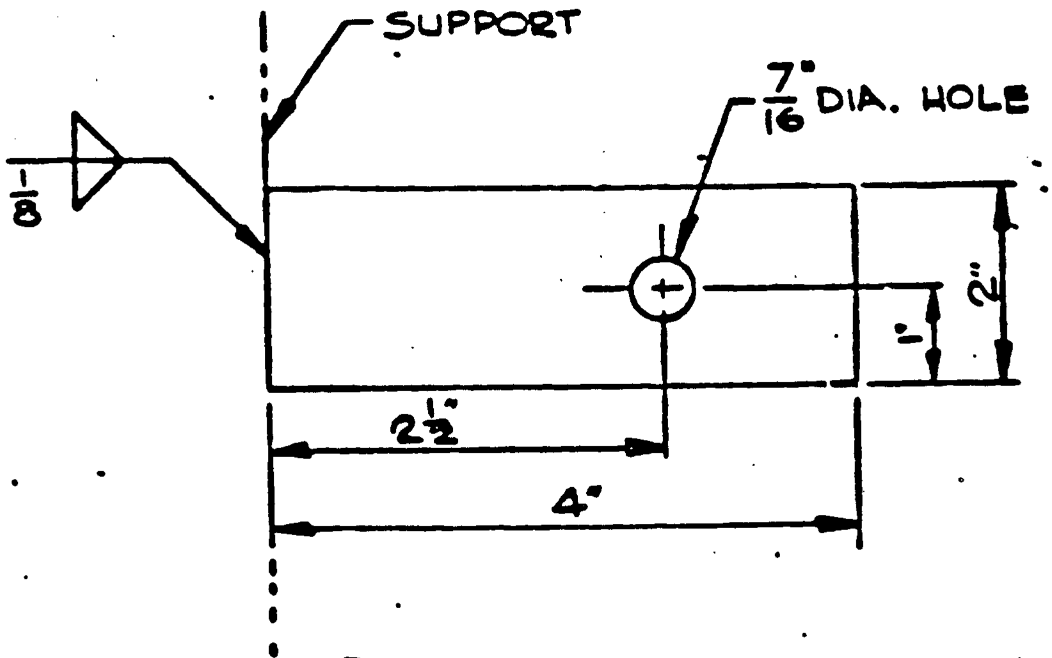


LOCATION OF GROUNDING LUGS

NOTES:

1. TWO GROUNDING LUGS PER VESSEL.
2. AT ENDS ON HORIZONTAL VESSELS ON HEADS.
3. AT 180° APART ON VERTICAL VESSELS & TOWERS.
4. NOTE THAT GROUNDING LUGS ARE WELDED TO SUPPORTS OR VESSELS.

5. BREAK ALL SHARP EDGES



MATERIAL: C.S. 2" × 3/16" × 4" LG.

DR BY	CH	5-7-69
CH BY		
APPD	[illegible]	[illegible]
APPD		
APPD		
APPD		
DATE STARTED		
DATE FINISHED		

CATALYTIC, INC.
ENGINEERING DEPT., PHILA., PENNA 19102

ENGINEERING DEPT. STANDARD

GROUNDING LUG

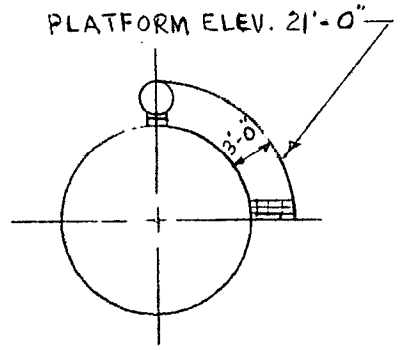
SCALE	CONTRACT NO	JOB NO.	DRAWING NO.	REV NO
			S-0800-112	1

NO.	DATE	RECORD OF ALTERATIONS	BY	[illegible]	[illegible]
1	[illegible]	REV. NOTES 2 & 4 [illegible] A	[illegible]	[illegible]	

08302-584P

NOTES:

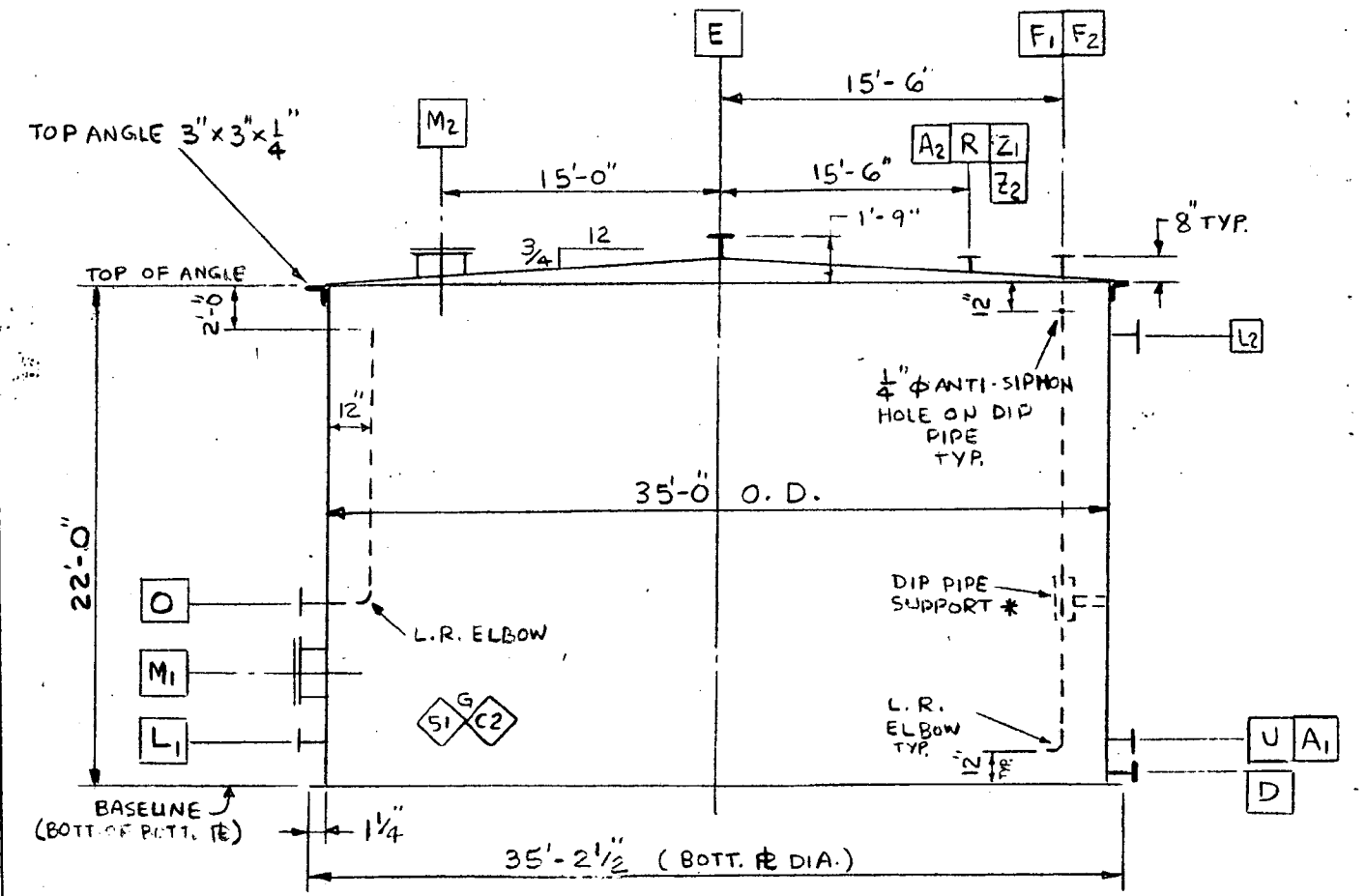
1. TANK VENDOR TO FURNISH & INSTALL 90° PLATFORM & CAGED LADDER FOR ACCESS TO TANK TOP PER OSHA REQUIREMENTS AND DUPONT STDS B9Y, B2W, B3W, B3V, SB4X, B6Y
2. FLANGE FACE FINISH SHALL BE SPIRAL (OR CONCENTRIC) SERRATED WITH A ROUGHNESS OF 125 AARH.
3. DAVIT FOR MANWAY M1 SHALL BE PER DUPONT STD. G15.1 C (TYPE 1)
4. BOLTS: A193 GR. B7 / NUTS: A194 GR. 2H (EXCEPT MANWAYS: A 307 GR. B)
5. PAINTING PER SPEC. 8572. SEE PROCUREMENT SPEC. 02-2501 FOR PAINTING SYSTEMS
6. INSULATION: 1½" THK. POLYISOCYANURATE CODE 118.1, WATER RESISTANT (BY VENDOR)
7. FOUNDATION TO BE FLEXIBLE-BASE CONSTRUCTION PER DUPONT STD. C1K (BY OTHERS)



PLATFORM AND LADDER DETAIL

NOZZLE SCHEDULE

FLG TYPE	MK	SIZE	SERVICE	PROJ.	ELEV.	ORIENT
G1C	F1	6"	LIQ. INLET W/ DIP PIPE	SEE DWG	SEE DWG	
↑	F2	4"	↓	↓	↓	
	D	4"	DRAIN	18'-2"	(FLUSH)	
	E	4"	VENT	SEE DWG		& TOP
G1C-D	L1	3"	LEVEL	18'-2"		
API-6	M1	24"	MANWAY W/COVER & DAVIT	18'-2"	2'-6"	
API-65	M2	24"	MANWAY W/COVER	SEE DWG	SEE DWG	
G1C-D	R	2"	RELIEF	↓	↓	
G1C-1	U	4"	OUTLET	18'-2"		
G1C-D	O	6"	INTERNAL OVERFLOW	18'-2"		
G1C-A	Z1	1"	LIQ. INLET	SEE DWG		
G1C-1	A1	4"	SPARE W/BLD. FLG	18'-2"		
G1C-1	A2	4"	SPARE W/BLD FLG	SEE DWG.		
G1C-D	L2	3"	LEVEL	18'-2"		
G1C-D	Z2	2"	LIQ. INLET	SEE DWG		



NOTE:
TANK MUST BE KEPT FILLED WITH 3" OF FLUID TO RESIST MAX. EXTERNAL OPERATING PRESSURE

Design conditions
LIQUID HEAD ± 3" W.C. psig AMB °F
psig °F
Operating conditions ± 2" W.C. psig AMB °F
psig °F
Specified corrosion allow. 1/16"
Wind load NY. STATE UNIFORM FIRE PREV. & BLD CODE 1984 (75 MPH)
Seismic ZONE 2 APE-650 APPX. E
Code API-650 7TH. ED. Code Stamp NO
Nat'l Board Stamp —
PW.H.T. — Radiography SPOT
MAWP — Limited by —
Shell spec. A-516-60 1/4" THK
Joint eff. 0.85
Head spec. A-516-60, SUPPORTED ROOF, * THK (MIN. 1/4")
BOTTOM PL. A-516-60, 5/16" THK
Joint eff. —
Cladding or lining spec. —
Gasket spec. SU2A CODE G-1, 1/8" THK
Support spec. A-516-60
External pipe spec. A-106 GR B (NORMALIZED)
Internal pipe spec. A-106 GR B (NORMALIZED)
Flange spec. A-105
Rating 150 # ANSI (EXCEPT MANWAYS)
Facing R.F. (SEE NOTE 5)
Paint PER PAINT SPEC. 8572 (SEE NOTE 5)
Insulation PER INSUL. SPEC 8575 (SEE NOTE 6)
Fireproofing —
Empty wt. 53,600 LBS Max. wt. 1,382,000 LBS (TEST)
Elevation measured from baseline SEE DWG
Orientation measured clockwise from 0°. North is 0°.
Projection measured from ℄ of vessel to extreme face of flange.
Capacity 140,000 GAL (NOM.) Sp. gr. 1.0
Operating Wt. = 1,259,000 LBS

References:
DUPONT SPEC SG 11.45 DESIGN PROCEDURES
SPEC. 8575 INSUL. SPEC.
SPEC. 8572, SYSTEM 213X, 207V, 170W, PAINTING
STD G12D INSUL., SUPPORT
STD. G1C FLANGES
SPCC, SU2A GASKETS
STD B9Y, B2W, B3W B3V, SB4X, B6Y LADDER/PLATE,
STD C1K FOUNDATION
SEE SPEC. 2500-01 FABRICATION
STD G15.1C MANWAY DAVIT
* PER VENDOR DESIGN

ITEM NO. 880-1-1 ONE (1) REQUIRED

DUPLICATE TRACING

REV #	DATE	RECORD OF ALTERATIONS	BY	APPD	APPD
O	12/24/86	FOR APPROVAL	DH		
A	10/13/86	FOR COMMENT	DH		

DR BY M 6/23/86
CH BY DH 10/13/86
APPD
APPD
APPD
APPD
INQ. NO. 2501
REQ. NO
SCALE —

STEARNS CATALYTIC CORPORATION
Engineering Department, Philadelphia, PA

E. I. DUPONT DE NEMOURS & CO., INC.
REMEDIATION PROJECT, NIAGARA, NY

EQUALIZATION / SURGE TANK

CONTRACT NO	JOB NO	DRAWING NO	REV NO.
3995A	113592	F-25001	O

CATALYTIC, INC.
Engineering Department

08918/01-1179P

ADSORBER DATA SHEET

1 Contract Number SCC # 39,950 Item Nos. 880-2-1 / 880-2-2 Specification No. ____

2 Client E.I. DuPont De Nemours & Co., Inc Requisition No. ____

3 Location NIAGARA FALLS, NY Number Required TWO (2)

4 Unit or Area PUMPING WELL SYSTEM By PFC Date 1/15/86

5 Service AIR POLLUTION CONTROL Rev. ____ By ____ Date ____

PROCESS DATA

6 Source of Contaminant EQUALIZATION TANK ORGANIC VAPOR EMISSIONS

7 ☑ Cyclic ☐ Continuous Cycle Time Period

8 Gas Volume at Adsorber Inlet:

9 Normal Rating 40 ACFM AMB °F ATM. Inch W.C. ____

10 Peak Rating 120 ACFM AMB °F ATM. Inch W.C. ____

11 Design 120 ACFM AMB °F ATM. Inch W.C. ____

12 Moisture Content in Gas 0.015 lbs/lb dry air Dew Point N.A °F

13 Type of Contaminant: VARIOUS DILUTE ORGANIC CMPDS. IN WATER

14

Gases Present	Mol. Wt.	Mol. or Vol. %	Mols./Hr.	lbs of Gas/Hr	Partial Pressure, psia

15 Additional Data SEE DATA SHEET ON TANK VENT ORGANIC COMPOUND EMISSIONS

16 Utilities Available: N.A.

17 Electrical: NEMA ____ Volt ____ Phase ____ Cycle ____

18 Compressed Air ____ psig; Nitrogen ____ psig

19 Cooling Water ____ GPM @ ____ psig and ____ °F

20 Steam: Lo Press ____ psig @ ____ °F; Hi Press ____ psig @ ____ °F

21 Installation Preferred: Indoor ____ Outdoor X ; Roof ____ Ground X

22 Control Panel Location: ☐ On Unit ☐ Remote ____ ft. from unit N.A.

23 Equipment Bypass to be Provided: Yes ____ No X

24 Specified Adsorbent CALGON TYPE BPL - 4X10 MESH

25 Regnerable ☐ Yes ☑ No

26 Intended Use of Recovered Solvent N.A.

27 Disposal: ☐ Yes ☐ No: Method ____

28 Remarks ____

CATALYTIC, INC.
Engineering Department

ADSORBER DATA SHEET

PERFORMANCE DATA

29 Collection Efficiency: MEET MINIMUM OF 85% REMOVAL OF CONTAMINANTS IDENTIFIED ON DATA SHEET

Contaminant	% Removal	Outlet Concentration	
		Lbs/Hr	ppm (Volume)

30 Vendor to supply Adsorption Isotherm(s): ☑ Yes ☐ No

31 Maximum Adsorber Pressure Drop: * Inch W.C. .

32 Operating Pressure: * Inch W.C. negative/positive

33 Outlet Temperature * °F

34 Additional Data: MAXIMUM SYSTEM PRESSURE DROP PERMITTED ± 10" W.C.

DESIGN DATA

Theoretical Adsorption Rate:

35 Adsorber Capacity: * lbs. gas/100 lb adsorbent

36 Working Capacity: * lbs. gas/100 lb adsorbent

37 Saturation Rate: * lbs. of adsorbent saturated per hour

Vessels: ☑

38 Vertical ☑ Horizontal ☐ Coded ☐ psig

39 Number of Adsorber Vessels 2

40 Diameter of Vessel * feet inches

41 Height or Length of Vessel * feet inches

Adsorbent:

42 Size BPL Type 4 X 10 Mfg. CALGON (TYP)

43 Quantity per Bed * lbs.

44 Thickness of Bed * inches

45 Expected Service Life of Bed * hours other basis

46 Velocity of Gas through Bed: * ft/min. (minimum)

* ft/min. (maximum)

47 Pressure Drop Across Bed * inches W.C.

Solvent Recovery: N.A.

48 Continuous ☐ Non-continuous ☐ Sacrificial ☑

49 Adsorption Cycle minutes hours other

50 Frequency

ADSORBER DATA SHEET

Condenser N.A.

51 Type _____

52 Overall Heat Transfer Coefficient _____ Btu/Hr/ft^2

53 Heat Transfer Area _____ ft^2

54 Coolant Rate _____ gpm _____ lbs/Hr

55 Temperature: In _____ °F Out _____ °F

56 Diameter of Shell _____ inches

57 Height or Length of Shell _____ feet _____ inches

Separator: N.A.

58 Capacity _____ gallons

59 Diameter _____ inches

60 Height or Length _____ feet _____ inches

MATERIALS OF CONSTRUCTION

	Flanges	Specification/Description	Thickness
61	Gas Inlet:	4" ϕ / *	*
62	Gas Outlet:	4" ϕ / *	*
63	Solvent/Condensate Outlet:	N.A.	
64	Steam Inlet	N.A.	
65	Steam Outlet	N.A.	

66 Other: _____

AUXILIARY EQUIPMENT

67 Adsorbed Material Storage: Capacity N.A Gallons _____ Integral ☐ _____ Separate ☐ _____

68 ☐ Fan and Auxiliary (Complete Fan Data Sheet)

69 ☐ Fan Motor (Complete Motor Data Sheet)

70 ☐ Recirculation Pump (Complete Pump Data Sheet)

71 ☐ Pump Motor (Complete Motor Data Sheet)

72 ☐ Flame Arrestor (Complet PID Sheet)

73 ☐ Instrumentation: ☐ Local Panel ☐ Control Room

74 ☐ See Attached Specifications ☐ Per Vendor's Specifications

75 Remarks: _____

*Data to be supplied by Vendor

TANK VENT ORGANIC CMPD. VAPOR EMISSIONS

COMPONENTS	M.W.	EMISSIONS, LBS/HR
VINYL CHLORIDE	62.5	2×10^{-4}
METHYLENE CHLORIDE	84.9	3.4×10^{-4}
TRANS-1,2-DICHLOROETHYLENE	97.0	3.6×10^{-4}
CHLOROFORM	119.4	6.3×10^{-4}
TRICHLOROETHYLENE	131.4	2.7×10^{-4}
TETRACHLOROETHYLENE	165.8	0.3×10^{-4}
1,1,2,2-TETRACHLOROETHANE	167.9	0.1×10^{-4}
BENZENE	78.1	0.3×10^{-4}
CHLOROBENZENE	112.6	$< 0.1 \times 10^{-4}$
1,4 DICHLOROBUTANE	127.0	2.1×10^{-4}
2-METHYL FURAN	82.0	16.0×10^{-4}
TETRAHYDROTHIOPHENE	84.1	7.6×10^{-4}
WATER	18.0	1.19
AIR	29.0	78.71

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0900-0901

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

PUMPS - CENTRIFUGAL

CONSISTING OF

Reference Attachments:

Du Pont Spec. No. 8572 - Painting and Protective Coating System 207D

Item Number	Description
EN 880-3-1	Stripper Feed
EN 880-13-1	Stripper Bottoms
EN 880-6-1	Stripper Feed & Bottoms Common Spare
EN 880-20-2-2	Chilled Water

Approved _____ Date _____

Approved _____ Date _____
CLIENT

Approved V. H. Wu Date 12/8/86
STEARNS CATALYTIC

Prepared By T. G. Fitz
STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
1					JCB				1-22-87
	CLIENT				STEARNS CATALYTIC CORPORATION				

PUMPS - CENTRIFUGAL

SPECIFICATION NO. 39950-0900-0901

TABLE OF CONTENTS

PUMPS - CENTRIFUGAL

SPECIFICATION NO. 39950-0900-0901

1.00 SCOPE

1.01 This specification describes the minimum requirements for the design, manufacture, testing, inspection and delivery of horizontal, end suction, single stage, centerline discharge centrifugal pumps conforming to the requirements of ANSI B73.1.

1.02 Items furnished under this specification are to include pump, shaft seal, seal liquid piping, shaft coupling, coupling guard and driver, all assembled, aligned, and mounted on a common baseplate, ready for installation. For pumps supplied with mechanical seals, the mechanical seal shall be shipped loose and a temporary lip seal shall be installed on the pump.

1.03 The following will be furnished by Others; installation, piping, controls and electrical feeder wiring to motor terminal box.

2.00 REFERENCE STANDARDS

2.01 American National Standard Specification for Horizontal, End Suction Centrifugal Pumps for Chemical Process, ANSI B73.1.

2.02 Occupational Safety and Health Standards of the U.S. Department of Labor (OSHA).

2.03 The issues or revisions of these documents in effect on the date of inquiry shall apply.

3.00 PERFORMANCE CRITERIA

3.01 The performance criteria for the pumps to be furnished under this specification are listed on the vendor proposal data sheet(s).

3.02 The pump impeller furnished shall provide the design head at the design flow rate as stipulated on Line 12 of the data sheet(s). The impeller diameter selected to meet design conditions shall be no smaller than the minimum as shown on the manufacturer's published performance curves. The pump shall be capable of at least 10% head increase at design conditions by installing a larger impeller.

3.03 The differential head generated by all available impeller sizes shall rise continuously from maximum capacity to shut-off. Duplicate pumps shall be capable of stable operation in parallel.

3.04 If feasible, the pump is to be sized for an operating point on the pump curve to the right of the maximum efficiency point on the efficiency curve. Review the resulting operating point relative to the specific pump performance curve, pump design, and pump application as some pumps tend to be susceptible to performance "fall-off" in this area of the curve.

4.00 DESIGN DETAILS

4.01 The American National Standard Specification for Horizontal, End Suction Centrifugal Pumps for Chemical Process, ANSI B73.1 shall govern the design, fabrication, assembly and testing of all equipment furnished under this specification with the exception of the following additions, changes or deletions:

4.01.1 (Modify 4.1.3 to read) Statement. "Pressure-temperature limitations shall be stated by the pump manufacturer on Line 14 of the pump data sheet(s)".

4.01.2 (Change 4.5.4 to read) "Dynamic shaft deflection at the face of the innermost mechanical seal or innermost ring of packing shall not exceed 0.05 mm (0.002 in.). The measurement shall be made at the maximum load and/or shut off condition with a maximum diameter impeller pumping a fluid having either a specific gravity of 1.00 or the design specific gravity, whichever is greater".

4.01.3 (Modify 4.7.1) Design. "Two anti-friction bearing assemblies shall be provided, one assembly free to float within the frame to carry radial thrust only, and the other assembly arranged to carry both radial and axial thrust. The latter assembly shall be a double row ball bearing assembly".

4.01.4 (Change 4.12.1 to read) "All exposed rotating parts shall be protected against accidental personnel contact in accordance with the requirements of OSHA, Paragraphs 1910.212 and 1910.219".

4.01.5 (Modify 4.11 to read) Dimensions. "Pump dimensions shall conform to Fig. 1. Baseplate dimensions shall conform to Fig. 2 and the requirements noted in Paragraph 4.02 of this specification.

4.01.6 (Modify 4.12.4 to read) Tapped Openings. "All tapped openings including those in the mechanical seal gland which may be exposed to the pumped fluid under pressure, shall be plugged with threaded metal plugs. Tapped openings shall have a radius and chamfer applied on the inside surfaces. Plugs normally in contact with the pumped fluid shall be of the same material as the case except that carbon steel plugs may be used in cast iron or ductile iron pumps. Threaded plugs shall not be used in the heating or cooling jackets including glands with heating or cooling passages instead snap-in plugs or waterproof tape shall be used. Threaded plugs shall be non-galling".

4.01.7 (Modify 5.1.2 to read) Flange Loading. "Allowable flange loading imposed by the piping shall be available from pump manufacturer. Loading shall be given for X, Y and Z planes on Line 16 of the pump data sheet(s). The pump manufacturer shall provide the criteria used to establish the flange loads."

4.02 The pump baseplate shall be supplied to allow stilt mounting of the pumps. Design criteria is noted in the following paragraphs.

4.02.1 The pump baseplates shall be sized to accommodate motors of at least one NEMA frame size larger than the motor supplied with the pump. When the motor specified with the pump is the maximum size used with the pumps, no oversizing of pump baseplate is required.

4.02.2 The pump baseplates shall be rigid enough to maintain alignment of the pump to motor shaft with 0.002 inch eccentricity under combined dead weight, full load motor torque and maximum allowable flange loads.

4.02.3 The support lugs for the pump baseplates shall be located as noted below:

If four supports are used, two supports are to be located in the plane of the discharge nozzle, and two supports are to be located as close as possible to the center of gravity of the pump motor.

If six supports are used, four supports will be located as stated above, and the additional two supports are to be located in a plane passing through the pump coupling assembly.

4.02.4 Pump baseplates may be manufactured from cast iron or carbon steel. If cast iron baseplates are selected, grout holes in the baseplate are acceptable. If carbon steel baseplates are selected, there shall be no grout holes in the baseplate.

4.02.5 Drain holes shall be provided in the closed box baseplate design. The drain holes (1/2" diameter) shall be located in the bottom closure plate to prevent trapping of liquids in the baseplate.

4.02.6 The pump baseplate design is affected by the pump size and motor horsepower.

4.02.6.1 Pumps with motors 40 H.P. and below may be furnished with the Vendor's standard baseplate design with support lugs located as noted in Paragraph 4.02.3. The baseplate material may be cast iron or carbon steel.

4.02.6.2 Pumps with motors above 40 H.P. up to and including 75 H.P. shall be furnished with the Vendor's standard carbon steel baseplate modified as noted. A carbon steel plate, 3/4" thick, shall be continuously welded to the bottom of the baseplate to form a rectangular cross section. The plate may be sized to incorporate the support lugs as an integral part of this attachment. Drain holes shall be provided as noted in Paragraph 4.02.5.

4.02.6.3 Pumps with motors 100 H.P. and over shall be furnished with a fabricated steel baseplate. The baseplates shall be designed for each application. Diagonal cross bracing of the baseplate will be required.

As a minimum, the baseplate shall consist of four structural steel channels, C10x25, standing on one flange and welded to form a box. A carbon steel plate, 3/4" thick, shall be welded to the top flange of the channels, and may be sized to provide support lugs as an integral part of the baseplate. Diagonal bracing channels shall be welded to the underside of the steel plate. One brace shall run from one baseplate corner at the pump casing end of the baseplate to a point in the plane of the coupling on the opposite side of the baseplate with the second brace from this point to the opposite corner at the motor end of the baseplate. A steel channel shall be welded to the plate to serve as a motor stand to raise the motor shaft to the same elevation as the pump shaft.

For pumps with motors 150 H.P. and up, the use of four cross braces located as noted above, and the use of the standard steel pump baseplate welded to the 3/4" carbon steel plate shall be considered.

4.02.6.4 Baseplate designs will be reviewed and approved by Purchaser prior to fabrication.

4.02.7 The pump stilts (support legs) shall be stainless steel of the Vendor's standard design. When the pump is subject to thermal expansion, the pump stilts shall be mounted on fixed wear plates. This condition will be noted on the pump data sheet.

4.03 The anticipated seal life for each pump, based on service conditions, shall be provided by the Vendor. This information will be noted on the pump data sheet.

4.04 Pumps which have a mechanical seal specified on the data sheets shall be supplied with a temporary lip seal installed on the pump and the mechanical seal shipped loose. The mechanical seal will be installed by others at the jobsite.

4.05 Mechanical seal chambers shall be designed in accordance with ANSI B73.1, paragraph 4.6.1.1.

4.06 Drill and tap both sides of bearing frame for oiler installation.

4.07 Motors furnished shall conform to Stearns Catalytic specification and data sheet and shall be non-overloading over the entire pump curve using the design impeller diameter and handling the pumpage specified on the data sheet(s).

4.08 Where the data sheet indicates "Seal Recirculation" flow, the fluid from the pump discharge to the seal flush tap shall be provided using rigid metallic tubing. Tubing material shall be compatible with the process fluid as noted on the data sheet. The tubing shall be capable of withstanding the pump design pressure and incorporate the use of a reduced diameter drilling in the seal gland. A radius and chamfer shall be applied to the inside surface of the drilling.

4.09 Equipment shall be painted in accordance with the Du Pont Specification 8572, System 207D.

Stearns Catalytic Corporation
Engineering Department

08451-285P

Pumps, Centrifugal, Chemical Service – AVS/In-Line

Page 1

1. Contract Number 39950 Item Number 880-3-1 Specification No. 39950-0900-0901
2. Client E.I. DUPONT Requisition Number
3. Location NIAGARA FALLS, N.Y. Number Required ONE(1)
4. Unit or Area By TGL Date 9/12/86
5. Status For: Approval ☐; Inquiry ☐; Purchase ☐; As Bought ☐ Revision ____ By ____ Date ____

		Vendor		Alternate (optional)
6.	Reference Standard – ANSI B73.1 ☒; B73.2 ☐			
7.	Duty: 24 Hrs./Day; 7 Days/Week	Date		
8.	Service: STRIPPER FEED	Proposal No.		
9.	Type: AVS ☒; In-Line ☐	**Requirements**	**Offered**	
10.	Pump Size/Pump Model No.	* / *	/	/
11.	Pumpage GROUND WATER @ 50 °F; Sp.Gr. 1.0 ; Visc. 1.3 cp; VP 0.17 Psia			
12.	Capacity: GPM @ Total Head (Suction Head = 0 MIN.-Ft.)	270 @ 159 Ft.	@ Ft.	@ Ft
13.	NPSH, Available/Required (Feet, Absolute) 22' MAX	33 / —	/	/
14.	Design Pressure (PSIG) & Temperature (°F)	* / *	/	/
15.	Inlet/Outlet Flanges (Size, in. and Rating)	1/150#FF	/	
16.	Allowable Flange Loading, X/Y/Z planes (LB-Ft.)	—/—/—	/ /	/ /
17.	Casing Vent & Drains - Drilled, Tapped, Plugged	—		
18.	Pressure Gage Taps - Drilled, Tapped, Plugged	—		
19.	Jacket – Casing/Stuffing Box	—/—	/	/
20.	Impeller Type (Open, Semi-open, Closed)	*		
21.	Impeller Diameter – Min./Design/Max.	*/*/*	/ /	/ /
22.	Coupling – Manuf./Type W/GUARD	WOODS/SPACER	/	/
23.	Materials: Casing	D.I.		
24.	Impeller	D.I.		
25.	Shaft	316SS	/	
26.	Sleeve	—		
27.	Gland & Taps	316SS		
28.	Gaskets	*		
29.	Packing	—		
30.	Mechanical Seal Type/Manufacturer CRANE 9T OR DURA RO		/	/
31.	Gland Features	RECIRC FLUSH		
32.	Materials: Seal Ring/Gland Ring DURA CODE	T.C. / 316SS	/	/
33.	Rotary/Inserts/Packing EU5EFVV	316SS/CARBON/VITON	/ /	/ /
34.	Brake Horsepower: Design/Maximum	—	/	/
35.	Motor Horsepower/Speed	20 (Est.) / 1750	/	/
36.	Painting	SYSTEM 207D		
37.	Tests: GPM/Head/EFF/HP. (F=Factory; W = Witnessed)	—		
38.	NPSHA/Hydrostatic	— / STD	/	/
39.				
40.	BEARING LUBE	OIL		
41.	SUCT PRESS = 14.6 PSIA			
42.	DISCH. " = 83.3 PSIA			
43.				
44.	FLOW RANGE:			
45.	MAX = 270 GPM			
46.	AVG = 90 GPM			
47.	MIN. = 45 GPM			
48.	PUMPAGE CONTAINS LOW LEVELS OF TOXIC VOLATILE CHLORINATED HYDROCARBONS			
49.	Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
50.	Estimated Weight			
51.	Delivery *	TO BE COMPLETED BY VENDOR		
52.	Freight —	NOT REQUIRED		
53.	Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

NOTE: Use check "√" to show compliance.

Stearns Catalytic Corporation
Engineering Department

08451-285P

Pumps, Centrifugal, Chemical Service – AVS/In-Line

Page 1

1. Contract Number 39950 Item Number 880-6-1 Specification No. 39950-0900-0901
2. Client E.I. DUPONT Requisition Number
3. Location NIAGARA FALLS, N.Y. Number Required ONE (1)
4. Unit or Area By T&L Date 9/12/86
5. Status For: Approval ☐; Inquiry ☐; Purchase ☐; As Bought ☐ Revision By Date

		Vendor		Alternate (optional)
6.	Reference Standard – ANSI B73.1 ☒; B73.2 ☐			
7.	Duty: SPARE Hrs./Day; Days/Week	Date		
8.	Service: COMMON SPARE 880-3-1 & 880-13-1	Proposal No.		
9.	Type: AVS ☒; In-Line ☐	**Requirements**	**Offered**	
10.	Pump Size/Pump Model No.	* / *	/	/
11.	Pumpage- WATER @ 50 °F; Sp.Gr. 1.0 ; Visc. 1.3 cp; VP 0.17 Psia			
12.	Capacity: GPM @ Total Head (Suction Head = Ft.)	270 @ 159 Ft.	@ Ft.	@ Ft
13.	NPSH, Available/Required (Feet, Absolute)	10.6 / —	/	/
14.	Design Pressure (PSIG) & Temperature (°F)	* / *	/	/
15.	Inlet/Outlet Flanges (Size, in. and Rating)	/ 150# FF	/	
16.	Allowable Flange Loading, X/Y/Z planes (LB-Ft.)	— / — / —	/ /	/ /
17.	Casing Vent & Drains - Drilled, Tapped, Plugged	—		
18.	Pressure Gage Taps - Drilled, Tapped, Plugged	—		
19.	Jacket – Casing/Stuffing Box	— / —	/	/
20.	Impeller Type (Open, Semi-open, Closed)	*		
21.	Impeller Diameter – Min./Design/Max.	* / * / *	/ /	/ /
22.	Coupling – Manuf./Type WOODS SPACER		/	/
23.	Materials: Casing	D.I.		
24.	Impeller	D.I.		
25.	Shaft	316SS	/	
26.	Sleeve	—		
27.	Gland & Taps	316SS		
28.	Gaskets	*		
29.	Packing	—		
30.	Mechanical Seal Type/Manufacturer CRANE 9T OR DURA RO		/	/
31.	Gland Features	PEDIAC FLUSH		
32.	Materials: Seal Ring/Gland Ring DURA CODE	T.C. / 316SS	/	/
33.	Rotary/Inserts/Packing EUSEF VV	316SS/CARBON VITON	/ /	/ /
34.	Brake Horsepower: Design/Maximum	—	/	/
35.	Motor Horsepower/Speed	20 (Est.) / 1750	/	/
36.	Painting	SYSTEM 20TD		
37.	Tests: GPM/Head/EFF/HP. (F=Factory; W = Witnessed)	—		
38.	NPSHA/Hydrostatic	— / STD	/	/
39.	BEARING LUBE	OIL		
40.				
41.	NOTE: PUMP TO BE COMMON SPARE			
42.	FOR 880-3-1 & 880-13-1	WITH		
43.	IMPELLER CUT FOR 880-3-1 DUTY (highest head).			
44.	FLOW CONTROL VALVE ON PUMP DISCHARGE			
45.	WILL ABSORB P.D. DIFFERENCE WHEN			
46.	OPERATING AS 880-13-1.			
47.				
48.				
49.	Unit Price (Incl. Motor, Pump, Base, Seal, etc.) *	TO BE COMPLETED BY VENDOR		
50.	Estimated Weight			
51.	Delivery —	NOT REQUIRED		
52.	Freight			
53.	Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

NOTE: Use check "√" to show compliance.

Stearns Catalytic Corporation
Engineering Department

08451-285P

Pumps, Centrifugal, Chemical Service – AVS/In-Line

1. Contract Number 39950 Item Number 880-13-1 Specification No. 39950-0900-0901
2. Client E.I. DUPONT Requisition Number
3. Location NIAGARA FALLS, N.Y. Number Required ONE (1)
4. Unit or Area By T&L Date 9/12/86
5. Status For: Approval ☐; Inquiry ☐; Purchase ☐; As Bought ☐ Revision By Date

		Vendor		Alternate (optional)
6.	Reference Standard – ANSI B73.1 ☒; B73.2 ☐			
7.	Duty: 24 Hrs./Day; 7 Days/Week	Date		
8.	Service: STRIPPER BOTTOMS	Proposal No.		
9.	Type: AVS ☒; In-Line ☐	**Requirements**	**Offered**	
10.	Pump Size/Pump Model No.	* / *	/	/
11.	Pumpage- WATER @ 220 °F; Sp.Gr. .956; Visc. 0.3 cp; VP 17.2 Psia			
12.	Capacity: GPM @ Total Head (Suction Head = 13 Ft.)	285 @ 102 Ft.	@ Ft.	@ Ft
13.	NPSH, Available/Required (Feet, Absolute)	10.6 / —	/	/
14.	Design Pressure (PSIG) & Temperature (°F)	/	/	/
15.	Inlet/Outlet Flanges (Size, in. and Rating)	/ 150# FF	/	
16.	Allowable Flange Loading, X/Y/Z planes (LB-Ft.)	— / — / —	/ /	/ /
17.	Casing Vent & Drains - Drilled, Tapped, Plugged	—		
18.	Pressure Gage Taps - Drilled, Tapped, Plugged	—		
19.	Jacket – Casing/Stuffing Box	— / —	/	/
20.	Impeller Type (Open, Semi-open, Closed)	*		
21.	Impeller Diameter – Min./Design/Max.	* / * / *	/ /	/ /
22.	Coupling – Manuf./Type W/GUARD	WOODS SPACER	/	/
23.	Materials: Casing	D.I.		
24.	Impeller	D.I.		
25.	Shaft	316SS	/	
26.	Sleeve	—		
27.	Gland & Taps	316SS		
28.	Gaskets	*		
29.	Packing	—		
30.	Mechanical Seal Type/Manufacturer CRANE 9T OR DURA RO		/	/
31.	Gland Features	REQ'D FLUSH		
32.	Materials: Seal Ring/Gland Ring DURA CODE	T.C. / 316SS	/	/
33.	Rotary/Inserts/Packing EUSEFVV	316SS CARBON VITON	/ /	/ /
34.	Brake Horsepower: Design/Maximum	—	/	/
35.	Motor Horsepower/Speed	15 (Est.) / 1750	/	/
36.	Painting	SYSTEM 20TD		
37.	Tests: GPM/Head/EFF/HP. (F=Factory; W = Witnessed)	—		
38.	NPSHA/Hydrostatic	— / STD	/	/
39.	BEARING LUBE	OIL		
40.				
41.	SUCT PRESS = 21.6 psia			
42.	DISCH. PRESS = 63.7 PSIA.			
43.				
44.				
45.	FLOW RANGE: MAX = 285 GPM, AVG = ~90 GPM, MIN = 45 GPM			
46.				
47.				
48.	*	TO BE COMPLETED BY VENDOR		
49.	Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
50.	Estimated Weight —	NOT REQUIRED		
51.	Delivery			
52.	Freight			
53.	Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

NOTE: Use check "√" to show compliance

08451-2S5P

Stearns Catalytic Corporation
Engineering Department

Pumps, Centrifugal, Chemical Service – AVS/In-Line

1. Contract Number 39950 Item Number 880-20-2-2 Specification No. 39950-0900-0901
2. Client E.I. DuPONT Requisition Number
3. Location NIAGARA FALLS, N.Y. Number Required ONE (1)
4. Unit or Area By T6c Date 1/9/87
5. Status For: Approval [X]; Inquiry [ ]; Purchase [ ]; As Bought [ ] Revision ____ By ____ Date ____

		Vendor		Alternate (optional)
6.	Reference Standard – ANSI B73.1 [X]; B73.2 [ ]	Date		
7.	Duty: 24 Hrs./Day; 7 Days/Week	Proposal No.		
8.	Service: CHILLED WATER	Requirements	Offered	
9.	Type: AVS [X]; In-Line [ ]			
10.	Pump Size/Pump Model No.	* / *	/	/
11.	Pumpage- WATER @ 35 °F; Sp.Gr. 1.0 ; Visc. 1.47 cp; VP 0.1 Psia			
12.	Capacity: GPM @ Total Head (Suction Head = Ft.)	10 @ 51 Ft.	@ Ft.	@ Ft
13.	NPSH, Available/Required (Feet, Absolute)	/	/	/
14.	Design Pressure (PSIG) & Temperature (°F)	/	/	/
15.	Inlet/Outlet Flanges (Size, in. and Rating)	1/150# FF	/	
16.	Allowable Flange Loading, X/Y/Z planes (LB-Ft.)	—/—/—	/ /	/ /
17.	Casing Vent & Drains - Drilled, Tapped, Plugged	DRAIN		
18.	Pressure Gage Taps - Drilled, Tapped, Plugged	—		
19.	Jacket – Casing/Stuffing Box	— / —	/	/
20.	Impeller Type (Open, Semi-open, Closed)	*		
21.	Impeller Diameter – Min./Design/Max.	* / * / *	/ /	/ /
22.	Coupling – Manuf./Type W/GUARD	WOODS/ SPACER	/	/
23.	Materials: Casing	D.I.		
24.	Impeller	D.I.		
25.	Shaft	STL	/	
26.	Sleeve	316 SS		
27.	Gland & Taps	316 SS		
28.	Gaskets	NON ASBESTOS		
29.	Packing	—		
30.	Mechanical Seal Type/Manufacturer SINGLE INSIDE	CRANE 1	/	/
31.	Gland Features	RECIRC FLUSH		
32.	Materials: Seal Ring/Gland Ring CODE: BFIC1	CERAMIC 316SS	/	/
33.	Rotary/Inserts/Packing	316SS/CARBON BUNAN	/ /	/ /
34.	Brake Horsepower: Design/Maximum	—	/	/
35.	Motor Horsepower/Speed	11 (Est.) 1750	/	/
36.	Painting	SYSTEM 207D		
37.	Tests: GPM/Head/EFF/HP. (F=Factory; W = Witnessed)	—		
38.	NPSHA/Hydrostatic	— / STD.	/	/
39.	GEARING LUBE	OIL		
40.				
41.	SUCTION PRESS = 14.2 PSIA			
42.	DISCH. PRESS = 36 PSIA.			
43.				
44.				
45.				
46.				
47.				
48.	* VENDOR TO FILL IN.			
49.	Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
50.	Estimated Weight			
51.	Delivery			
52.	Freight			
53.	Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(4881E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0900-0903

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

PUMPS - METERING

CONSISTING OF

Reference Attachments:

SCC Form 08703 - Induction Motor Data Sheet

Item Number	Description
EN 880-7-1	Scale Inhibitor Metering Pump
EN 880-7-1-1	Metering Pump Relief Valve
EN 880-8-1	Antifoam Metering Pump
EN 880-8-1-1	Metering Pump Relief Valve

Approved _____ Date _____

Approved _____ Date _____
CLIENT

Approved _____ Date 1-22-87
STEARNS CATALYTIC

Prepared By _____
STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

PUMPS - METERING

SPECIFICATION NO. 39950-0900-0903

TABLE OF CONTENTS

PUMPS - METERING

SPECIFICATION NO. 39950-0900-0903

1.00 SCOPE

1.01 This specification describes the minimum requirements for the design, manufacture, testing and inspection of positive displacement metering pumps conforming to the Hydraulic Institute Standards, Reciprocating Pump Section.

1.02 Items furnished by this specification are to include pump, inlet and outlet check valves, pulsation damper, reciprocating mechanism, coupling, coupling guard, and driver all assembled, aligned and mounted on a common baseplate, ready for installation.

1.03 The following will be furnished by others; installation, piping and electrical feeder wiring to motor terminal box.

2.00 REFERENCE STANDARDS

2.01 Standards of the Hydraulic Institute (HI).

2.02 Occupational Safety and Health Standards of the U.S. Department of Labor (OSHA).

2.03 American Society for Testing and Materials (ASTM).

2.04 American National Standards Institute (ANSI):

ANSI B1.1 Unified Screen Threads.
ANSI B2.1 Pipe Thread (except dry seal).
ANSI B16.5 Steel Pipe Flanges, Flanged Valves and Fittings.

2.05 National Electric Code (NEC).

2.06 The issues or revisions of these documents in effect on the date of inquiry shall apply.

3.00 PERFORMANCE CRITERIA

3.01 The performance criteria for the pumps to be furnished under this specification are listed on the data sheet(s).

3.02

4.00 DESIGN DETAILS

4.01 General Requirements

4.01.1

4.01.2 In the event of conflicts between this specification and the requirements of the attached data sheets, the data sheets shall govern.

4.02 Casing Assembly

4.02.1 Pump pressure bearing parts (liquid cylinder, valve assemblies, etc.) shall be designed and tested for hydrostatic test pressure of 1.5 times the maximum pressure.

4.02.2 Pump liquid cylinder shall be designed to allow maintenance on diaphragm without removing pump from installed location.

4.02.3 All pump lubrication chambers shall be supplied with a tapped drain connection, sealed by a forged or rolled bar stock plug at least equal in strength and in corrosion resistance to the casing material.

4.02.4 Double ball check valves shall be provided on the suction and discharge connections on the pump.

4.02.5 Vendor shall include in his proposal an externally adjustable relief valve for each pump and indicate if relief valve is separate or part of pump assembly.

4.02.6 Relief valve setting is to be a minimum of 10% above the rated head.

4.03 Liquid End Design

4.03.1 A precision ground plunger shall be used with a diaphragm to pump liquid.

4.03.2 The plunger movement will be transmitted to the diaphragm using a hydraulic coupling.

4.03.3 Provisions shall be provided to maintain a consistent volume of fluid free of air and entrained gases in the hydraulic chamber. The hydraulic fluid shall be protected against over pressurization.

4.04 Pump Capacity Control

4.04.1 The pump capacity control shall be accomplished using a method indicated below. The pump shall be capable of flow adjustment during operation.

A. Constant speed drive with manual stroke adjustment.

B. Constant speed drive with automatic stroke adjustment using a pneumatic or electric signal.

C. Variable speed drive with speed controller.

4.04.2 The pump capacity control arrangement shall be noted on the Pump Data Sheet.

4.05 Drive Mechanism

4.05.1 All moving parts in the drive mechanism shall be submerged in lubricating oil.

4.05.2 Oil lubricators shall be provided on the drive mechanism casing and shall have provisions for indicating oil level.

4.05.3 Coupling of the motor to the drive mechanism shall be accomplished using non-lubricated flexible disc couplings.

4.06 Motor Drivers

4.06.1 All electric motors shall be in accordance with the Induction Motor Data Sheet.

4.06.2 The motor shall be non-overloading up to the relief valve setting of the pump.

4.07 Miscellaneous

4.07.1 All exposed moving parts shall be protected against accidental personnel contact in accordance with the requirements of OSHA.

4.07.2 Cast iron baseplates are preferred. Heavy gauge steel baseplates which do not depend upon grouting for strength are acceptable.

Stearns Catalytic Corporation
Engineering Department

08402

Metering Pumps

Contract Number 39950 Item Number 880-7-1 Specification No. 39950 0900-0903
Client E.I. DUPONT Requisition Number
Location NIAGARA FALLS, N.Y. Number Required ONE(1)
Unit or Area By TGL Date 9/15/96
Status For: Approval ☐; Inquiry ☐; Purchase ☐; As Bought ☐ Revision By Date

	Vendor		Alternate (optional)
Reference Standard –			
Duty: 24 Hrs./Day: 7 Days/Week	Date		
Service: SCALE INHIBITOR METERING	Proposal No.		
Type: DIAPHRAGM	Requirements	Offered	
Pump Size/Pump Model No.	* / *	/	/
Pumpage: SCALE INHIB @ AMB. °F; Sp.Gr. 1.08 ; Visc.	1.3 cp; VP 0.5 Psia	PH = 9.5	
Capacity: GPH @ Discharge Press. (Suct.Press.= 12.8 ~~PSIG~~ PSIA.	2.0 GPH @ 85 PSIA		
NPSH, Available/Required (Feet)	26 / *		
Solids– % / Diameter	NONE		
Materials: Casing	316SS		
~~Plunger~~ or Diaphragm	TEFLON		
Plunger Packing			
Valve/Seat	316SS / 316SS	/	
Valve Type	DF; BALL CK		
Jacketing of: Head – Valves	—		
Working Pressure of Head Jacket			
Working Pressure of Valve Jacket			
Relief Valve-Set at PSIG (INTERNAL)	*		
Control Signal: Manual – 3 to 15 PSIG Air–	—		
Electric–Variable Speed Drive	AC INVERTER		
Controllable While Running – Stopped	RUNNING		
Rotating Parts Guards	Per O.S.H.A.		
B.H.P.–Design/at Relief Valve Setting	*	/	
Pump Strokes per Minute @ Design	*		
Motor: Hp/RPM	1/4 / 1750	/	
Enclosure/Frame No.	TENV *	/	
Volts/Phase/Cycles	460 3 60	/ /	
Tests Required:	STD		
Duty 24 Hrs./Day	✓		

PUMP TO RECEIVE REMOTE 4–20 MA SIGNAL FOR VARIABLE SPEED CAPACITY CONTROL CONTROLLER BY PUMP VENDOR.
PUMP CAPACITY: 0.4 GPH MIN, 2.0 GPH MAX

* VENDOR TO FILL IN

Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
Estimated Weight			
Delivery			
Freight			
Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

Stearns Catalytic Corporation
Engineering Department

08402

Metering Pumps

Contract Number 39950 Item Number 880-8-1 Specification No. 39950-0900-0903
Client E.I. DUPONT Requisition Number
Location NIAGARA FALLS, N.Y. Number Required ONE (1)
Unit or Area By TGL Date 1/21/87
Status For: Approval [X]; Inquiry [ ]; Purchase [ ]; As Bought [ ] Revision ____ By ____ Date ____

Reference Standard –	Vendor		Alternate (optional)
Duty: 24 Hrs./Day: 7 Days/Week	Date		
Service: ANTIFOAM METERING	Proposal No.		
Type:	Requirements	Offered	
Pump Size/Pump Model No. (ASSUMED	* / *	/	/
Pumpage- ANTIFOAM @ AMB. °F; Sp.Gr. 1.08 ; Visc. 1000 cp; VP 0.5 Psia			
Capacity: GPH @ Discharge Press. (Suct.Press.= 12.8 ~~PSIG~~ PSIA	2.0 GPH @ 85 PSIA		
NPSH, Available/Required (Feet)	26 / *		
Solids– % / Diameter	NONE		
Materials: Casing	316SS		
~~Plunger~~ or Diaphragm	TEFLON		
Plunger Packing	—		
Valve/Seat	316SS/316SS	/	
Valve Type	DBL BALL CK		
Jacketing of: Head – Valves	—		
Working Pressure of Head Jacket			
Working Pressure of Valve Jacket			
Relief Valve-Set at PSIG (INTERNAL)	*		
Control Signal: Manual – 3 to 15 PSIG Air–	—		
Electric–Variable Speed Drive	AC INVERTER		
Controllable While Running – Stopped	RUNNING		
Rotating Parts Guards	Per O.S.H.A.		
B.H.P.–Design/at Relief Valve Setting	* / *	/	
Pump Strokes per Minute @ Design	*		
Motor: Hp/RPM	* / 1750	/	
Enclosure/Frame No.	T.E. / *	/	
Volts/Phase/Cycles	460 3 60	/ /	
Tests Required:	STD		
Duty 24 Hrs./Day	✓		

PUMP TO RECEIVE REMOTE 4-20 MA SIGNAL FOR VARIABLE SPEED CAPACITY CONTROL – CONTROLLER BY PUMP VENDOR

PUMP CAPACITY: 0.4 GPH MIN, 2.0 GPH MAX

* VENDOR TO FILL IN.

Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
Estimated Weight			
Delivery			
Freight			
Total Price Ft. Alwd. (Unit pr. x No. of Pumps)			

NOTE: Number of Spares

CATALYTIC, INC.
ENGINEERING DEPARTMENT

88010-3746P

STATIC MIXER DATA SHEET

Page 1 of 1

1. CONTRACT NO. 39950 ITEM NO. 880-5-1 SPEC. NO.
2. CLIENT DuPONT REQ. NO.
3. LOCATION NIAGARA FALLS, NY. NUMBER REQ'D. 1
4. SERVICE OF UNIT BY JDB DATE 9-10-86
GROUND WATER REMEDIATION REVISION 1 DATE 1-21-87 BY JDB

PERFORMANCE DATA

	STREAM	A	B	C	D
8.	SERVICE	Ground water	Scale Inhibitor	Antifoam	
9.	LIQUID, LBS/HR.	135,000	18 (max.)	18 (max.) *	
10.	VAPOR, LBS/HR.	—	—	—	
11.	SOLIDS, LBS/HR.	neg.	none	none	
12.	TEMPERATURE, °F	~ 50	Amb.	Amb.	
13.	PRESSURE, PSIA	85	85	85 *	
14.	VISCOSITY, CP	1.3	1.3 *	1000 *	
15.	HEAT CAPACITY, BTU/LB °F	1	1 *		
16.	SPECIFY GRAVITY	1	1.08	1 *	

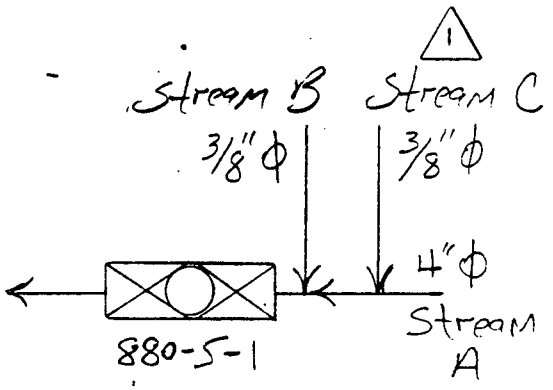
* Assumed

VENDOR'S UNIT CHARACTERISTICS

17. MANUFACTURER _____ MODEL NO. _____
18. HOUSING SIZE 4 ID SCHEDULE _____
19. DESIGN PRESSURE 150 PSI DESIGN TEMPERATURE 100 °F
20. LENGTH OF MODULE _____ FT. NUMBER OF MODULES _____
21. ALLOWABLE PRESSURE LOSS 5 PSI NUMBER OF ELEMENTS/MODULE BY VENDOR _____
22. ACTUAL PRESSURE LOSS _____ PSI

23. MATERIALS OF CONSTRUCTION:
24. HOUSING C.S.
25. INTERNALS C.S.
26. END CONNECTION Flange
27. REMARKS
28. Performance data shown above is MAXIMUM conditions. A turndown of 6:1 is possible

INSTALLATION:



1.0 IDENTIFICATION

EN Number	Quantity	Description
880-12-1	1	Stripping Tower

2.0 SCOPE

This specification defines requirements for the design and fabrication of one stripping tower.

3.0 DESCRIPTION

Stripping tower: Vertical tower, 3'-6" I.D. x 30'-0" TL/TL with ASME ellipsoidal heads and constructed of carbon steel. Design, fabrication and inspection shall be be per current ASME Pressure Vessel Code, Section VIII, Division 1, and Du Pont standards and specifications. Tower to be furnished complete with all nozzles, internal pipes, platforms, ladders, support skirt, and all internals (including packing), all in accordance with Drawing F-05002 and references thereon.

4.0 GENERAL

4.1 All notes, instructions, etc., included on the drawings are made part of this specification. Design, fabrication and inspection shall be in accordance with the current ASME Pressure Vessel Code, Section VIII, Division 1 and Du Pont standards and specifications.

ASME National Board Code stamping is required.

4.2 Calculations, Welding Procedures (WSP) and Welder Qualifications (PQR) shall be furnished along with initial submission of drawings for approval. All thicknesses, reinforcements, supports, etc., shall be verified by calculations. Thicknesses shown on control drawings shall be considered as minimum.

4.3 Du Pont inspection of equipment is required prior to shipment.

4.4 Vendor is released to purchase all materials on placement of order.

4.5 Nozzle bolt holes shall straddle the vessel 0^{o}-180^{o} centerline or its parallel for horizontal nozzles and the vertical centerline for vertical nozzles.

4.6 Gaskets, bolts and nuts for shell, head, manhole and blind flanges shall be furnished by the Vendor.

4.7 Vendor shall identify all subcontractor supplied parts and accessories with manufacturer's name and address and shall submit documentation for Stearns Catalytic and/or Du Pont approval.

4.8 All vessels shall have lifting lugs for handling per Specification SG4C.

4.9 Tower fabricator shall install all internals (excluding packing) in shop to insure proper fit-up and ship them loose for final field installation.

4.10 Vendor shall furnish all data and drawings as indicated in Paragraph 7.0 and as indicated on the attached "Vendor Data Requirements".

4.11 Handrails, cages, ladders and guards to be painted in accordance with Painting System 213X. All coats to be applied at the fabricator's shop. Top coat to be High Vis. Yellow 326-Y-23663.

4.12 Platform support steel to be painted in accordance with Painting System 207V. All coats to be applied at the fabricator's shop. Top coat to be Shale Gray 326-Y-67633.

4.13 Platform grating to be galvanized in accordance with System 170W.

5.0 STANDARDS AND SPECIFICATIONS

Du Pont Spec. SG1S	-	Fabrication
Du Pont Spec. SU2A	-	Gaskets
Du Pont Spec. SG4C	-	Lifting Lugs
Du Pont Std. G1C	-	Nozzle Construction
Du Pont Std. G10C	-	Manway
Du Pont Std. G15.1C	-	Manway Davit
Du Pont Std. G12D	-	Insul. Supports
Du Pont Std. G5B	-	Skirt Support

Du Pont Std. G8H - Vortex Breaker
Du Pont Spec. 8572 (Sheet #16) - Painting System 213X
Du Pont Spec. 8572 (Sheet #13) - Painting System 170W
Du Pont Spec. 8572 (Sheet #18) - Painting System 207V
Du Pont Std. B9Y - Platforms
Du Pont Std. B2W - Ladder Details
Du Pont Std. B3W - Ladder Cages
Du Pont Std. B3V - Handrail
Du Pont Spec. SB4X - Grating
Du Pont Spec. B6Y - Grating Anchors

Drawings

F-05002 - Rev. A

6.0 INSPECTION

Inspection will be made by Du Pont Quality Assurance Field Representative (QAFR) and inspection procedures are given in the Inspection Planning Data Sheets attached for each vessel. Some of the inspection items that will be checked are noted for each visit. Visit requests are not necessarily in chronological order.

7.0 YOUR QUOTATION MUST STATE YOUR SCHEDULE FOR SUBMITTING DRAWINGS AS FOLLOWS:

Design Approval Drawings in weeks after receipt of order.
Final Drawings in weeks after return of all Design Approval Drawings.

7.1 One reproducible* of Design Approval Drawings required.
One reproducible* of Final Drawings required.

*Two legible copies may be submitted for 8-1/2" x 11" or 11" x 17" drawing.

7.2 All drawings, drawing transmittal letters and correspondence must show the following identification:

Plant: Niagara
Project: 113592
Du Pont Order No.:
EN Numbers:

7.3 The following information is required for approval:

Layout and orientation.	Connection locations and types.
Overall dimensions, weights and materials.	Weld details (WP/PQR).
Mounting or foundation dimensions.	Seam locations.
Critical tolerances and finishes.	Internal details.
	Calculations.
	Nameplate data.

7.4 Design Approval Drawings

These drawings must be submitted before we will release start of fabrication. One print of each drawing will be returned stamped "Approved", "Approved as Noted", or "Not Approved". Fabrication will be released according to a note on the transmittal letter covering the returned prints. Upon receipt of all "Approved" and "Approved as Noted" drawings, vendor shall revise to include all changes and return for our use as Final Drawings. "Not Approved" drawings must be corrected and re-submitted for approval.

7.5 Final Drawings

These drawings are for Du Pont design and construction purposes.

CLIENT DuPont

FOR INQUIRY NO. _____

FOR PURCHASE ORDER NO. _____

CLIENT REFERENCE NO. .

VENDOR DATA REQUIREMENTS

DRAWINGS AND DATA REQUIRED	Copies with Bid	2EPR26 Copies for Appr'l.	Date Due	After Approval: Cer. Cop. of Prts.	After Approval: Repro. Tracing	Date Due	Copies Reqd w/o App'l.	Date Due	NOTES
1. DIMENSIONED OUTLINE DRAWINGS		1		2*	1				
2. CROSS SECTIONAL DRAWINGS		1		2*	1				
3. COMPONENT AND/OR DETAIL DRAWINGS		1		2*	1				
4. ASSEMBLY AND/OR ERECTION DRAWINGS		1		2*	1				
5. FOUNDATION DIAGRAMS AND LOADING REQUIREMENTS									
6. SCHEMATIC PIPING DRAWINGS									
7. SCHEMATIC WIRING DIAGRAMS									
8. DETAILED PARTS LIST									
9. RECOMMENDED SPARE PARTS FOR ONE YEAR'S NORMAL MAINTENANCE WITH PRICES									
10. INSTALLATION, OPERATION, MAINTENANCE AND LUBRICATION MANUALS									
11. COMPLETED EQUIPMENT DATA SHEETS, AS NOTED									
12. RIVET AND BOLT ERECTOR'S LIST									
13. RIVET AND BOLT SUMMARY LIST									
14. PERFORMANCE CURVES									
15. CATALOG INFORMATION, CUTS, ETC.									
16. MANUFACTURER'S INSPECTION AND DATA REPORTS							3		f
17. MILL TEST CERTIFICATES							3		f
18. WELDING PROCEDURES AND PROCEDURE QUALIFICATION TEST RECORDS		2*		2*					f
19. FACSIMILE OR RUB-OFF OF STAMPING							5		f
20. SHIPPING SCHEDULE, SHIPPING MEMORANDUM AND/OR PACKING LIST							3		f
21. WEIGHT LIST OF FABRICATED PARTS AND/OR UNIT SHIPPING WEIGHT									
22. VENDOR'S CALCULATIONS		2*		2*					
23.									
24. * TWO LEGIBLE COPIES MAY BE SUBMITTED FOR 8½"x11" OR 11"x17" DRAWINGS.									

f Date indicated must be furnished when material or equipment is ready for inspection or shipment.

GENERAL NOTES: - 1. Drawings and data "For Approval" are required within two weeks after order is placed.
2. "Certified Correct" data and drawings are required within two weeks after return of "For Approval" data and drawing
3. Cost of above data must be included in quotation.

Approval and certified vendor prints be forwarded to:

Stearns Catalytic Corporation, Centre Square West, 1500 Market St., Phila., PA 19102 Attn: E. D. Baldi

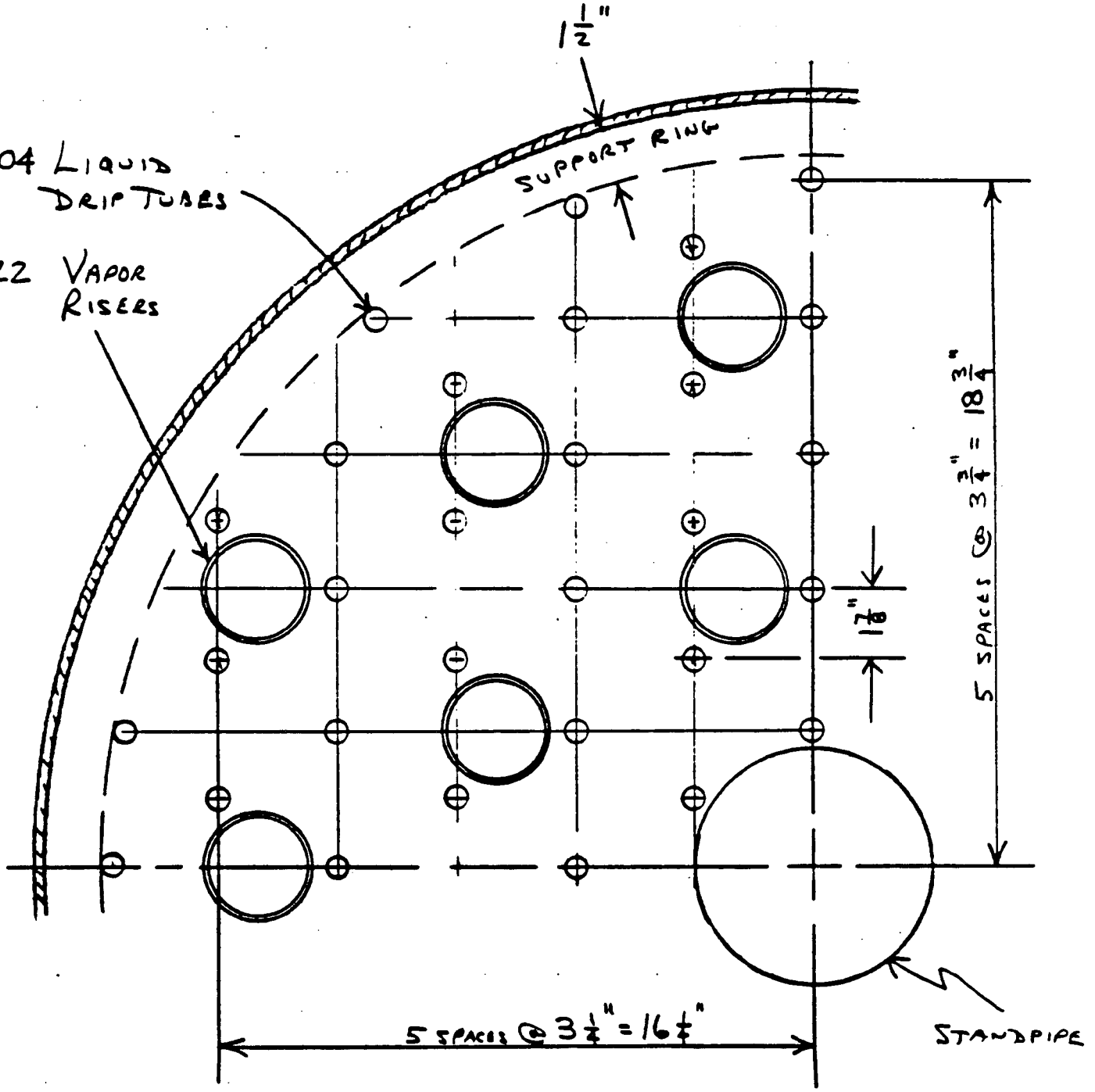
G-46 REV. 5-77 ENGINEERING DUPONT COMPUTATION SHEET SHEET NO _____

TITLE OF PROJ OR STUDY GROUNDWATER STRIPPER PROJ OR STUDY NO _____

SUBJECT LIQUID DISTRIBUTOR WORKS NIAG FALLS

COMPUTER M.E. MECKLEY DATE 9-9-86 19 _____

TOWER I.D. = 42"
SUPPORT RING = 1.5"



ABOVE PATTERN GIVES 104 PTS/PLATE ⇒ 10.8 PTS/FT² ✓

SKETCH D-05002 SHT
REV. A

USE STANDARDS FOR MINIMUM ESSENTIAL INSTALLATIONS

G-44 REV. 5-77

ENGINEERING DUPONT COMPUTATION SHEET

SHEET NO

TITLE OF PROJ OR STUDY GROUNDWATER STRIPPER

PROJ OR STUDY NO

SUBJECT LIQUID DISTRIBUTOR

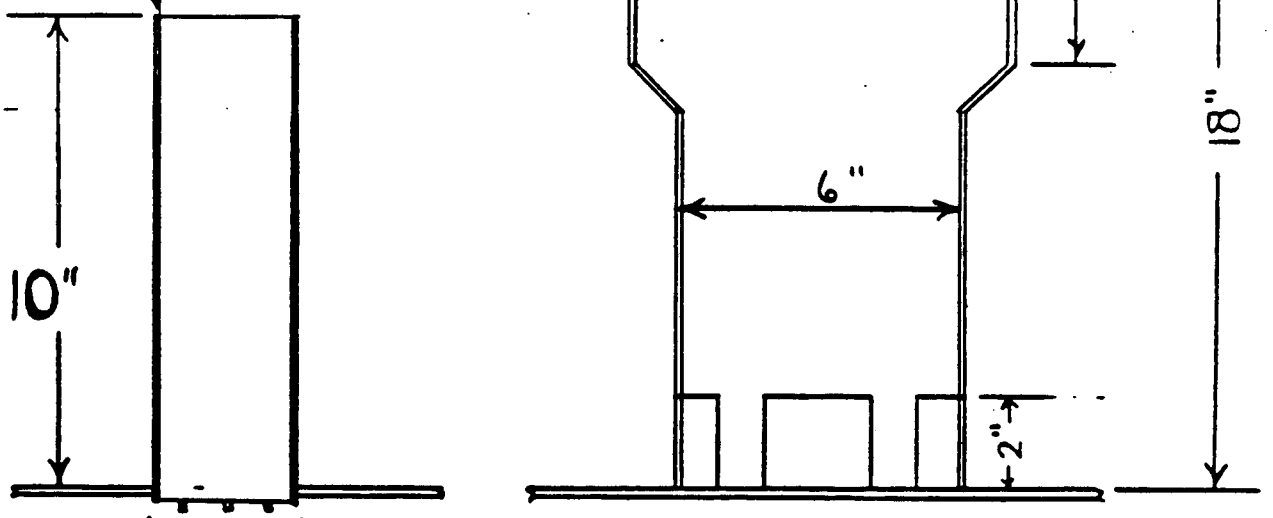
WORKS NIAGARA FALLS

VAPOR RISERS & STANDPIPE

COMPUTER M. E. MECKLEY DATE 9-9-86 19

1 LIQUID FEED STANDPIPE, 304SS SCH 40S

22 VAPOR RISERS 3" O.D. 12 GAUGE, 304 SS, ROLLED INTO DECK PLATE



3 ANTI-MIGRATION BARS EQUALLY SPACED PER RISER

6 1" WIDE EQUALLY SPACED SUPPORT LEGS ON BOTTOM OF STANDPIPE & WELDED TO TRAY. ORIENT LEGS TO LINE UP WITH 6 NEAREST DRIP TUBES.

SKETCH D-05002 SHT. 2 REV A

G-44 REV. 5-77

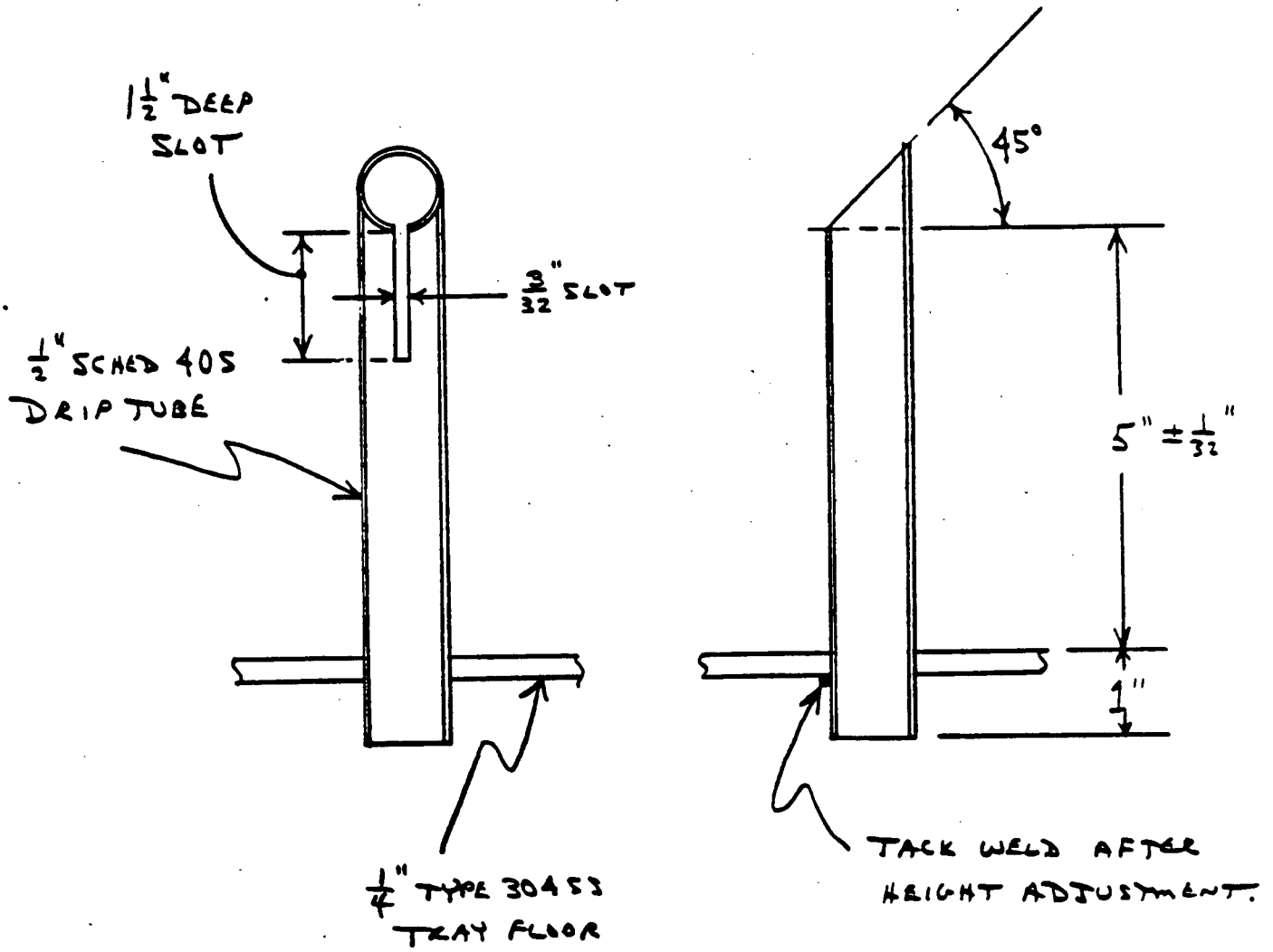
ENGINEERING DUPONT COMPUTATION SHEET

SHEET NO _____

TITLE OF PROJ. OR STUDY GROUNDWATER STRIPPER PROJ. OR STUDY NO _____

SUBJECT LIQUID DISTRIBUTOR WORKS NIAGARA

LIQUID DRIP TUBE DETAIL COMPUTER M E MECKLEY DATE 9-9-86 19



NOTE: BOTTOM 1½" OF DRIP TUBES TO BE STRAIGHT MACHINE THREADS. HOLES IN TRAY FLOOR TO BE TAPPED.

SKETCH D-05002 SHT. 3 REV. A

Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 4 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0802
Item or Service See Below

Inspection Activity	Instruction
	ASME Code Section VIII, Div. 1 Inspection and Stamp Required.
Qty-Item-No One (1)	Tank - Carbon Steel EN 880-12-1 Stripping Tower
NOTES: 1.	Inspection DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed. When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders. The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608. The Vendor shall assure that applicable documents that require SCC/ DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: W. Lehner Date 23 January 1987

Stearns Catalytic	Inspection Planning Data Sheet	Sheet 2 of 4 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0802
Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers. The following documentation is to be provided by the Vendor: 1. Procedure(s) 1. Welding 2. Welder Qualification 2. Report(s) 1. Mill Test 2. Manufacturer's Data 3. Inspection Documentation 4. Radiograph Reader Sheet(s) 5. Nameplate(s) Rubbing(s)
2.	Inspection Meeting The QAFR shall visit the Vendor's shop to review the requirements of this Inspection Planning Data Sheet with Vendor shop personnel.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 4.
4.	Carbon Steel Tank(s) Preliminary - Prior to Fabrication
1. Verify	Welding procedure(s) is approved by SCC.
2. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item in accordance with the SCC approved Vendor's welding procedure(s).
3. Verify	Quality control and inspection procedure(s) are employed to assure strong ductile welds.
4. Verify	In-process materials are controlled and identified to provide traceability to the Mill Test Report(s).

Prepared by: W. Lehner Date 23 January 1987

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 4 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0802
Item or Service See Sheet 1

Inspection Activity	Instruction
	Intermediate - In Progress
5. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's welding procedure(s).
6. Witness	A fit-up of a circumferential joint and a nozzle joint.
7. Witness	The magnet test of the stainless steel material(s) of construction.
8. Witness	Fabrication is in accordance with the SCC Spec., the DuPont Std. and the SCC approved Vendor's drawing(s).
9. Inspect	All connections are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
10. Inspect	All welds to assure compliance to the SCC approved Vendor's welding procedure(s).
11. Inspect	General quality of workmanship - no burrs, no sharp edges, clean welds, etc.
12. Inspect	Overall dimensions are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
13. Witness	Liquid penetrant tests and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s), as required.
14. Verify	Radiograph reader sheets and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
15. Witness	The hydrostatic test in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
16. Verify	Listed item(s) are drained, dried and cleaned, internally and externally after hydro.

Prepared by: W. Lehner Date 23 January 1987

Steams Catalytic	Inspection Planning Data Sheet	Sheet 4 of 4 Control No. Rev. 1

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0802
Item or Service See Sheet 1

Inspection Activity	Instruction
	Final - Prior to Shipment
17. Verify	The following are in accordance with the SCC Spec., the DuPont Std(s) and the SCC approved Vendor's drawing(s): 1. Gaskets, Grating and Grating Anchors 2. Handrails 3. Insulation Supports and Internals 4. Ladder Cages, Ladder Details and Lifting Lugs 5. Manways and Manway Davits 6. Nozzles 7. Platforms 8. Skirt Support 9. Vortex Breaker
18. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventative in accordance with the SCC Spec. and the DuPont Std.
19. Witness	Ferrous metal exterior surface preparation and painting is in accordance with the SCC Spec. and the DuPont Spec.
20. Witness	Preparation for shipment and assure the following: 1. Desiccant installation and tag location, as required. 2. All openings sealed, as required. 3. Skidding and/or packaging is provided and identified, as required.

Prepared by: W. Lehner Date 23 January 1987

SPECIFICATION 39950-0800-0803

PLANT: Niagara
PROJECT: 113592
SPEC.: 02-803
REVISION: A
DATE: 20 January 1987

1.0 IDENTIFICATION

EN Number	Quantity	Description
880-20-1	1	Organics Storage Tank

2.0 SCOPE

This specification defines requirements for the design and fabrication of one storage tank.

3.0 DESCRIPTION

Organics Storage Tank: Vertical vessel, 4'-0" O.D. x 3'-6" TL/TL with ASME torispherical heads and constructed of carbon steel. Design, fabrication and inspection shall be per current ASME Pressure Vessel Code, Section VIII, Division 1, and Du Pont standards and specifications. Vessel to be furnished complete with all nozzles, internal pipes and support legs, all in accordance with Drawing F-08003 and references thereon.

4.0 GENERAL

4.1 All notes, instructions, etc., included on the drawings are made part of this specification. Design, fabrication and inspection shall be in accordance with the current ASME Pressure Vessel Code, Section VIII, Division 1 and Du Pont standards and specifications.

ASME National Board Code stamping is required.

4.2 Calculations, Welding Procedures (WSP) and Welder Qualifications (PQR) shall be furnished along with initial submission of drawings for approval. All thicknesses, reinforcements, supports, etc., shall be verified by calculations. Thicknesses shown on control drawings shall be considered as minimum.

4.3 Du Pont inspection of equipment is required prior to shipment.

4.4 Vendor is released to purchase all materials on placement of order.

4.5 Nozzle bolt holes shall straddle the vessel 0°-180° centerline or its parallel for horizontal nozzles and the vertical centerline for vertical nozzles.

4.6 Gaskets, bolts and nuts for shell, head, manhole and blind flanges shall be furnished by the Vendor.

4.7 Vendor shall identify all subcontractor supplied parts and accessories with manufacturer's name and address and shall submit documentation for Stearns Catalytic and/or Du Pont approval.

4.8 All vessels shall have lifting lugs for handling per Specification SG4C.

4.9 Vendor shall furnish all data and drawings as indicated in Paragraph 7.0 and as indicated on the attached "Vendor Data Requirements".

5.0 STANDARDS AND SPECIFICATIONS

Du Pont Spec. SG1S	-	Fabrication
Du Pont Spec. SU2A	-	Gaskets
Du Pont Spec. SG4C	-	Lifting Lugs
Du Pont Std. G1C	-	Nozzle Construction
Du Pont Std. G10C	-	Manway
Du Pont Std. G15.1C	-	Manway Davit
Du Pont Std. G12D	-	Insul. Supports
Du Pont Std. G6B	-	Structural Leg Supports
Du Pont Spec. 8572 (Sheet #16)	-	Painting System 213X

Drawings

F-08003 - Rev. A

6.0 INSPECTION

Inspection will be made by Du Pont Quality Assurance Field Representative (QAFR) and inspection procedures are given in the Inspection Planning Data Sheets attached for each vessel. Some of the inspection items that will be checked are noted for each visit. Visit requests are not necessarily in chronological order.

7.0 YOUR QUOTATION MUST STATE YOUR SCHEDULE FOR SUBMITTING DRAWINGS AS FOLLOWS:

Design Approval Drawings in weeks after receipt of order.
Final Drawings in weeks after return of all Design Approval Drawings.

7.1 One reproducible* of Design Approval Drawings required.
One reproducible* of Final Drawings required.

*Two legible copies may be submitted for 8-1/2" x 11" or 11" x 17" drawing.

7.2 All drawings, drawing transmittal letters and correspondence must show the following identification:

Plant:	Niagara
Project:	113592
Du Pont Order No.:	
EN Numbers:	880-20-1

7.3 The following information is required for approval:

Layout and orientation.	Connection locations and types.
Overall dimensions, weights and materials.	Weld details (WP/PQR).
	Seam locations.
Mounting or foundation dimensions.	Internal details.
	Calculations.
Critical tolerances and finishes.	Nameplate data.

7.4 Design Approval Drawings

These drawings must be submitted before we will release start of fabrication. One print of each drawing will be returned stamped "Approved", "Approved as Noted", or "Not Approved". Fabrication will be released according to a note on the transmittal letter covering the returned prints. Upon receipt of all "Approved" and "Approved as Noted" drawings, vendor shall revise to include all changes and return for our use as Final Drawings. "Not Approved" drawings must be corrected and re-submitted for approval.

7.5 Final Drawings

These drawings are for Du Pont design and construction purposes.

a002-1264P

PAGE _____ OF _____

CLIENT DuPont

FOR INQUIRY NO. _____

FOR PURCHASE ORDER NO. _____

CLIENT REFERENCE NO. .

VENDOR DATA REQUIREMENTS

DRAWINGS AND DATA REQUIRED	Copies with Bid	REPRO Copies for Appr'l.	Date Due	After Approval: Cer. Cop. of Pts.	After Approval: Repro. Tracing	Date Due	Copies Reqd w/o App'l.	Date Due	NOTES
1. DIMENSIONED OUTLINE DRAWINGS		1		2*	1				
2. CROSS SECTIONAL DRAWINGS		1		2*	1				
3. COMPONENT AND/OR DETAIL DRAWINGS		1		2*	1				
4. ASSEMBLY AND/OR ERECTION DRAWINGS		1		2*	1				
5. FOUNDATION DIAGRAMS AND LOADING REQUIREMENTS									
6. SCHEMATIC PIPING DRAWINGS									
7. SCHEMATIC WIRING DIAGRAMS									
8. DETAILED PARTS LIST									
9. RECOMMENDED SPARE PARTS FOR ONE YEAR'S NORMAL MAINTENANCE WITH PRICES									
10. INSTALLATION, OPERATION, MAINTENANCE AND LUBRICATION MANUALS									
11. COMPLETED EQUIPMENT DATA SHEETS, AS NOTED									
12. RIVET AND BOLT ERECTOR'S LIST									
13. RIVET AND BOLT SUMMARY LIST									
14. PERFORMANCE CURVES									
15. CATALOG INFORMATION, CUTS, ETC.									
16. MANUFACTURER'S INSPECTION AND DATA REPORTS							3		f
17. MILL TEST CERTIFICATES							3		f
18. WELDING PROCEDURES AND PROCEDURE QUALIFICATION TEST RECORDS		2*		2*					f
19. FACSIMILE OR RUB-OFF OF STAMPING							5		f
20. SHIPPING SCHEDULE, SHIPPING MEMORANDUM AND/OR PACKING LIST							3		f
21. WEIGHT LIST OF FABRICATED PARTS AND/OR UNIT SHIPPING WEIGHT									
22. VENDOR'S CALCULATIONS		2*		2*					
23.									
24. * TWO LEGIBLE COPIES MAY BE SUBMITTED FOR 8½" x 11" OR 11" x 17" DRAWING.									

f Date indicated must be furnished when material or equipment is ready for inspection or shipment.

GENERAL NOTES: 1. Drawings and data "For Approval" are required within two weeks after order is placed.
2. "Certified Correct" data and drawings are required within two weeks after return of "For Approval" data and dra
3. Cost of above data must be included in quotation.

E. D. Baldi

39582-3/86P (35)

Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0803
Item or Service See Below

Inspection Activity	Instruction
	ASME Code Section VIII, Div. 1 Inspection and Stamp Required.
Qty-Item-No One (1)	Tank - Carbon Steel EN 880-20-1 Organics Storage
NOTES: 1.	Inspection DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed. When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders. The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608. The Vendor shall assure that applicable documents that require SCC/ DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: W. Lehner Date 23 January 1987

Steams Catalytic	Inspection Planning Data Sheet	Sheet 2 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0803
Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers. The following documentation is to be provided by the Vendor: 1. Procedure(s) 1. Welding 2. Welder Qualification 2. Report(s) 1. Mill Test 2. Manufacturer's Data 3. Inspection Documentation 4. Radiograph Reader Sheet(s) 5. Nameplate(s) Rubbing(s)
2.	Inspection Meeting The QAFR shall visit the Vendor's shop to review the requirements of this Inspection Planning Data Sheet with Vendor shop personnel.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 4.
4.	Carbon Steel Tank(s) Preliminary - Prior to Fabrication
1. Verify	Welding procedure(s) is approved by SCC.
2. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item in accordance with the SCC approved Vendor's welding procedure(s).
3. Verify	Quality control and inspection procedure(s) are employed to assure strong ductile welds.
4. Verify	In-process materials are controlled and identified to provide traceability to the Mill Test Report(s).

Prepared by: W. Lehner Date 23 January 1987

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 4 Control No. Rev. 0

☒ Source Inspection

Inspection Level 1

P.O. Number

Project/Spec. No. 113592/02 39950-0800-0803

Item or Service See Sheet 1

Inspection Activity	Instruction
	Intermediate - In Progress
5. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's welding procedure(s).
6. Witness	A fit-up of a circumferential joint and a nozzle joint.
7. Witness	The magnet test of the stainless steel material(s) of construction.
8. Witness	Fabrication is in accordance with the SCC Spec., the DuPont Std. and the SCC approved Vendor's drawing(s).
9. Inspect	All connections are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
10. Inspect	All welds to assure compliance to the SCC approved Vendor's welding procedure(s).
11. Inspect	General quality of workmanship - no burrs, no sharp edges, clean welds, etc.
12. Inspect	Overall dimensions are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
13. Witness	Liquid penetrant tests and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s), as required.
14. Verify	Radiograph reader sheets and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
15. Witness	The hydrostatic test in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
16. Verify	Listed item(s) are drained, dried and cleaned, internally and externally after hydro.

Prepared by: W. Lehner Date 23 January 1987

Steams Catalytic	Inspection Planning Data Sheet	Sheet 4 of 4 Control No. Rev. 0

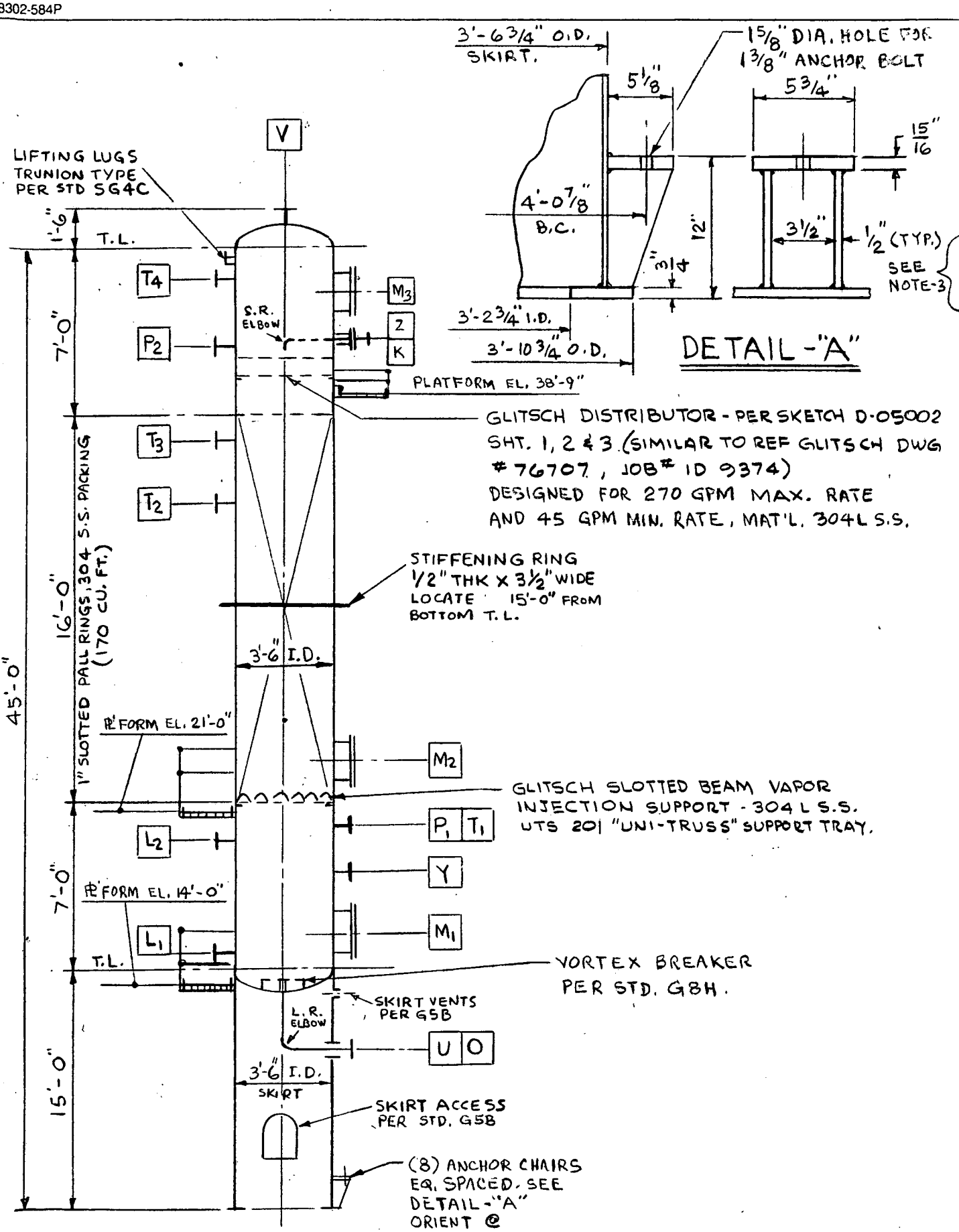
☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0803
Item or Service See Sheet 1

Inspection Activity	Instruction
	Final - Prior to Shipment
17. Verify	The following are in accordance with the SCC Spec., the DuPont Std(s) and the SCC approved Vendor's drawing(s): 1. Gaskets 2. Insulation Supports and Internal 3. Lifting Lugs 4. Manway and Manway Davit 5. Nozzles 8. Structural Leg Support
18. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventative in accordance with the SCC Spec. and the DuPont Std.
19. Witness	Ferrous metal exterior surface preparation and painting is in accordance with the SCC Spec. and the DuPont Spec.
20. Witness	Preparation for shipment and assure the following: 1. Desiccant installation and tag location, as required. 2. All openings sealed, as required. 3. Skidding and/or packaging is provided and identified, as required.

Prepared by: W. Lehner Date 23 January 1987

08302-584P



NOZZLE SCHEDULE

MK	SIZE	SERVICE	PROJ.	ELEV.	ORIENT
Z	4"	LIQ. INLET W/ INT. PIPE	3'-0"		
Y	8"	VAP. INLET	2'-6"		
K	8"	MOUNT FOR "Z"	2'-6"		
L_1	3"	LEVEL CONN.	2'-6"		
L_2	3"	↓			
M_1	22"	MANWAY W/ DAVIT			
M_2	22"	↓			
M_3	22"	↓			
P_1	2"	PRESSURE CONN.			
P_2	2"	↓			
T_1	2"	THERMOCOUPLE CONN.			
T_2	2"	↓			
T_3	2"	↓			
T_4	2"	↓			
U	6"	LIQUID OUTLET	↓		
V	3"	VAPOR OUTLET	SEE DWG	SEE DWG	& TOP
O	10"	OPENING FOR "U"	BANDED		

NOTES:

1. BOLTING MAT'L. SA-193 GR.B7 HEX NUTS, SA-194 GR.2H
2. ALL NOZZLES SHALL BE FLUSH WITH INSIDE OF VESSEL EXCEPT AS NOTED.
3. VESSEL VENDOR TO FURNISH THREE (3) 180° PLATFORMS AND CAGED LADDERS IN ACCORDANCE WITH OSHA REQUIREMENTS AND DUPONT STDS B9Y, B2W, B3W, B3V, SB4X, B6Y
4. MANWAYS TO BE PER DUPONT STD. G10C WITH FLG. MAT'L. PER SA516 GR.60 & BOLTS PER SA193 GR.B7 W/ SA194 GR.2H HEX NUTS.
5. HYDRO TEST PRESS:
   (a) VESSEL IN VERTICAL POSITION AND GAGE AT TOP, P = 1.5 x DES. PRESS. x STRESS RATIO = 45 PSIG.
   (b) VESSEL IN VERTICAL POSITION & GAGE AT BOTTOM OR VESSEL IN HORIZONTAL POSITION: P = 1.5 x DES. PRESS. x STRESS RATIO + H.H. = 58 PSIG.

Design conditions
FULL VAC & 30 psig 360 °F
psig °F
Operating conditions 3 psig 217° F.
psig °F
Specified corrosion allow 1/16"

Wind load NY STATE UNIFORM FIRE PREV. & BUILDING CODE 1984 (75 MPH)
Seismic ZONE 2, ANSI A-58.1-1982
Code 1986 ASME SEC. VIII DIV 1 Code Stamp YES
Nat'l Board Stamp YES
PW.H.T. — Radiography SPOT
MAWP — Limited by —
Shell spec. SA-516 GR. 70 3/8" THK
Joint eff. 85 %
Head spec. SA-516 GR. 70 3/8" MIN. THK. ASME 2:1 ELLIPSOIDAL HEADS
Joint eff. 100 % (ALLOW. STRESS 85 %)
Cladding or lining spec. NONE
Gasket spec. SU2A CODE G-1
Support spec. SA-516 GR. 70 3/8" THK.
External pipe spec. SA-106 GR B
Internal pipe spec. SA-106 GR B
Flange spec. SA-105 (SEE NOTE-4)
Rating 150 # ANSI (GIC TYPE D, SLIP-ON)
Facing R.F.
Paint PER PAINT SPEC 8572 (SEE INQ.)
Insulation HC 2 1/2 THK. (C27) (BY OTHERS)
Fireproofing NONE
Shipping wt. 9500 LBS. Max. wt. 41200 LBS.
Elevation measured from baseline SEE DWG
Orientation measured clockwise from 0°. North is 0°.
Projection measured from ℄ of vessel to extreme face of flange.
Capacity 2240 GALS Sp. gr. 1.0
Operating wt. = 33,400 LBS
References: SPEC. 8572, SYSTEM 213X, 207V, 170W

DUPONT		
SPEC	SG15	FABRICATION
SPEC	SU2A	GASKETS
SPEC	SG4C	LIFTING LUGS
STD.	G1C	NOZZLE CONSTR.
STD	B9Y, B2W, B3W, B3V, SB4X, B6Y	LADDER/PLATF.
STD.	G10C & G15.1C	MANWAY & DAVIT
STD	G12D	INSUL. SUPPORTS
STD	G5B	SKIRT SUPPORT
STD	G8H	VORTEX BREAKER

ITEM NO. 880-12-1 ONE (1) REQUIRED

DR BY	AR	6/29/86
CH BY	DH	10/14/86
APPD		
APPD		
APPD		
APPD		
INQ. NO.	0802	
REQ. NO.		

STEARNS CATALYTIC CORPORATION
Engineering Department, Philadelphia, PA

E. I. DUPONT DE NEMOURS & CO.
REMEDIATION PROJECT, NIAGARA, NY

STRIPPING TOWER

REV	DATE	RECORD OF ALTERATIONS	BY	APPD	APPD
A	9/16/86	FOR APPROVAL	DH		

SCALE	CONTRACT NO	JOB NO.	DRAWING NO.	REV NO.
—	39950	113592	F-05002	A

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(4801E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0600-0601

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

HEAT EXCHANGER - SHELL AND TUBE

CONSISTING OF

Reference Attachments:

SCC Spec. No. SP-2200-S31 - Insulation Supports for Heat Exchangers
Du Pont Spec. No. SG1E - Shell and Tube Heat Exchangers for Process Service

Item Number	Description
EN 880-14-1	Overheads Condenser
EN 880-20-2	Secondary Condenser

Approved _____ Date _____
CLIENT

Approved _____ Date _____

Approved V.R.W. Date Aug. 26, 1986
STEARNS CATALYTIC

Prepared By T. D. Tietz
STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

HEAT EXCHANGER - SHELL AND TUBE SPECIFICATION NO. 39950-0600-0601

TABLE OF CONTENTS

HEAT EXCHANGER - SHELL AND TUBE

SPECIFICATION NO. 39950-0600-0601

1.00 SCOPE

1.01 This specification, plus individual Heat Exchanger Data Sheets, and all references noted thereon, covers the design, material, construction, workmanship, inspection and testing of general service heat exchangers.

1.02 The following will be furnished by others:

A. Installation

B. Foundation and anchor bolts

C. Piping and pipe supports to equipment boundaries

D. Insulation.

2.00 REFERENCE STANDARDS

2.01 The following industry, association and government codes and standards shall be followed as applicable to the design, fabrication, assembly and testing of all equipment furnished under this specification.

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code:

Section II - Material Specifications
Section V - Non-Destructive Examination
Section VIII - Pressure Vessels
Section IX - Welding & Brazing Qualifications

Tubular Exchanger Manufacturer's Association (TEMA) Standards.

2.02 The issues or revisions of these documents in effect on the date of the Vendor's proposal shall apply. These shall include all code cases, supplements, and addenda.

3.00 PERFORMANCE CRITERIA

3.01 The performance of the unit shall be as described on the attached Heat Exchanger Data Sheet(s).

3.02 Upon award of a purchase order, vendor shall verify the designs specified on the data sheets and guarantee thermal design and pressure drop.

4.00 DESIGN DETAILS

4.01 General Requirements

4.01.1 All process shell and tube heat exchangers shall be designed, constructed, inspected and tested in accordance with this specification including requirements of all references.

4.01.2 In the event of conflicts, the requirements of the data sheets shall govern.

4.01.3 Vendors shall notify the Purchaser of all conflicts and/or deviations from good design practice.

4.01.4 Exchangers shall meet the requirements of TEMA Class "B", Chemical Process Service.

4.01.5 Specified shell sizes are approximate. Vendor shall be responsible for sufficient shell diameter to accommodate number of tubes required as well as impingement plates and inlet and outlet velocity limits.

4.02 Materials

4.02.1 The materials of construction for exchanger components shall be indicated on the data sheets.

4.02.2 Materials shall conform to the specification tabulated in the TEMA standards and subject to use as limited by the ASME Code.

4.02.3 No asbestos or asbestos-containing material shall be used in the exchangers.

4.03 Mechanical

4.03.1 Shell and tube side components shall be designed for the temperatures stated on the data sheets, components subject to both shell and tube side temperatures shall be designed for maximum operating metal temperature plus 50°F.

4.03.2 Exchanger parts normally shall be designed for full design pressures. In the event that differential pressure is permitted for design, the data sheets will so state.

4.03.3 Fixed tube sheet units shall be provided with a shell expansion joint when either of the following conditions would result in over-stressing of components and/or the loosening of the joints between tube and tube sheet:

A. Operating conditions including start-up and shut-down.

B. Failure of one stream.

4.03.4 Flanged and flued type expansion joints are preferred. The expansion joints shall be designed for a minimum of 500 cycles at full temperature and pressure. Vendor shall provide complete expansion joint design with movements peak combined stresses and predicted cycle life for approval prior to material procurement.

4.03.5 Tube bundles and shell sizes shall be standardized for maximum interchangeability within practical limits.

4.03.6 Vendor shall design all tube bundles to preclude flow-induced vibrations or sonic vibrations. Support or baffle plate spacing may be closer than TEMA minimum if necessary to prevent vibrations.

4.03.7 The inner row of U-tubes may be angled to reduce the distance between the inner row of tubes providing continuous cleaning lanes are maintained for square pitch bundles.

4.03.8 When seal or strength welding of the tube-to-tube sheet is specified, the sequence of fabrication shall be: center tube in the tube sheet hole by lightly expanding or drifting, weld, and final roll. The weld shall be examined using the dye penetrant method in accordance with ASME Code Section VIII after the final roll. Where halide or freon leak testing is specified, it shall precede the final roll.

4.03.9 High point vents and low point drains shall be provided on both shell and tube sides. These vents and drains connections shall be 3/4 inch FNPT (minimum). Vertical units shall have a tube sheet vent. The vent hole shall be drilled from the edge of the upper tube sheet through to the shell side of the exchanger. The hole shall be threaded at the tube sheet edge with a 1/4 inch FNPT. Vent and drain connections shall be fitted with non-galling plugs.

4.03.10 All exchangers shall be complete with supports or saddles. Multiple shell units shall be designed for stacking. Shells of lower units shall be designed to preclude distortion or buckling due to the weight of upper shells when in their corroded condition.

4.03.11 Lifting devices shall be furnished in accordance with TEMA Para. G7.2. This shall apply in general to all individual items with a weight in excess of 60 pounds.

4.03.12 Insulation supports shall be furnished if specified on the Heat Exchanger Data Sheet.

4.03.13 Reinforcing pads, when required, shall be made of the same or similar material as the shell and shall be furnished with tapped telltale holes. Where savings may be affected by the use of carbon steel reinforcing pads, alternate quotations may be submitted.

4.03.14 Where feasible, exchanger removable bundles in corrosive service shall be designed for 180° rotation to prolong life.

4.03.15 Removable tube bundles with shell side fouling factors of .0025 or greater shall use a square tube pattern. Pattern shall be rotated for all but boiling service shell side, or condensing tube side. Other services shall use triangular pitch as standard.

4.03.16 Shell baffles shall be notched to permit complete shell drainage.

4.03.17 Bonnet/channel connections shall be located to permit withdrawal of shell body flange studs.

4.04 Thermal

4.04.1 Fouling allowances shown on the data sheet are the minimum acceptable.

4.04.2 For all units, particularly those with extended surface, the tube side fouling factor specified is to be multiplied by the outside surface/inside surface ratio in the calculations of the overall heat transfer rate.

4.04.3 The guaranteed pressure drops shall be stated for clean and fouled conditions.

4.04.4 The number of tubes in any pass shall be plus or minus 10% of the total number of tubes divided by the number of passes.

4.04.5 For exchangers with U-tubes, the bend surface shall not be considered effective when calculating the heat transfer area.

4.04.6 Total amount of heat exchanged shall be as specified on the attached Heat Exchanger Data Sheet(s). The units of heat exchanged are BTU/HR.

4.05 Welding

4.05.1 Vendor shall submit welding procedures for approval prior to start of fabrication. Vendor shall qualify tube-to-tube sheet seal weld and alloy facing weld procedures as well as code required weld procedures. The Vendor shall submit a mockup of tube-to-tube sheet welds and rolls to Du Pont for approval prior to start of fabrication. Refer to inspection brief for details.

4.05.2 Shell radiograph, when required by the ASME Code, shall meet the following minimum requirements:

A. One spot radiograph for each circumferential seam.

B. One spot radiograph for each longitudinal seam.

C. Location of the spot radiographs will be selected by the Purchaser's Inspector or by the Code Agency Inspector.

4.05.3 When the component is other than all carbon steel, that is, all or part alloy steel, non-ferrous metal or composite materials (clad or lined), the Bidder shall furnish full information on the proposed fabrication, qualification of welding procedures, heat treatment, examination of welds, methods and extent of attachment, if requested.

4.05.4 Backing strips must be removed before final assembly.

5.00 INSPECTION

5.01 The Owner/Engineer's inspector shall have free entry to parts and/or areas of the manufacturer's shop where work on the equipment is performed.

5.02 Acceptance by the Owner/Engineer's inspector shall not relieve the manufacturer of responsibility for warranty and performance guarantees.

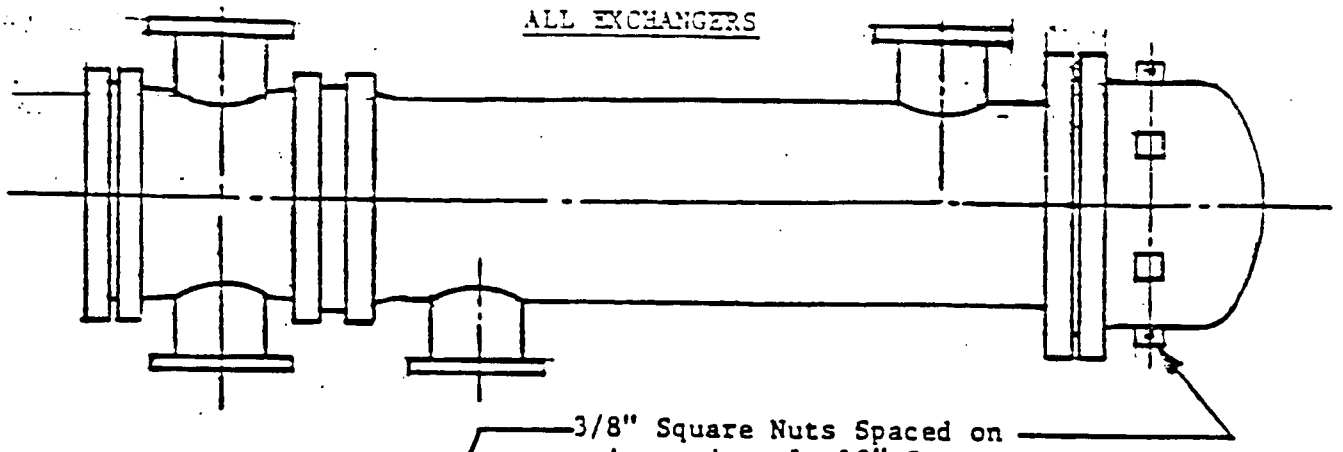
5.03 The Owner/Engineer's inspector will witness hydrostatic tests. Five days notice prior to testing shall be given.

STEARNS CATALYTIC CORP.
ENGINEERING DEPARTMENT

INSULATION SUPPORTS FOR
HEAT EXCHANGERS

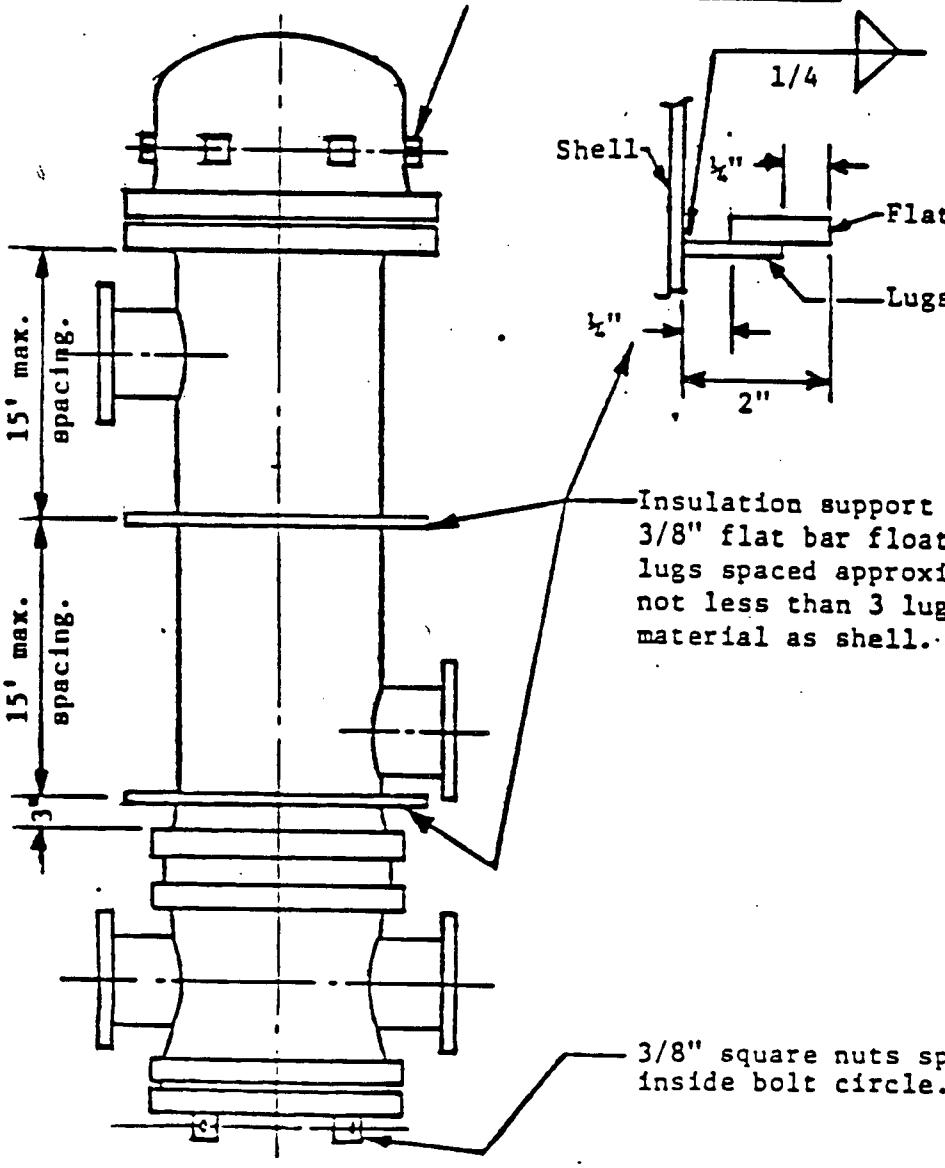
SPECIFICATION SP-2200-S31
Rev.0; dated 11 October 1984

ALL EXCHANGERS



3/8" Square Nuts Spaced on Approximately 12" Centers

VERTICAL EXCHANGERS SIZED 18" O.D. AND LARGER



Insulation support consisting of continuous 3/8" flat bar floating on 3/8" x 3" wide lugs spaced approximately 3'-0" apart, not less than 3 lugs. Make lugs of same material as shell.

3/8" square nuts spaced on 12" centers inside bolt circle.

Steams Catalytic Corporation
Engineering Department

08414-177P

HEAT EXCHANGER DATA SHEET

1	Contract Number	39950	Item Number 880-14-1	Specification No. 39950-0600-060
2	Client	E.I. DUPONT		Requisition No.
3	Location	NIAGARA FALLS, N.Y.		Number Required ONE(1)
4	Unit or Area	PRIMARY CONDENSER		By JDB Date 8/15/86
				Revision 1 By JDB/H&L Date 8/19/86
5	Manufacturer			
6	Size 6-72	Type BEM OR AEL	Horiz/Vert. Connected in	VERTICAL
7	Surface Per Unit 306 FT²	Shells per unit 1		Surface per shell

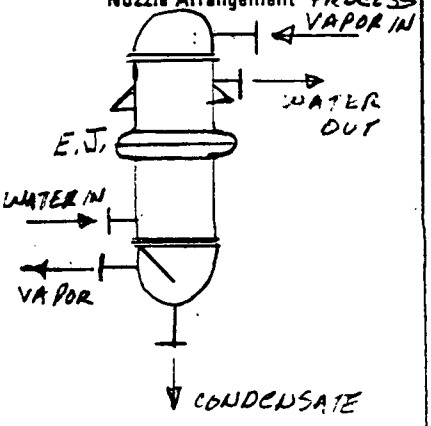
PERFORMANCE OF ONE UNIT

			SHELL SIDE	TUBE SIDE
8	Fluid Circulated		WATER	TOWER OVERHEADS
9	Total Fluid Entering	lb/hr.	11000	121
10	Vapor	lb/hr.		121
11	Liquid	lb/hr.	11000	
12	Steam	lb/hr.		
13	Non-Condensables	lb/hr.		5
14	Fluid Vaporized or Vapor Condensed	lb/hr.		116
15	Steam Condensed	lb/hr.		
16	Gravity-Liquid (Sp.Gr.)(A.P.I.)		1 @ 87 °F	@ °F
17	Viscosity	Centipoises	0.83 @ 87 °F	.01 @ 210 °F
18	Thermal Conductivity, BTU/(Hr.)(Sq.Ft.)(°F/Ft.)		0.36 @ 87 °F	.01 @ 210 °F
19	Molecular Weight - Vapors	in/		22.4
20	Specific Heat	BTU/(lb.)(°F)	1 @ °F	0.4 @ 210 °F
21	Latent Heat - Vapors	BTU/lb.		993
22	Temperature - In	°F	78	210
23	Temperature - Out	°F	90	86
24	Operating Pressure	PSIG	IN ~ 60	IN 1
25	Number of Passes per shell		1	1
26	Velocity	FT./SEC.		
27	Pressure Drop per unit	PSI	MAX. DESIGN 2	MAX. DESIGN NIL
28	Fouling Resistance	(Hr.)(Sq.Ft.)(°F)/BTU	.0015	.001
29	Heat Exchanged— BTU/Hr.	131,220	L.M.T.D. Corrected	102.5 °F
30	Transfer Rate - Service	42.77 BTU/(Hr.)(Sq Ft)(F)	Clean	138.2

CONSTRUCTION OF EACH SHELL

31	Design Pressure	PSIG	125			100# F.V.	
32	Test Pressure	PSIG	CODE			CODE	
33	Design Temperature	°F	250			250	
34	Corrosion Allowance		1/16"			1/16"	
35	Code Requirements	ASME SECT VIII	TEMA Class	B	Stamp Required	NAT BOARD	
36	Weights: Each Exchanger, Empty		Full of Water	~ 500#	Tube Bundle Only		
37	Tubes 90/10 CU-NI	No. 31	OD 5/8"	BWG 16	Length 6 FT	Pitch 7/8"	△
38	Tube Sheets: Stationary	CS	Thk	: Floating	—	Thk.	
39	Cross Baffles	CS	Type 3, SEGM.	Thk	Spacing 3"	% Cut 20	
40	Long Baffle	—	Type	Thk			
41	Tube Supports			Thk			
42	Baffle Spacers	CS	Size				
43	Tie Rods	CS	Size	5/1"			
44	Shell	CS	ID	OD 6 5/8	Thk .28"		
45	Shell Cover	—		Thk			
46	Floating Head Cover	—		Thk			
47	Channel or Bonnet	CS		Thk			
48	Channel Cover	CS		Thk			
49	Gaskets	G1	Tube/Tubesheet Joint	ROLLER EXPANDED			
50	Studs / NUTS:	SA 193-B7 / SA 194-2H	Sealing Strips - No. of Pairs	—			
51	Impingement Plate	—	Painting	SYSTEM 20?D			
52	Shell Connections - In	2"	Out 2"	Rating 150#	Type RF		
53	Channel Connections In	3"	Out 2"V, 2"L	Rating 150#	Type RF		
54	[redacted] Non-Removable" Tube Bundle		PROVIDE INSULATION NUTS				
55	Remarks: SR=Steam Relieved	X R=X Raved	& SHELL EXP. JOINT				

Nozzle Arrangement



Steams Catalytic Corporation
Engineering Department

08414-177P

HEAT EXCHANGER DATA SHEET

Page 1 OF 1

1	Contract Number	39950	Item Number	880-20-2	Specification No. 39950-0600-0601
2	Client	E.I. DUPONT			Requisition No.
3	Location	NIAGARA FALLS, N.Y.			Number Required ONE(1)
4	Unit or Area	SECONDARY CONDENSER			By JDB/TGL Date 8/15/86
					Revision ___ By ___ Date ___
5	Manufacturer				
6	Size	6-36	Type	BEM OR AEL	Horiz/Vert. Connected in VERTICAL
7	Surface Per Unit	156 FT²	Shells per unit	1	Surface per shell

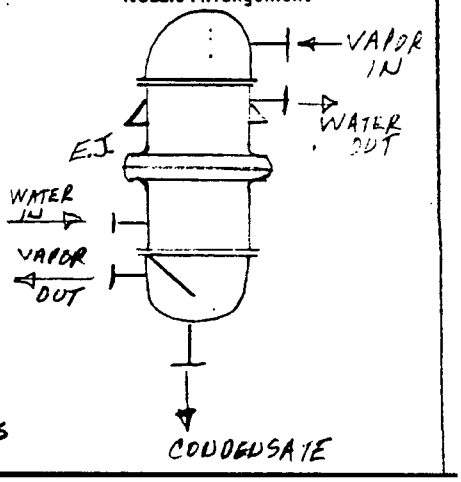
PERFORMANCE OF ONE UNIT

			SHELL SIDE	TUBE SIDE
8	Fluid Circulated		WATER	ORGANIC VAPORS
9	Total Fluid Entering	lb/hr.	1000	5
10	Vapor	lb/hr.		5
11	Liquid	lb/hr.	1600	
12	Steam	lb/hr.		
13	Non-Condensables	lb/hr.		3.7
14	Fluid Vaporized or Vapor Condensed	lb/hr.		1.3
15	Steam Condensed	lb/hr.		
16	Gravity-Liquid (Sp.Gr.)(A.P.I.)		1 @ 35 °F	@ °F
17	Viscosity	Centipoises	1.47 @ 35 °F	.01 @ 86 °F
18	Thermal Conductivity,	BTU/(Hr.)(Sq.Ft.)(°F/Ft.)	0.34 @ 35 °F	.01 @ 86 °F
19	Molecular Weight - Vapors	in/		43.7
20	Specific Heat	BTU/(lb.)(°F)	@ °F	0.2 @ 86 °F
21	Latent Heat - Vapors	BTU/lb.		1538
22	Temperature - In	°F	35	86
23	Temperature - Out	°F	37	41
24	Operating Pressure	PSIG	IN	IN
25	Number of Passes per shell		1	1
26	Velocity	FT./SEC.		
27	Pressure Drop per unit	PSI	MAX. , DESIGN 0.5	MAX. DESIGN N/A
28	Fouling Resistance	(Hr.)(Sq.Ft.)(°F)/BTU	.0015	.001
29	Heat Exchanged— BTU/Hr.	2000	L.M.T.D. Corrected	20.47 °F
30	Transfer Rate - Service	6.64 BTU/(Hr)(Sq Ft)(F)	Clean	28

CONSTRUCTION OF EACH SHELL

31	Design Pressure	PSIG	100			100 @ F.V.	
32	Test Pressure	PSIG	CODE			CODE	
33	Design Temperature	°F	250			250	
34	Corrosion Allowance		1/16"			1/16"	
35	Code Requirements	ASME SECT VIII	TEMA Class	B		Stamp Required	NAT. BOARD
36	Weights: Each Exchanger, Empty		Full of Water	~ 4000 lb		Tube Bundle Only	
37	Tubes	90/10 CU-NI	No. 31	OD 5/8"	BWG 16	Length 3 FT	Pitch 7/8" △
38	Tube Sheets: Stationary	CS	Thk	: Floating	—	Thk.	
39	Cross Baffles	CS	Type S. SEGM	Thk		Spacing 3"	% Cut 20
40	Long Baffle	—	Type	Thk			
41	Tube Supports	—		Thk			
42	Baffle Spacers	CS	Size				
43	Tie Rods	CS	Size	1/4"			
44	Shell	CS	ID	OD 6 1/8	Thk .28"		
45	Shell Cover	—		Thk			
46	Floating Head Cover	—		Thk			
47	Channel or Bonnet	CS		Thk			
48	Channel Cover	CS		Thk			
49	Gaskets	G1	Tube/Tubesheet Joint	ROLLER EXPANDED			
50	Studs/NUTS:	SA193-B7/SA194-2H	Sealing Strips - No. of Pairs	—			
51	Impingement Plate	—	Painting	SYSTEM 207D			
52	Shell Connections - In	2"	Out 2"	Rating 150#	Type RF		
53	Channel Connections In	2"	Out 2"V, 2"L	Rating 150#	Type RF		
54	[redacted] Non-Removable" Tube Bundle		; PROVIDE INSULATION NUTS				
55	Remarks: SR=Stress Relieved, XR=X-Rayed.		* SHELL EXP. JOINT				

Nozzle Arrangement



Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0601
Item or Service See Below

Inspection Activity	Instruction
	ASME Code Section VIII, TEMA Class B, Inspection Required.
Qty-Item-No Two (2)	Exchanger(s) - Shell and Tube Heat EN 880-14-1 EN 880-20-2
NOTES: 1.	Inspection DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed. When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders. The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608. The Vendor shall assure that applicable documents that require SCC/ DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: Hal W. Lehner Date 11 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 2 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0601
Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers. The following documentation is to be provided by the Vendor: 1. Manufacturers Data Reports 2. Mill Test Reports 3. Nameplate Rubbings 4. Weld Procedure(s) and Welder Qualifications 5. Mock-up Tube to Tubesheet Rolls 6. Radiographic Reader Sheets and Reports 7. Test Results and Report(s) 8. Spare Parts List for DuPont, Niagara
2.	Inspection Meeting The QAFR shall visit the Vendor's shop to review the requirements of this Inspection Planning Data Sheet with Vendor shop personnel.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 4.
4.	Shell and Tube Heat Exchanger(s) Preliminary - Prior to Fabrication
1. Verify	The submittal of the mock-up tube to tube sheet roll(s) for DuPont approval in accordance with the SCC Spec.
2. Verify	Design calculation(s) and welding procedure(s) have been approved by SCC.
3. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item(s) in accordance with the SCC Spec., the ASME Code and the SCC approved Vendor's welding procedure(s).
4. Verify	Quality control and inspection procedure(s) are employed to assure compliance with the SCC Spec.
5. Verify	In process material(s) is controlled and identified to provide traceability to the material documentation.

Prepared by: W. Lehner Date 11 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0601
Item or Service See Sheet 1

Inspection Activity	Instruction
	Intermediate - In Progress
6. Verify	The mock-up tube to tube sheet roll(s) has been approved by DuPont and/or SCC.
7. Verify	The tubes are seamless, cold drawn and heat treated per ASME/ASTM Standard(s). Obtain a certificate of compliance.
8. Verify	The eddy current test has been preformed in accordance with the material (ASME/ASTM) Standard(s). Obtain certified test result(s).
9. Verify	The air-underwater test at 150 psig. has been performed. No leaks allowed. Obtain certified test result(s).
10. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's welding procedure(s).
11. Witness	Fabrication is in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
12. Inspect	Welds to assure compliance to the SCC approved Vendor's welding procedure(s). Review the radiographic reader sheet(s).
13. Inspect	Tube sheet drilling, finish and flatness are in accordance with the SCC approved Vendor's drawing(s).
14. Inspect	The shell and tube bundle for general quality of workmanship - no burrs, no sharp edges, clean welds, clean rolls, etc.
15. Inspect	The shell and tube bundle that overall dimensions are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
16. Verify	External bundle and internal shell surfaces are cleaned - free of debris, dirt, oil, etc.
17. Witness	The installation of the tube bundle into the shell. Assure no damage occurs to the shell, baffle(s) and tubes.
18. Witness	The hydrostatic pressure test in accordance with the ASME Code, the SCC Spec. and the SCC approved Vendor's drawing(s).
19. Witness	The air test of the tube bundle. Test shall be in accordance with the DuPont Standard.

Prepared by: W. Lehner Date 11 December 1986

Stearns Catalytic	Inspection Planning Data Sheet	Sheet 4 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0601
Item or Service See Sheet 1

Inspection Activity	Instruction
20 Witness	The halide test of the tube sheet. Test shall be in accordance with the DuPont Standard. Final - Prior to Shipment
21. Verify	Bundle and shell have been drained dry.
22. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventive in accordance with the SCC Spec. and DuPont Standard.
23. Verify	Ferrous metal exterior surface preparation and painting is in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
24. Verify	Gasket(s) conform to the SCC Spec. and the SCC approved Vendor's drawing(s).
25. Witness	Preparation for shipment and assure the following: 1. Desiccant installation and location, as required. 2. All opening(s) sealed, as required. 3. Skidding and/or packaging is provided and identified, as required.

Prepared by: W. Lehner Date 11 December 1986

1.0 IDENTIFICATION

EN Number	Quantity	Description
880-14-2	1	Decanter

2.0 SCOPE

This specification defines requirements for the design and fabrication of one decanter.

3.0 DESCRIPTION

Vertical vessel, 18" O.D. x 18" TL/TL with ASME torispherical heads and constructed of unalloyed titanium. Design, fabrication and inspection shall be per current ASME Pressure Vessel Code, Section VIII, Division 1 and Du Pont standards and specifications. Vessel to be furnished complete with all nozzles, internal dip pipes and support lugs all in accordance with Drawing F-08004 and references thereon.

4.0 GENERAL

4.1 All notes, instructions, etc., included on the drawings are made part of this specification. Design, fabrication and inspection shall be in accordance with the current ASME Pressure Vessel Code, Section VIII, Division 1 and Du Pont standards and specifications.

ASME National Board Code stamping is not required.

4.2 Calculations, Welding Procedures (WSP) and Welder Qualifications (PQR) shall be furnished along with initial submission of drawings for approval. All thicknesses, reinforcements, supports, etc., shall be verified by calculations. Thicknesses shown on control drawings shall be considered as minimum.

4.3 Du Pont inspection of equipment is required prior to shipment.

4.4 Vendor is released to purchase all materials on placement of order.

4.5 Nozzle bolt holes shall straddle the vessel 0^{o}-180^{o} centerline or its parallel for horizontal nozzles and the vertical centerline for vertical nozzles.

4.6 Gaskets, bolts and nuts for shell, head, manhole and blind flanges shall be furnished by the Vendor.

4.7 Vendor shall identify all subcontractor supplied parts and accessories with manufacturer's name and address and shall submit documentation for Stearns Catalytic and/or Du Pont approval.

4.8 All vessels shall have lifting lugs for handling per Specification SG4C.

4.9 Vendor shall furnish all data and drawings as indicated in Paragraph 7.0 and as indicated on the attached "Vendor Data Requirements".

5.0 STANDARDS AND SPECIFICATIONS

Du Pont Spec. SG16S - Fabrication
Du Pont Spec. SW11N - Material
Du Pont Spec. SU2A - Gaskets
Du Pont Spec. SG4C - Lifting Lugs
Du Pont Std. G1C - Nozzle Construction
Du Pont Std. G12D - Insul. Supports
Du Pont Spec. 8572 (Sheet #16) - Painting System 213X

Drawings

F-08004 - Rev. A

6.0 INSPECTION

Inspection will be made by Du Pont Quality Assurance Field Representative (QAFR) and inspection procedures are given in the Inspection Planning Data Sheets attached for each vessel. Some of the inspection items that will be checked are noted for each visit. Visit requests are not necessarily in chronological order.

7.0 YOUR QUOTATION MUST STATE YOUR SCHEDULE FOR SUBMITTING DRAWINGS AS FOLLOWS:

Design Approval Drawings in weeks after receipt of order.
Final Drawings in weeks after return of all Design Approval Drawings.

7.1 One reproducible* of Design Approval Drawings required.
One reproducible* of Final Drawings required.

*Two legible copies may be submitted for 8-1/2" x 11" or 11" x 17" drawing.

7.2 All drawings, drawing transmittal letters and correspondence must show the following identification:

Plant:	Niagara
Project:	113592
Du Pont Order No.:	
EN Numbers:	

7.3 The following information is required for approval:

Layout and orientation.	Connection locations and types.
Overall dimensions, weights and materials.	Weld details (WP/PQR).
	Seam locations.
Mounting or foundation dimensions.	Internal details.
	Calculations.
Critical tolerances and finishes.	Nameplate data.

7.4 Design Approval Drawings

These drawings must be submitted before we will release start of fabrication. One print of each drawing will be returned stamped "Approved", "Approved as Noted", or "Not Approved". Fabrication will be released according to a note on the transmittal letter covering the returned prints. Upon receipt of all "Approved" and "Approved as Noted" drawings, vendor shall revise to include all changes and return for our use as Final Drawings. "Not Approved" drawings must be corrected and re-submitted for approval.

7.5 Final Drawings

These drawings are for Du Pont design and construction purposes.

CLIENT DuPont

FOR INQUIRY NO. _____

FOR PURCHASE ORDER NO. _____

CLIENT REFERENCE NO. .

VENDOR DATA REQUIREMENTS

DRAWINGS AND DATA REQUIRED	Copies with Bid	REPRO Copies for Appr'l.	Date Due	After Approval: Cer. Cop. of Prts.	After Approval: Repro. Tracing	Date Due	Copies Reqd. w/o App'l.	Date Due	NOTES
1. DIMENSIONED OUTLINE DRAWINGS		1		2*	1				
2. CROSS SECTIONAL DRAWINGS		1		2*	1				
3. COMPONENT AND/OR DETAIL DRAWINGS		1		2*	1				
4. ASSEMBLY AND/OR ERECTION DRAWINGS		1		2*	1				
5. FOUNDATION DIAGRAMS AND LOADING REQUIREMENTS									
6. SCHEMATIC PIPING DRAWINGS									
7. SCHEMATIC WIRING DIAGRAMS									
8. DETAILED PARTS LIST									
9. RECOMMENDED SPARE PARTS FOR ONE YEAR'S NORMAL MAINTENANCE WITH PRICES									
10. INSTALLATION, OPERATION, MAINTENANCE AND LUBRICATION MANUALS									
11. COMPLETED EQUIPMENT DATA SHEETS, AS NOTED									
12. RIVET AND BOLT ERECTOR'S LIST									
13. RIVET AND BOLT SUMMARY LIST									
14. PERFORMANCE CURVES									
15. CATALOG INFORMATION, CUTS, ETC.									
16. MANUFACTURER'S INSPECTION AND DATA REPORTS							3		f
17. MILL TEST CERTIFICATES							3		f
18. WELDING PROCEDURES AND PROCEDURE QUALIFICATION TEST RECORDS		2*		2*					f
19. FACSIMILE OR RUB-OFF OF STAMPING							5		f
20. SHIPPING SCHEDULE, SHIPPING MEMORANDUM AND/OR PACKING LIST							3		f
21. WEIGHT LIST OF FABRICATED PARTS AND/OR UNIT SHIPPING WEIGHT									
22. VENDOR'S CALCULATIONS		2*		2*					
23.									
24. * TWO LEGIBLE COPIES MAY BE SUBMITTED FOR 8½"x11" OR 11"x17" DRAWINGS.									

f Data indicated must be furnished when material or equipment is ready for inspection or shipment.

GENERAL NOTES:
1. Drawings and data "For Approval" are required within two weeks after order is placed.
2. "Certified Correct" data and drawings are required within two weeks after return of "For Approval" data and drawing
3. Cost of above data must be included in quotation.

Approval and certified vendor prints be forwarded to:
Stearns Catalytic Corporation, Centre Square West, 1500 Market St., Phila.,PA 19102 Attn: E. D. Baldi

Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0801
Item or Service See Below

Inspection Activity	Instruction
	ASME Code Section VIII, Div. 1 Inspection Required.
Qty-Item-No One (1)	Vessel - Titanium EN 880-14-2 Decanter
NOTES: 1.	Inspection DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed. When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders. The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608. The Vendor shall assure that applicable documents that require SCC/DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: W. Lehner Date 3 November 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 2 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0801
Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers. The following documentation is to be provided by the Vendor: 1. Procedure(s) 1. Welding 2. Welder Qualification 2. Report(s) 1. Mill Test 2. Manufacturer's Data 3. Inspection Documentation 4. Radiograph Reader Sheet(s) 5. Nameplate Rubbing(s)
2.	Inspection Meeting The QAFR shall visit the Vendor's shop to review the requirements of this Inspection Planning Data Sheet with Vendor shop personnel.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 4.
4.	Titanium Vessel Preliminary - Prior to Fabrication
1. Verify	Welding procedure(s) is approved by SCC.
2. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item in accordance with the SCC approved Vendor's welding procedure(s).
3. Verify	Quality control and inspection procedure(s) are employed to assure strong ductile welds.
4. Verify	In-process materials are controlled and identified to provide traceability to the Mill Test Report(s).

Prepared by: W. Lehner Date 3 November 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0800-0801
Item or Service See Sheet 1

Inspection Activity	Instruction
	Intermediate - In Progress
5. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's welding procedure(s).
6. Witness	A fit-up of a circumferential joint and a nozzle joint.
7. Verify	The material is in accordance with the SCC Spec., the DuPont Std. and the SCC approved Vendor's drawing.
8. Witness	Fabrication is in accordance with the SCC Spec., the DuPont Std. and the SCC approved Vendor's drawing(s).
9. Inspect	All connections are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
10. Inspect	All welds to assure compliance to the SCC approved Vendor's welding procedure(s).
11. Inspect	General quality of workmanship - no burrs, no sharp edges, clean welds, etc.
12. Inspect	Overall dimensions are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
13. Witness	Liquid penetrant tests and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s), as required.
14. Verify	Radiograph reader sheets and assure examination is in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
15. Witness	The hydrostatic test in accordance with the ASME Code and the SCC approved Vendor's drawing(s).
16. Verify	Listed item(s) are drained, dried and cleaned, internally and externally after hydro.

Prepared by: W. Lehner Date 3 November 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 4 of 4 Control No. Rev. 0

☑ Source Inspection
Inspection Level 1

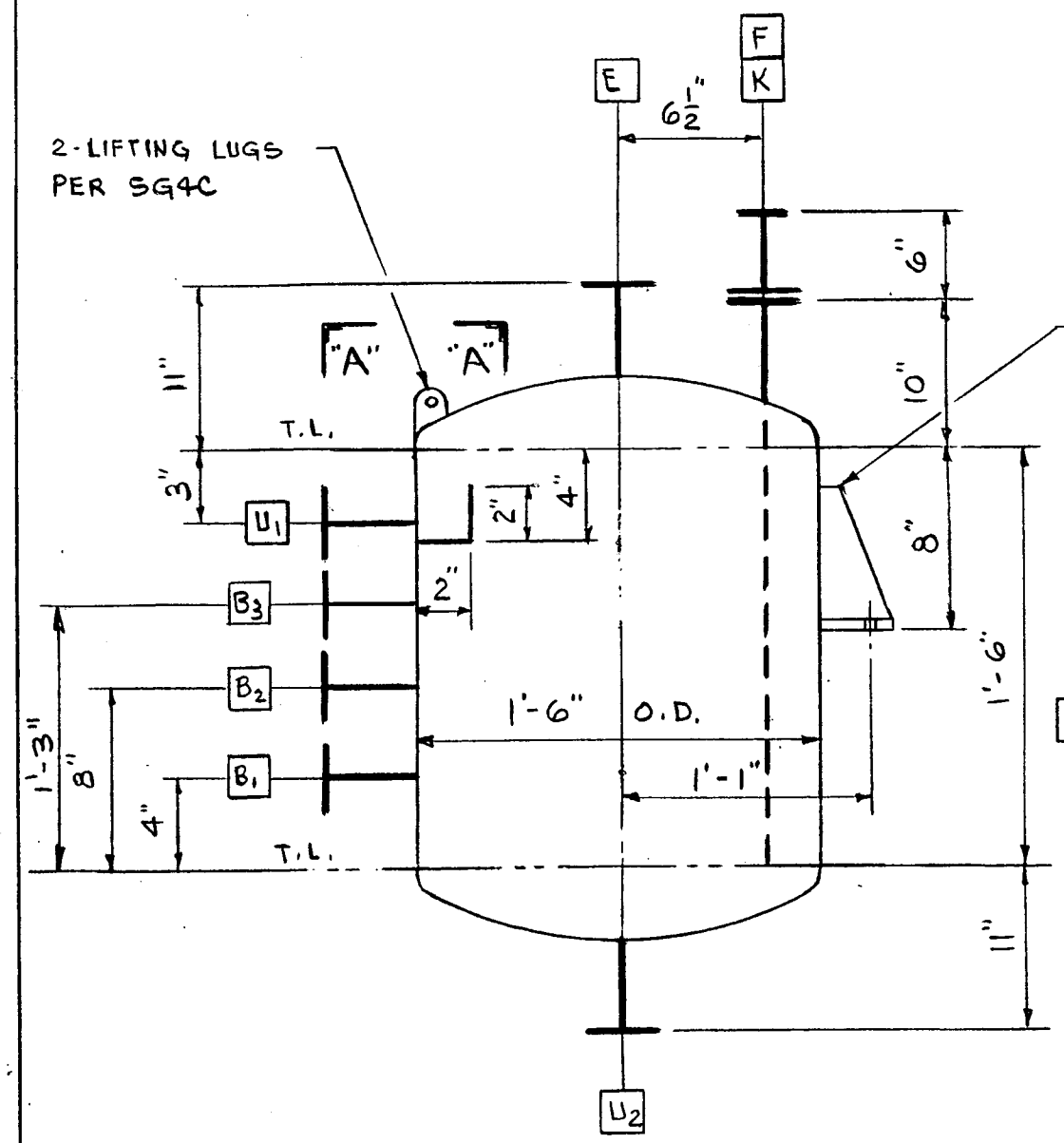
P.O. Number
Project/Spec. No. 113592/02 39950-0800-0801
Item or Service See Sheet 1

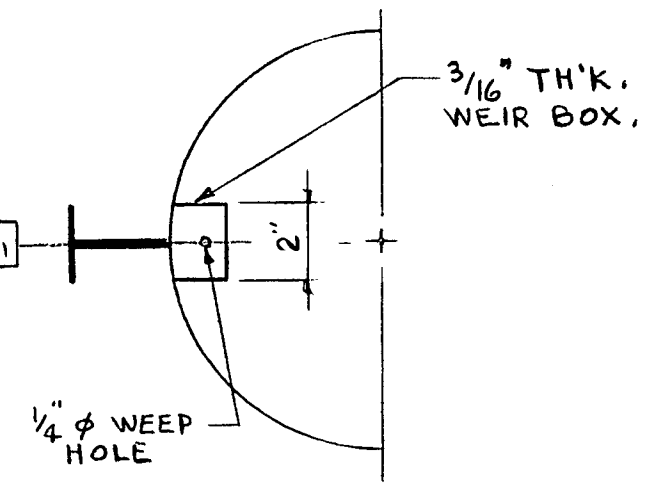
Inspection Activity	Instruction
	Final - Prior to Shipment
17. Verify	The following are in accordance with the SCC Spec., the DuPont Std(s) and the SCC approved Vendor's drawing(s): 1. Gaskets 2. Insulation Supports and Internals 3. Lifting Lugs 4. Nozzles
18. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventative in accordance with the SCC Spec. and the DuPont Std.
19. Witness	Ferrous metal exterior surface preparation and painting is in accordance with the SCC Spec. and the DuPont Spec.
20. Witness	Preparation for shipment and assure the following: 1. Desiccant installation and tag location, as required. 2. All openings sealed, as required. 3. Skidding and/or packaging is provided and identified, as required.

Prepared by: W. Lehner Date 3 November 1986

08302-584P

NOZZLE SCHEDULE						
FLG. TYPE	MK	SIZE	SERVICE	PROJ.	ELEV.	ORIENT
G1C-C	B_1	3"	CONDUCTIVITY PROBE	1'-5"	SEE DWG.	Later
	B_2	3"	CONDUCTIVITY PROBE	1'-5"		
	E	1"	VENT	SEE DWG.		℄ TOP
	F	1"	INLET W/ DIP PIPE	SEE DWG.		
	K	2"	MOUNT FOR NOZ. F	SEE DWG.		
	U_1	1"	LIQ. OUTLET	1'-5"		
	U_2	1"	LIQ. OUTLET	SEE DWG.		℄ BOTT.
	B_3	3"	CONDUCTIVITY PROBE	1'-5"		





VIEW "A-A"

NOTES:

1. ALL NOZZLES TO BE FLUSH WITH INSIDE OF VESSEL.
2. BOLTING MAT'L: SA-193 GR. B7; HEX NUTS; SA-194 GR. 2H
3. CIC TYPE-C FLG. MAT'L. TO BE SA-105, BLD. FLG & L.J. STUB ENDS TO BE SB-381 GR. F2 OR SB-265 GR. 2 (ANNEALED)
4. ALL COMPLETED WELD JOINTS SHALL BE EXAMINED BY THE LIQ.-PENETRANT METHOD PER APP'D. 8 OF THE 1986 ASME SECT. VIII DIV. 1.
5. HYDRO. TEST @ 1.5 x DESIGN PRESS x STRESS RATIO = 18 PSIG.

Design conditions ..... 5 psig 200 °F
..... psig °F
Operating conditions ..... 1 psig 86 °F
..... psig °F
Specified corrosion allow. NONE
Wind load N.Y. STATE UNIFORM FIRE PREV. & BLDG. CODE-1984
Seismic ZONE: 2 ANSI A-58.1-1982 75 MPH
Code 1986 ASME SEC. VIII, DIV. 1 Code Stamp NO
Nat'l Board Stamp NO
P.W.H.T. — Radiography SPOT
MAWP — Limited by —
Shell spec. SB-265 GR. 2 (ANNEALED) TITANIUM 3/16" TH'K.
Joint eff. 85%
Head spec. SB-265 GR. 2 (ANNEALED) TITANIUM ASME TORISPHERICAL 18" D.R. 1 1/8" I.C.R. 3/16" MIN. TH'K.
Joint eff. 100% (ALLOW STRESS 85%)
Cladding or lining spec. NONE
Gasket spec. .....
Support spec. SB-265 GR. 2 (ANNEALED) TITANIUM
External pipe spec. SB-337 GR. 2 (ANNEALED)
Internal pipe spec. SB-337 GR. 2 (ANNEALED)
Flange spec. SEE NOTE-3
Rating 150# ANSI (UNLESS NOTED)
Facing L.J.
Paint C.S. ONLY PER PAINT SPEC. 8572 (SEE INQ.)
Insulation F.P. 1 1/2" TH'K. <C2> (BY OTHERS)
Fireproofing —
Shipping wt. 150 LBS. Max. wt. 425 LBS.
Elevation measured from baseline SEE DWG.
Orientation measured clockwise from 0°. North is 0°.
Projection measured from ℄ of vessel to extreme face of flange.
Capacity 23.6 GALS. Sp. gr. 1.16

References: SPEC. 8572, SYSTEM 213X

DUPONT SPEC.	SG16S	FABRICATION
SPEC.	SW11N	MATERIAL
SPEC.	SU2A	GASKETS
SPEC.	SG4C	LIFTING LUGS
STD.	G1C	NOZZLE CONST.
STD.	G12D	INSUL. SUPPORTS.

ITEM NO. 880-14-2 ONE (1) REQUIRED

REV #	DATE	RECORD OF ALTERATIONS	BY	APPD	APPD
A	10/10/86	FOR APPROVAL	DH		

DR BY	W.B.	10/3/86
CH BY	D.H.	10/3/86
APPD		
APPD		
APPD		
APPD		
INQ. NO.	0801	
REQ. NO.		

SCALE 1 1/2" = 1'-0"

STEARNS CATALYTIC CORPORATION
Engineering Department, Philadelphia, PA

E.I. DUPONT DENEMOURS & Co. INC.
REMEDIATION PROJECT, NIAGARA, N.Y.

DECANTER

CONTRACT NO.	JOB NO.	DRAWING NO.	REV NO.
39750	113592	F-08004	A

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(4802E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0600-0602

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

HEAT EXCHANGERS - PLATE TYPE

CONSISTING OF

Reference Attachments:

SCC Spec. No. SP-2200-S30 - Insulation Supports for Plate Type Heat Exchangers

Item Number	Description
EN 880-10-1	Feed Preheater A
EN 880-11-1	Feed Preheater B

Approved _____ Date _____
CLIENT

Approved _____ Date _____

Approved _____ Date Aug. 26, 1986
STEARNS CATALYTIC

Prepared By _____
STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

HEAT EXCHANGERS - PLATE TYPE

SPECIFICATION NO. 39950-0600-0602

TABLE OF CONTENTS

HEAT EXCHANGERS - PLATE TYPE

SPECIFICATION NO. 39950-0600-0602
PAGE 1 of 4

1.00 SCOPE

1.01 This specification, plus individual Plate Type Heat Exchanger Data Sheets, and all references noted thereon, covers the design, material, construction, workmanship, inspection and testing of plate type heat exchangers.

1.02 The following will be furnished by others:

A. Installation

B. Foundation and anchor bolts

C. Piping and pipe supports to equipment boundaries

D. Insulation.

2.00 REFERENCE STANDARDS

2.01 The following industry, association and government codes and standards shall be followed as applicable to the design, fabrication, assembly and testing of all equipment furnished under this specification.

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code:

Section II	-	Material Specifications
Section V	-	Non-Destructive Examination
Section VIII	-	Pressure Vessels, Div. 1
Section IX	-	Welding & Brazing Qualifications

American National Standards Institute (ANSI) Standards:

B16.5	-	Steel Pipe Flanges and Flanged Fittings

2.02 The issues or revisions of these documents in effect on the date of the vendor's proposal shall apply. These shall include all code cases, supplements, and addenda.

3.00 PERFORMANCE CRITERIA

3.01 The performance of the unit shall be as described on the attached Plate Type Heat Exchanger Data Sheet(s).

3.02 Vendor shall guarantee thermal design and pressure drop.

4.00 DESIGN DETAILS

4.01 General Requirements

4.01.1 All heat exchangers shall be designed, constructed, inspected and tested in accordance with this specification including requirements of all references.

4.01.2 In the event of conflicts, the requirements of the data sheets shall govern.

4.02 Materials

4.02.1 The materials of construction for exchanger components shall be indicated on the data sheets.

4.02.2 Materials' use shall be subject to limits of the ASME Code.

4.02.3 No asbestos or asbestos-containing material shall be used in the exchangers.

4.03 Mechanical

4.03.1 End plates, ports, cover plates, and gaskets shall be designed for the temperatures stated on the data sheets. Plates shall be designed for maximum operating metal temperature plus or minus 50°F. Operating conditions shall include:

A. Start up and shutdown.

B. Failure of one stream.

4.03.2 Exchanger parts normally shall be designed for full design pressures. In the event that differential pressure is permitted for design, the data sheets will so state.

4.03.3 Plate heat exchangers shall be of single pass, counter-current flow design to achieve high efficiency, to facilitate access to the plate pack for maintenance and to enable cleaning by backflushing. For non-fouling streams, vendor may quote a multipass design as an alternate, if appreciably more economical, or if operating requirements, i.e. reduced flow, make such design more suitable.

4.03.4 The required additional heat transfer area to provide for a decrease in thermal performance due to fouling shall be as stated on the data sheet.

4.03.5 Total amount of heat exchanged shall be as specified on the attached data sheet(s). The units of heat exchanged are BTU/HR.

4.03.6 Flow area of ports shall be such that the entrance and exit pressure drops are not more than 50% of the total calculated pressure drop.

4.03.7 Plate sizes and patterns shall be standardized for maximum interchangeability within practical limits.

4.03.8 The design of the plate heat exchanger should assure against any hydraulically induced vibrations.

4.03.9 End plates shall be provided at the fixed and movable cover for sealing the first and last flow pass and to provide support to the adjacent plate.

4.03.10 Port holes not feeding passes between plates shall be fully gasketed and vented to the atmosphere.

4.03.11 Plates should be fully supported from the top carrying bar and guided only by the bottom bar, by reinforced slots integral with the plate.

4.03.12 The frame of the plate type heat exchanger shall be designed to permit future installation of a minimum of 20% additional plates.

4.03.13 The movable cover shall be supported from the upper carrying bar by means of roller bearings and guided by the bottom bar.

4.03.14 Units shall be shrouded to provide splash protection. Design shall facilitate easy maintenance and cleaning of the plate type heat exchanger.

4.03.15 Insulation supports shall be furnished if specified on the Heat Exchanger Data Sheet.

4.03.16 Lifting devices shall be furnished to all individual items with a weight in excess of 60 pounds.

4.03.17 Carbon steel ports and covers shall be designed for a minimum corrosion allowance of 1/8 inch. For alloy-lined parts, no corrosion allowance is required on the base metal behind the alloy. Alloy linings shall not be included in strength calculations.

4.03.18 No cold rolled lap joint flanges shall be used. Fabricated and annealed lap joints (stud ends) are acceptable provided that they are fabrication and inspected per ASME Code.

5.00 INSPECTION

5.01 The Owner/Engineer's inspector shall have free entry to parts and/or areas of the manufacturer's shop where work on the equipment is performed.

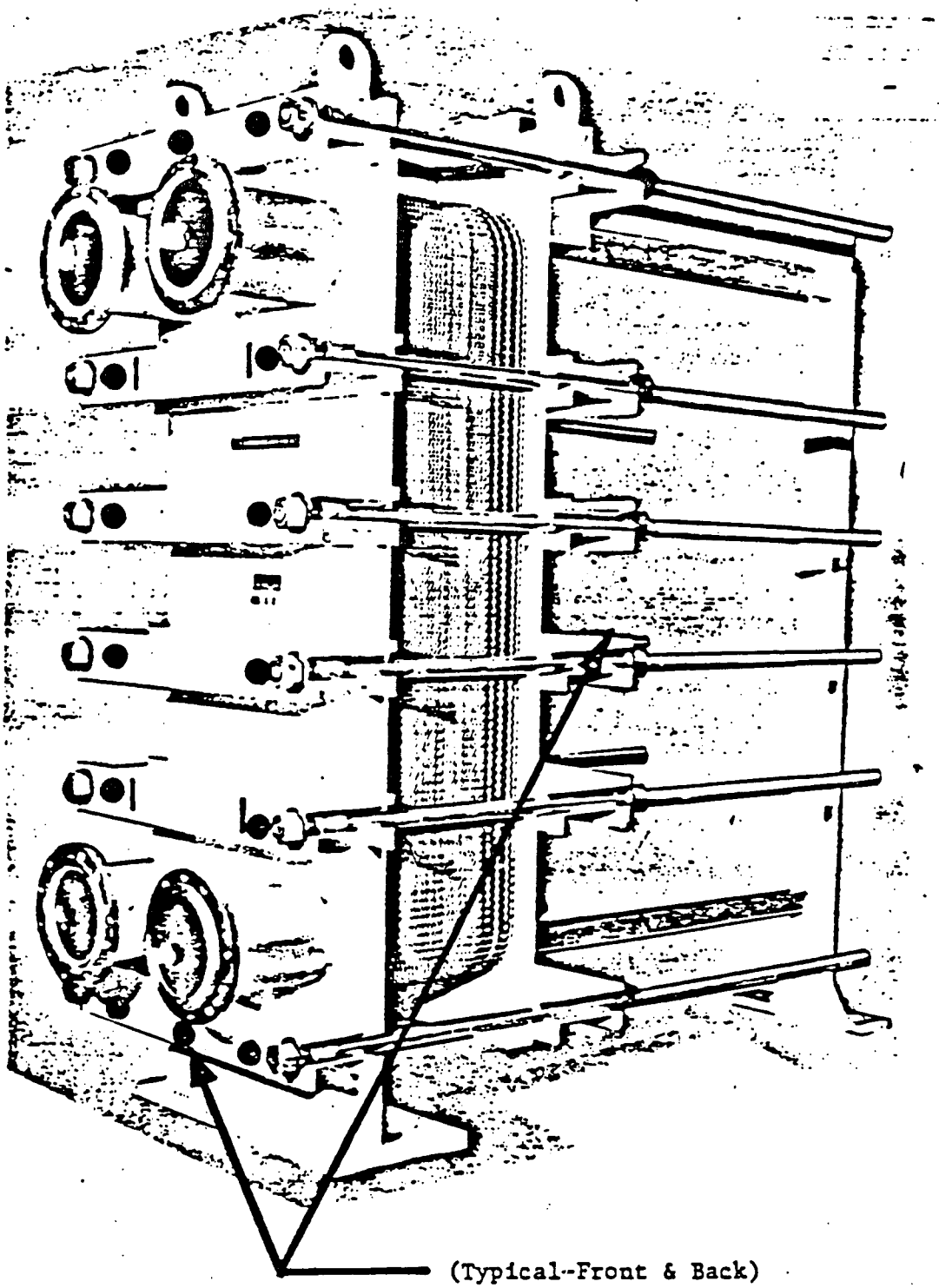
5.02 Acceptance by the Owner/Engineer's inspector shall not relieve the manufacturer of responsibility for warranty and performance guarantees.

5.03 The Owner/Engineer's inspector shall witness hydrostatic tests. Five days notice prior to testing shall be given.

INSULATION SUPPORTS FOR
PLATE TYPE HEAT EXCHANGERS

SPECIFICATION SP-2200-S30
Rev.0; dated 11 October 1984

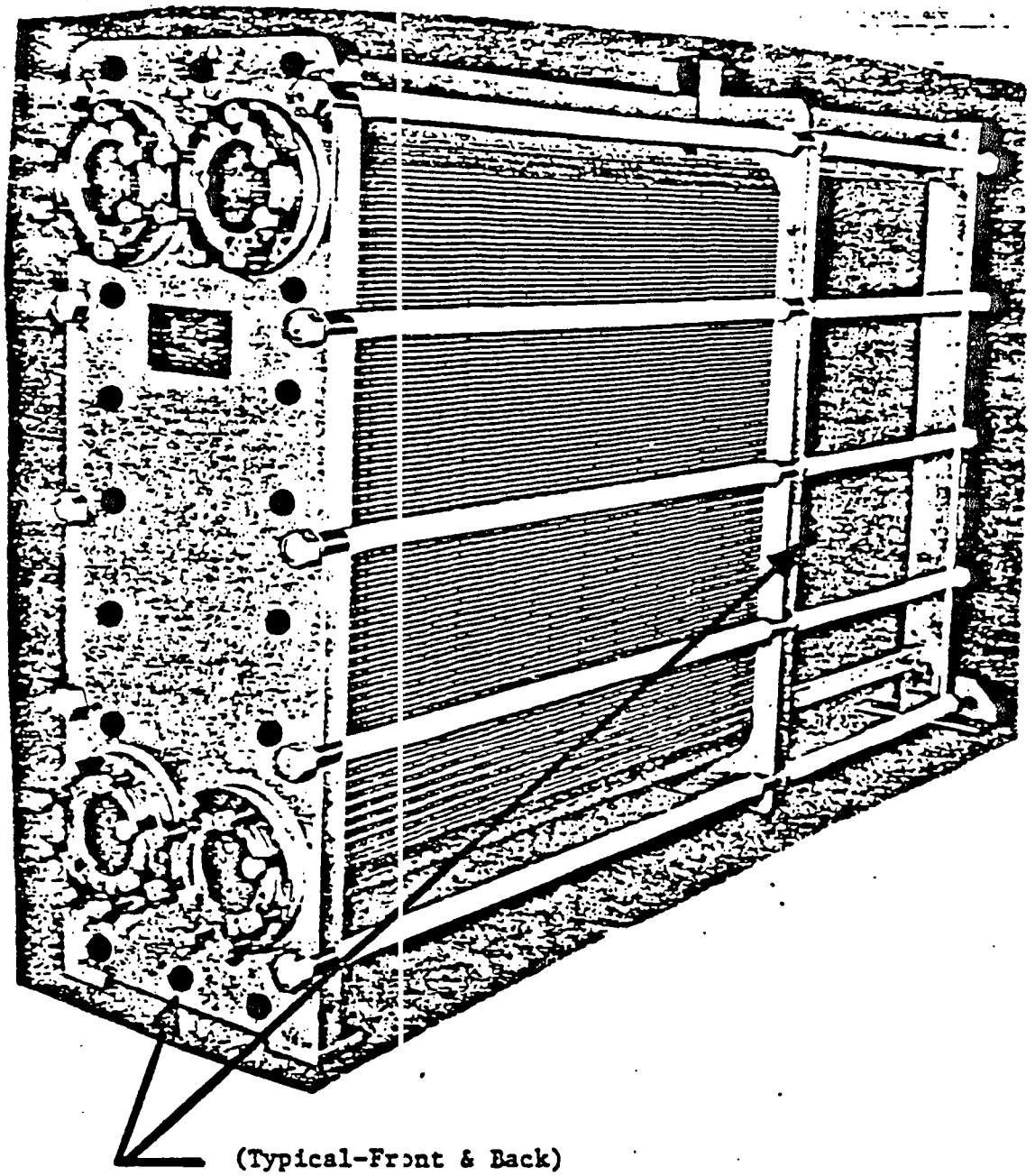
CHANNEL REINFORCED ENDS



(Typical--Front & Back)
(Typical-All Around)

3/8" square nuts tack welded to surface on 12" centers. Install nuts standing up so that a wire can be secured to the nut.

UNREINFORCED ENDS



(Typical-Front & Back)
(Typical-All Around)

3/8" square nuts tack welded to surface on 12" centers. Install nuts standing up so that a wire can be secured to the nut.

Stearns Catalytic, Inc.
Engineering Department

39630-10/84P

PLATE TYPE HEAT EXCHANGER DATA SHEET

Page 1 of 1

1 Contract Number 39950 Item Number 880-10-1 & 880-11-1 Specification No. 39950-0000-0602
2 Client E.I. DUPONT Requisition No.
3 Location NIAGARA FALLS, N.Y. Number Required TWO (2)
4 Service FEED PREHEATER A&B By JDB/TGL Date 8/14/86
Revision ___ By ___ Date ___
Revision ___ By ___ Date ___
5 Manufacturer ___ Model No. ___ Revision ___ By ___ Date ___
6 Size ___
7 Surface Per Unit, Sq. Ft. Total ___ Effective ___

Performance of One Unit

			HOT SIDE	COLD SIDE
8	Fluid Circulated		GROUND WATER	GROUND WATER
9	Total Fluid Entering (1)	lb/hr	66700	66700
10	Vapor	lb/hr		
11	Liquid	lb/hr	66700	66700
12	Steam	lb/hr		
13	Non-condensables	lb/hr		
14	Fluid Vaporized or Vapor Condensed	lb/hr		
15	Steam Condensed	lb/hr		
16	Gravity-liquid (sp.gr.)(A.P.I.)		0.98 @ 216 °F	0.99 @ 208 °F
17	Viscosity	Centipoises	0.48 @ 216 °F	0.52 @ 208 °F
18	Thermal Conductivity, Btu/(hr)(sq.ft.)(°F/ft)		0.38 @ 216 °F	0.37 @ 208 °F
19	Molecular Weight - Vapors + Steam + N.C.	in/out		
20	Specific Heat	Btu/(lb)(@F)	1 @ °F	1 @ °F
21	Latent Heat - Vapors	Btu/lb		
22	Temperature - In	°F	216	50
23	Temperature - Out	°F	58	208
24	Operating Pressure	psig	IN 60	IN 75
25	Number of Passes/Number of Channels		1	1
26	Velocity	ft/sec		
27	Pressure Drop Allowed/Calc.	psi	Allowed 20, Channel ___, Tot. ___	Allowed 20, Channel ___, Tot. ___
28	Fouling Resistance Over Surface	%	5-10	
29	Heat Exchanged - Btu/hr 10,538,600		L.M.T.D. Corrected	°F
30	Transfer Rate - Service		Clean	

Construction

31	Design Pressure	psig	150	
32	Test Pressure	psig	CODE	
33	Design Temperature	°F	250	
34	Corrosion Allowance		1/8" C.S.	
35	Code Requirements ASME SECT VIII			Stamp Required NAT. BOARD.
36	Weights: Each Exchanger, Empty		Full of Water	Frame Only
37	Plates: Material TITANIUM GR. 1 (2)		No. , Gauge	Spacing
38	Corrugation Type		Width Over Ports	Length Between Ports
39	Gaskets: Material EPDM			
40	Frame: Material C.S.		Max. Plate Capacity	Paint SYSTEM 207D CARBON STEEL.
41	Plate Removal Clearance Required			
42	Insulation: PROVIDE INSULATION NUTS			
43	Solid Particle Size		Required	Maximum for Plates
44				
45	Connections: Size		Type 150# ANSI	Material TITANIUM LINER
46	O.S.H.A. Splash Protector 304 SS		STUDDED PORT	

47
48 NOTES: (1) AVERAGE MASS FLOWRATE = 44,100 lb/HR,
49 MINIMUM = 22,050 lb/HR; VENDOR TO
50 QUOTE PERFORMANCE OF BASE UNIT AT FACE [illegible].
51 (2) VENDOR TO PROVIDE ALTERNATE USING 316SS
52 PLATES IN ANY PASS WHERE LIQUID IS ALWAYS
53 BELOW 150°F.
54

Steams Catalytic	Inspection Planning Data Sheet	Sheet 1 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0602
Item or Service See Below

Inspection Activity	Instruction
	ASME Code Section VIII, Inspection Required.
Qty-Item-No Two (2)	Exchanger(s) - Plate Type Heat EN 880-10-1 EN 880-11-1
NOTES: 1.	Inspection DuPont inspection is required per this Inspection Planning Data Sheet. You will be contacted by a DuPont Quality Assurance Field Representative (QAFR) to schedule inspection visits. In the event that you are not contacted, call (302) 451-0200 at least 5 days before inspection is needed. When major components or service are obtained from Sub-Vendors, the QAFR will inspect these items at the point of manufacture. It is the Vendor's responsibility to include DuPont inspection and notification requirements in Sub-orders. The QAFR shall perform and document all inspections. He shall assure that the Vendor documents any non-conformances and he shall notify the cognizant Quality Assurance Engineer (QAE) of the non-conformance. The SCC QAE for this P.O. is W. Lehner at (215) 864-1608. The Vendor shall assure that applicable documents that require SCC/DuPont approval, as identified in the Purchase Order and Specification(s), have been submitted and "Approved" or "Approved As Noted" before the use of such documents. Submittals shall be made to the SCC Manager of Expediting (E.D. Baldi) as required by Vendor Data Requirements attached to Purchase Order.

Prepared by: W. Lehner Date 12 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 2 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0602
Item or Service See Sheet 1

Inspection Activity	Instruction
	All documentation and equipment tags must be identified with the DuPont Plant location, Project Designation, Purchase Order and EN Numbers The following documentation is to be provided by the Vendor: 1. Manufacturer's Data Reports 2. Mill Test Reports 3. Nameplate Rubbings 4. Weld Procedure(s) and Welder Qualifications 5. Test Results and Report(s) 6. Spare Parts List for DuPont, Niagara
2.	Inspection Meeting The QAFR shall visit the Vendor's shop to review the requirements of this Inspection Planning Data Sheet with Vendor shop personnel.
3.	Inspection Instructions: The QAFR will include, but not be limited to, the following inspections: Preliminary, Intermediate and Final as required by Section 4.
4.	Plate Type Heat Exchanger(s) Preliminary - Prior to Fabrication
1. Verify	Welding procedure(s) is approved by SCC.
2. Verify	Welder(s) and welding operator(s) are qualified to fabricate the listed item in accordance with the SCC approved Vendor's welding procedure(s).
3. Verify	Quality control and inspection procedure(s) are employed to assure strong ductile welds.
4. Verify	In-process materials are controlled and identified to provide traceability to the Mill Test Report(s) and/or Material Documentation.

Prepared by: W. Lehner Date 12 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 3 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0602
Item or Service See Sheet 1

Inspection Activity	Instruction
	Intermediate - In Progress
5. Witness	Qualified welding operator(s), fit-up and welding practices are in compliance with the SCC approved Vendor's welding procedure(s).
6. Verify	Gasket(s) conform to the SCC Spec. and the SCC approved Vendor's drawing(s).
7. Inspect	Plates for cleanliness and workmanship. Plates shall be free of; debris, dirt, oil, etc. and surface defects, tears, scratches in the gasket area, etc.
8. Witness	Fabrication is in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
9. Inspect	All connections are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
10. Inspect	All welds to assure compliance to the SCC approved Vendor's welding procedure(s).
11. Inspect	General quality of workmanship - no burrs, no sharp edges, clean welds, etc.
12. Inspect	Overall dimensions are in accordance with the SCC Spec. and the SCC approved Vendor's drawing(s).
13. Witness	The hydrostatic pressure test(s) in accordance with the SCC Spec. and the ASME Code, Section VIII.
14. Witness	The draining, drying and cleaning of the listed item per the SCC Spec. and the DuPont Std.
	Final - Prior to Shipment
15. Verify	Ferrous metal machined surfaces are coated with a soluable rust preventative.
16. Witness	Listed item ferrous metal exterior surface preparation and painting per the SCC approved Vendor's procedure(s). Check for minimum of 4 mil thickness per the SCC Spec.
17. Verify	Conformance of specification data against Manufacturer's data reports and nameplate rubbings.

Prepared by: W. Lehner Date 12 December 1986

Steams Catalytic	Inspection Planning Data Sheet	Sheet 4 of 4 Control No. Rev. 0

☒ Source Inspection
Inspection Level 1

P.O. Number
Project/Spec. No. 113592/02 39950-0600-0602
Item or Service See Sheet 1

Inspection Activity	Instruction
18. Verify	Rubber gaskets shall be used for closure with 0.05 inch plywood covers and a full complement of inexpensive bolting.
19. Verify	The attachment of the equipment identification tags in accordance with the SCC Spec.
20. Witness	Preparation for shipment and assure the following: 1. Desiccant installation and location, as required. 2. All openings sealed, as required. 3. Skidding and/or packaging is provided and identified, as required.

Prepared by: W. Lehner Date 12 December 1986

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(5719E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-3400-3401

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

ICE BUILDER CHILLER

CONSISTING OF

Reference Attachments:

Item Number		Description
EN 880-20-2-1	-	Ice Builder Chiller

Approved _____ Date _____

Approved _____ Date _____

Approved _____ CLIENT Date 1-22-87

Prepared By _____ STEARNS CATALYTIC

STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

ICE BUILDER CHILLER

SPECIFICATION NO. 39950-3400-3401

TABLE OF CONTENTS

ICE BUILDER CHILLER

SPECIFICATION NO. 39950-3400-3401
PAGE 1 of 2

1.00 SCOPE

1.01 This specification describes the minimum requirements for the design, fabrication and delivery of a packaged Ice Builder Chiller to provide continuous chilled water for process. Unit shall be located indoors.

1.02 Ice builder shall include tank with insulation, refrigeration coils, baffled water side louvers for agitation, thermal expansion valve, suction line strainer, liquid line dryer, air cooled condensing unit, refrigeration charge, automatic ice thickness control, all mounted, wired, piped and shipped as complete package.

1.03 The following will be furnished by Others:

A. Foundation and anchor bolts.

B. Erection and installation.

C. Chilled water pump and chilled water piping.

D. Compressor motor starter.

E. Power and control wiring to unit.

2.00 REFERENCE STANDARDS

2.01 The following industry, association and government codes and standards shall be followed as applicable to the design, fabrication, assembly and testing of all equipment furnished under this specification.

2.01.1 OSHA - Occupational Safety and Health Act.

2.01.2 ANSI/ASHRAE - 15-78 Safety Code Mechanical Refrigeration.

2.01.3 ANSI - B31.5 Pressure Piping, Refrigeration.

2.01.4 NEMA - National Electrical Manufacturer's Association.

2.01.5 NEC - National Electric Code.

2.01.6 ASME Boiler and Pressure Vessel Code, Section VIII, Unfired Vessels.

2.02 The issues or revisions of these documents in effect on the date of the Vendor's proposal shall apply

3.00 PERFORMANCE CRITERIA

3.01 Ice builder chiller shall be capable of continuous 24 hour per day performance as follows:

Normal Maximum Ice Thickness:	500 Lb.
Refrigerant:	R-12
Chilled Water Flow:	10 GPM
Outlet Water Temperature:	35°F maximum
Process Load:	2,000 Btu/Hr. continuous
Condensing Unit Capacity:	5,500 Btu/Hr. minimum
Design Air Temperature:	90°F
Power Available:	3 Ph/60 Hz/460 Volt - motor 1 Ph/60 Hz/120 Volt - controls

4.00 DESIGN DETAILS

4.01 Cabinet tank shall be constructed of heavy gauge steel, electrically welded.

4.02 Cabinet shall be insulated on sides, ends, and bottom with 2 inch corkboard minimum. Outer jacket clad in embossed sheet aluminum protected by heavy galvanized angle corners with aluminum finish. Top has removable galvanized steel cover.

4.03 Refrigerant coil to be direct expansion serpentine type, downfed, welded to heavy gauge steel plates. Each coil equipped with expansion valve and liquid line filter-dryer. Provide suction line strainer and positive oil return to compressor.

4.04 Refrigerated coil plates shall have welded baffles for extended ice surface buildup and water agitation without mechanical agitation device.

4.05 Air cooled condensing unit shall be mounted on top of cabinet, factory piped and wired. Compressor shall be either serviceable hermetic or open type.

4.06 Compressor operation shall be controlled by automatic ice thickness control, independent of water flow.

4.07 Hand operated ice thickness gauge shall be provided.

4.08 Assembled unit shall prove leak-proof when tested with a suitable leak detector set for high sensitivity and pressure tested at the pressure specified by ANSI/ASHRAE 15-78 Safety Code on the refrigerant side. After pressure test, refrigerant side shall be dehydrated and charged with operating refrigerant and oil charge prior to shipment.

Stearns Catalytic
08008-285P

STEARNS CATALYTIC CORPORATION
ENGINEERING DEPARTMENT

(5717E)

PLANT: NIAGARA

SCC CONTRACT NO. 39950

CLIENT: E. I. DU PONT

SPECIFICATION NO. 39950-0900-0904

LOCATION: NIAGARA FALLS, NEW YORK

SPECIFICATION

for

PUMP - VERTICAL SINGLE STAGE SUMP PUMP

CONSISTING OF

Reference Attachments:

Item Number		Description
EN 880-21-1	-	Sump Pump

Approved _____ Date _____

Approved _____ Date _____

Approved _____ CLIENT Date 1-23-87

Prepared By _____ STEARNS CATALYTIC

Amendment	Approved	Date	Approved	Date	Approved	Approved	Approved	Approved	Date
	CLIENT				STEARNS CATALYTIC CORPORATION				

PUMP - VERTICAL SINGLE STAGE SUMP PUMP SPECIFICATION NO. 39950-0900-0904

TABLE OF CONTENTS

PUMP - VERTICAL SINGLE STAGE SUMP PUMP

SPECIFICATION NO. 39950-0900-0904

1.00 SCOPE

1.01 This specification describes the minimum requirements for the design, manufacture, testing, and inspection of a vertical single stage sump pump.

1.02 The following will be furnished by others: installation, piping and electrical feeder wiring to motor terminal box.

2.00 REFERENCE STANDARDS

2.01 Standards of the Hydraulic Institute (HI).

Centrifugal, Rotary, and Reciprocating Pumps.

2.02 American Society for Testing and Materials (ASTM).

2.03 American National Standards Institute (ANSI).

ANSI B2.1	Pipe Thread (except dry seal).
ANSI B16.5	Steel Pipe Flanges, Flanged Valves and Fittings.

2.04 Occupational Safety and Health Standards of the U.S. Department of Labor (OSHA).

2.05 National Electric Code (NEC).

2.06 The issues or revisions of these documents in effect on the date of inquiry shall apply.

3.00 PERFORMANCE CRITERIA

3.01 The performance criteria for the pumps to be furnished under this specification shall be in accordance with the information listed on the Pump Data Sheet(s).

3.02 The pump impeller furnished shall provide the design head at the design flow rate as noted on the Data Sheet(s). The impeller diameter selected to meet the design conditions shall not be smaller than the minimum on the manufacturer's published performance curves. The pump shall be capable of at least a 10% head increase at design conditions by installing a larger impeller.

3.03 The differential head generated by the pump with all available impeller sizes shall rise continuously from maximum capacity to shut-off. Duplicate pumps shall be capable of stable operation in parallel.

3.04 The Vendor shall state in his proposal the minimum submergence and NPSH required by the pump selected for optimum pump performance.

4.00 DESIGN DETAILS

4.01 General Requirements

4.01.1 The equipment shall be of manufacturer's standard construction whenever possible for ease of interchangeability of parts.

4.01.2 The pump suction and discharge nozzles shall be flanged connections with dimensions in accordance with ANSI B16.5 Class 150 steel standards as to bolt circle and number and size of bolts. Flanges shall be flat-faced.

4.01.3 All threaded parts shall conform to ANSI standards.

4.01.4 A lifting ring shall be provided to facilitate handling of equipment in excess of 60 pounds during installation and maintenance.

4.02 Materials

4.02.1 Materials of construction shall be suitable for listed service. See data sheet(s) for additional information.

4.02.2 Properties as defined by the material specification which have been altered during fabrication shall be restored to the requirements of the material specification.

4.03 Specific Requirements

4.03.1 Pump and Column

A. The pump column shall have relief holes to prevent trapping air and liquid under pressure. The column shall be self draining.

B. The pump column shall be flange mounted design to assure good alignment between the pump casing, column and motor.

C. The pump discharge pipe shall extend through the pump mounting plate and have flanged ends in accordance with Paragraph 4.01.2.

D. The pump shall be mounted to a cover plate (baseplate) fabricated to the size and thickness shown on the pump data sheet. The material shall be suitable for service conditions.

E. The pump suction opening shall be on the bottom of the pump casing. The opening shall have a suitable suction strainer to protect the impeller from solids and foreign matter.

F. Shaft seal of type specified on data sheet.

4.03.2 Bearings

A. The top bearing shall be an antifriction type thrust bearing. The bearing shall be capable of withstanding the design radial and axial loads.

B. The top bearing shall be regreaseable type with accessible grease fittings. The bearing housing shall be designed to protect the bearings from water, dust and other contaminants.

C. The top bearing shall have a LIO life of 10,000 hours.

D. The line and foot bearings shall be sleeve bearings. The length of the sleeve guide and bearing shall be a minimum of two and one-half times the pump shaft diameter.

E. The design shall provide for the use of flushing or lubricating liquid between the pump shaft and the line and foot bearings if required.

F. For pump design where the distance from the pump cover plate to the pump suction exceeds 36 inches, a line bearing shall be installed. Maximum span between bearings shall not exceed 36 inches.

4.03.3 Impeller

A. The pump shall have an open impeller.

B. The impeller shall be statically and dynamically balanced.

C. Impeller clearance shall be externally adjustable from the top of the unit, so that the pump does not have to be removed for adjustment.

D. The pump shall be selected so the impeller used is not the maximum size that can be used with the pump (refer to Paragraph 3.02).

4.03.4 Motors

A. The motor shall be supplied in accordance with the Induction Motor Data Sheet and the Motor Specification.

B. The electric motor driver shall be non-overloading for the full performance curve of the pump at the impeller design diameter.

C. The motor mounting bracket shall have tongue and groove machining to insure alignment of the motor and pump shaft.

D. OSHA approved type coupling and shaft guard.

08432

CATALYTIC, INC.
ENGINEERING DEPARTMENT

Vertical Sump Pumps

Contract Number 39950 Item Number 880-21-1 Specification No. 39950-0900-0904
Client E. I. DUPONT Requisition Number
Location NIAGARA FALLS, N.Y. Number Required ONE (1)
Unit or Area By TGL Date 1/27/87
Status For: Approval ☒; Inquiry ☐; Purchase ☐; As Bought ☐ Revision By Date

	Vendor		Alternate (optional)
	Date		
Duty: Hrs./Day: INTERMITTENT Days/Week	Proposal No.		
Service: SUMP PUMP	Requirements	Offered	Offered
Type: VERTICAL CENTRIFUGAL	*	1	1
Pump Size/Pump Model No.	AMB OF 10.6 CP.	-	-
Pumpage: ORGANICS SPILL STORMWATER Sp.Gr.- 1.16 /Temp./Visc.	100 @ 40	@	@
Capacity: GPM @TDH (Suct. Press.= 0 PSIG)	11.41 *	1	
NPSH, Available/Required (Feet)	NEGLIGIBLE	1	
Solids- %/Dia.	C.I.		
Materials: Casing/Strainer	C.I.		
Impeller/Type	316 SS		
Shaft	—		
Sleeves-Stuf. Box/Under Interm. Bearings	C.I.		
Gland & Taps	STEEL		
Cover Plate (SUPPORT)	CARBON / *	1	1
Intermediate Bearings/Max.Span. Between Bearings	—		
Intermediate Bearing Flush	*		
Packing (NON-ASBESTOS)	REQ'D.		
~~Mech. Seal-Rot./Stat./Gask.~~ STUFFING BOX	—		
Cat. Seal Coding	—		
Mech. Seal - Mfr./Code	—		
Seal Piping System	APPROX 8 FT		
Pump Setting	SPACER		
Coupling-Mfr./Type-With Coupling Guard Per. O.S.H.A.	Regreasable Ball Type		
Thrust Bearing	Required - NO		
Pressure Gage Tap-Discharge	—		
Jacketing of-Gland-Stuf. Box-Bear. Hous.	*1 *1 *	1 1	1 1
Impeller Diameter: Min./Design/Max.	*1 *1 *	1 1	1 1
B.H.P.-Des./Max./Corrected for Viscosity?	3/1750 EST'D.		
Motor-HP/RPM	TEFC		
Enclosure/Frame No.	460/3/60		
Volts/Phase/Cycles	STD		
Tests Required:	BY PURCHASER		
Level Switch-High-Low-Alternator	DIV 2.		
NEMA: Class/Group/Volts			
* VENDOR TO FILL IN.			
Unit Price (Incl. Motor, Pump, Base, Seal, etc.)			
Estimated Weight			
Delivery			
Freight			
Total Price Frt. Alwd. (Unit pr. x No. of Pumps)			

Note: Use Check "√" to Show Compliance

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

INSTRUMENTS ENGINEERING STANDARD

ISSUED	AUG 1946
THIS PAGE REVISED	DEC 1983
STANDARD REAFFIRMED	DEC 1983

R 110 J

Page 1 of 20

1. SCOPE

1.1 The purpose of this standard is to establish a uniform means of designating instruments and instrument systems for measurement and control by the use of symbols and identification numbers.

1.2 The system used by some vendors and contractors differs from this standard and is described in the Instrument Society of America Standard S5.1, "Instrument Symbols and Identification."

1.3 More detailed diagrams may be required for unusual or complex loops. See PR 8 and Design Manual Section 5 for the preparation of Control (Loop) Diagrams.

1.4 Material codes are included as further identification for manual or computer-generated cost estimating. These material codes are related to cost values in an Instrument Unit Library. The Library and procedural information are available from the Business Methods & Investment Division, Louviers Building, Wilmington, Delaware.

2. GENERAL

2.1 An instrument symbol is a graphic representation of the instrument to be used.

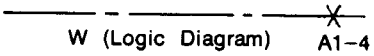
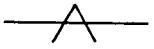
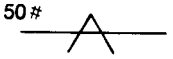
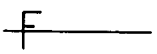
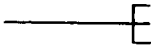
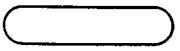
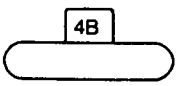
2.2 See R111J for symbols used on Instrument Arrangement Drawings.

2.3 The instrument symbol is always identified by an instrument item number as described in R121J, "Instrument Identification System."

2.4 The instrument symbols shown in this standard shall be used on instrument diagrams. Special or functional symbols may be used but they must be explained by legend or note on the drawing.

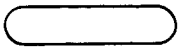
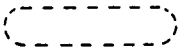
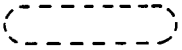
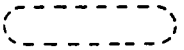
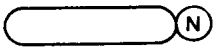
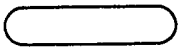
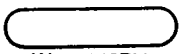
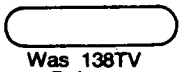
2.5 Instrument symbols may be drawn with Template D–1, see page 20.

GENERAL

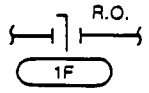
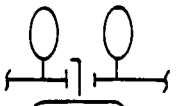
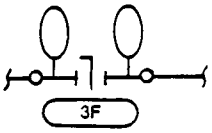
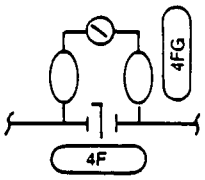
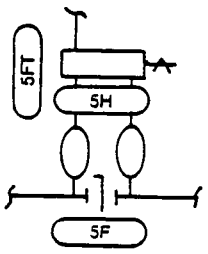
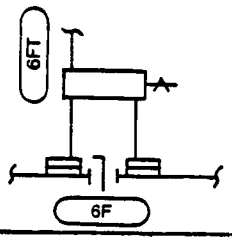
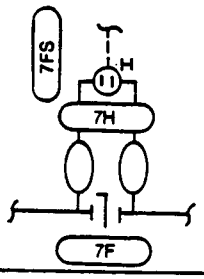
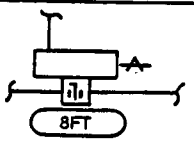
	Process piping
	Instrument transmission line (pneumatic or electronic)
	Electrical interconnection (normally 115 V ac or greater)
	Electrical interlock (system A, interlock 1 of 4)
	Regulated instrument air supply required (20–25 psig only. Any other pressure or supply to be so noted)
	Regulated instrument air supply pressure required other than 20–25 psig. Denote regulated pressure required (50 psig shown)
	Instrument air supply, filter only required
	Electrical power supply required for field-mounted instruments. 115 V ac unless otherwise noted
	Instrument item number ovals
	Example of item number for an instrument located on panelboard 4B

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

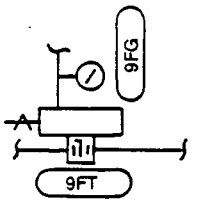
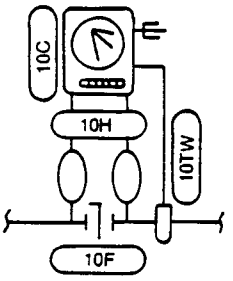
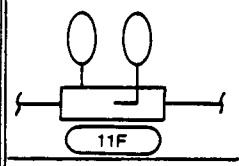
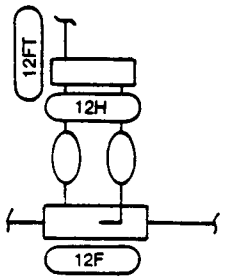
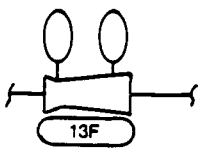
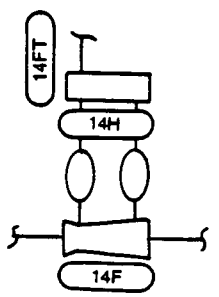
GENERAL

New Drawings	The purpose of new drawing symbols is to differentiate between new instruments and existing instruments reused in place or relocated on a new project. These symbols are to be used on both computer and manual diagrams.
	New instrument
	Existing instrument reused in place
 Reloc	Existing instrument relocated
 Was 140PV	Existing, reused in place but given new loop number
 Was 138TV Reloc	Existing, relocated to new service and given new loop number
Existing Drawings Being Reused on a Current Project	When existing drawings are being used for a current project, only the existing instruments being modified on the new project will be changed to reflect the modification
	New instrument. On subsequent project, N and notes will be removed and instrument will then appear as existing
	Existing instrument reused in place
 Reloc	Existing instrument relocated
 Was 140PV	Existing, reused in place but given new loop number
 Was 138TV Reloc	Existing, relocated to new service and given new loop number
	Denotes revision

Flow

Symbol	Legend	Material Code
	Restricting orifice	407A thru 407E 460A thru 460N
	Orifice, metering or test, primary element orifice	407A thru 407E 460A thru 460N
	Orifice flanges	412A
	Orifice plate	407A thru 407E 460A thru 460N
	Prefabricated orifice run	409A 2" and smaller 410A 3" and larger
	Orifice plate	407A thru 407E 460A thru 460N
	Differential pressure flow indicator primary element orifice	Indicator 715A 715B 715C 715D 715E
	Differential pressure flow transmitter (pneumatic shown), manifold and primary element orifice	Pneumatic 723A 723B 723C 723D 723E Electronic 724A 724B 724C 724D 724E Manifold valve 262A thru 262E Orifice plate 407A thru 407E 460A thru 460N
	Differential pressure flow transmitter filled system (pneumatic shown) primary element orifice	Pneumatic 723L Electronic 724B Orifice plate 407A thru 407E 460A thru 460N
	Differential pressure flow switch (specify high or low), electrical interconnection, manifold and primary element orifice	Flow switch 721A 721B 721C 721D 721E Manifold 262A thru 262E Orifice plate 407A thru 407E 460A thru 460N
	Differential pressure integral orifice flow transmitter (pneumatic shown)	Pneumatic 405A Electronic 406A

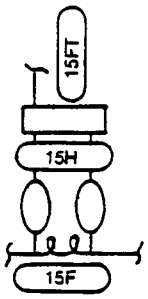
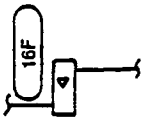
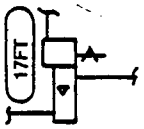
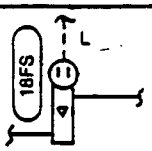
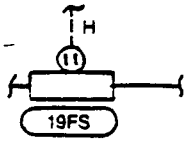
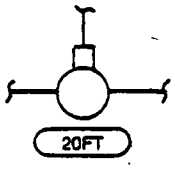
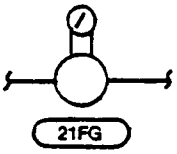
Flow

Symbol	Legend	Material Code
	Differential pressure integral orifice flow indicating transmitter (pneumatic shown)	Pneumatic 405A Receiver gage 551A Electronic 406A Receiver gage 552B
	Differential pressure flow accounting meter with temperature compensation and integrator, manifold and primary element orifice	Accounting meter 719A 719B 719C 719D 719E Manifold 262A thru 262E Thermowell 823A thru 823J Orifice plate 407A thru 407E 460A thru 460N
	Pitot	411A
	Annubar	414A
	Differential pressure flow transmitter, manifold and primary element pitot	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Pitot 411A Annubar 414A Manifold 262A thru 262E
	Venturi	427A
	Differential pressure flow transmitter manifold and primary element venturi	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Venturi 427A Manifold 262A thru 262E

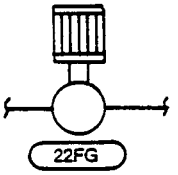
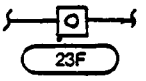
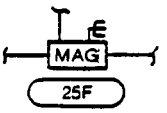
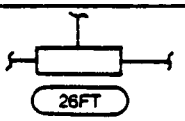
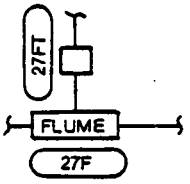
For material code suffix letters refer to the Instrument Unit Library DUPONT

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

Flow

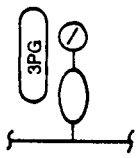
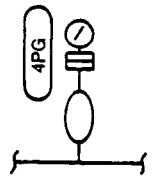
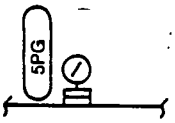
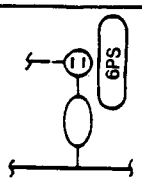
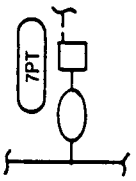
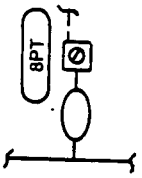
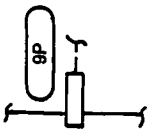
Symbol	Legend	Material Code
	Differential pressure flow transmitter (electronic shown) manifold and primary element capillary	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Manifold 262A thru 262E Capillary 408A
	Rotameter	415A
	Transmitting rotameter	Pneumatic 419A Electronic 420A
	Flow switch rotameter (specify high or low)	421A
	Flow switch mechanical type (specify high or low)	422A
	Transmitting positive-displacement meter Oval gear meter (insert "O.G." inside symbol)	Electronic 404A Electronic 401A
	Indicating positive-displacement meter	403A

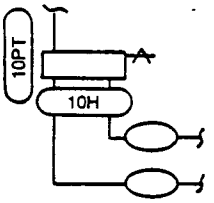
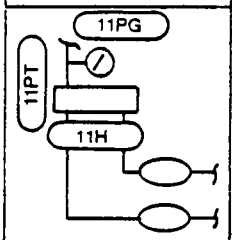
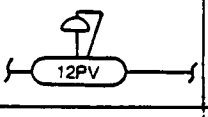
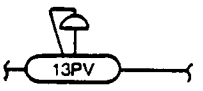
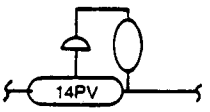
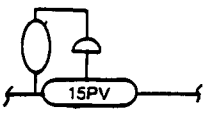
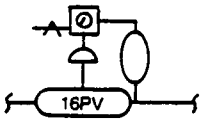
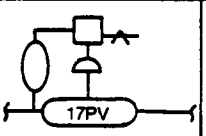
Flow

Symbol	Legend	Material Code
	Totalizing positive-displacement meter	402A
	Sight-flow or "Bulls-eye" indicator	425A
	Purge rotameter (air purge shown) other purge fluid to be noted	417A thru 417D and 418A thru 418E
	Magnetic flow transmitter Amplifier	429A 566D
	Flow Meters (TARG) = target pneumatic (TARG) = target electronic (TURB) = turbine (VORT) = vortex (U.S.) = ultrasonic (SPECL) = special flow (FLUD) = fluidic (SWRL) = swirl (SOLID) = solids cell (SOLID) = XMTR (BATCH) = batch Insert abbreviated meter type inside symbol	 424A 426A 430A 432A 433A 434A 435A 436A 440A 441A 442A
	Flow transmitter Flow element flume	Pneumatic 428A Electronic 428B Flow element 428C

For material code suffix letter refer to the Instrument Unit Library.

DUPONT

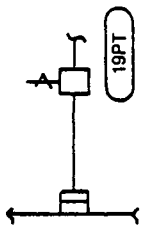
Pressure		
Symbol	Legend	Material Code
	Manometer (single tube)	755A 755E
	Manometer (multiple tube)	757A 757E
	Pressure gage (see SR211P)	727A 727B 727C 727D 727E 727N 727P
	Pressure gage, with chemical seal	729A Flange mount 729B With capillary for remote mounting
	In-line chemical seal pressure gage	729A
	Field-mounted pressure switch (specify high or low)	737A 737D 737E
	Pressure transmitter	Pneumatic 739A 739C 739D 739E Electronic 742A 742C 742D 742E
	Indicating pressure transmitter	Pneumatic 739A 739C 739D 739E Electronic 742A 742C 742D 742E
	Strain cell pressure-sensing element	745A

Pressure		
Symbol	Legend	Material Code
	Differential pressure transmitter with manifold	Pneumatic 723A 723C 723D 723E 724A 724C 724D 724E Manifold 262A thru 262E
	Indicating differential pressure transmitter with manifold	Pneumatic 723A 723C 723D 723E Receiver gage 551A Electronic 724A 724C 724D 724E Receiver gage 552B Manifold 262A thru 262E
	Self-actuated pressure reducing regulator	243A
	Self-actuated back pressure regulator	235A
	Self-actuated pressure-reducing regulator with external pressure connection	243A
	Self-actuated back pressure regulator with external pressure connection with valve-mounted pilot	235A
	Pilot-operated pressure-reducing regulator (indicating type shown) with valve-mounted pilot	245A
	Pilot-operated back pressure regulator with valve-mounted pilot	237A

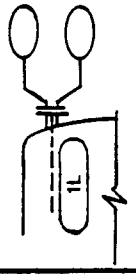
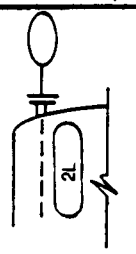
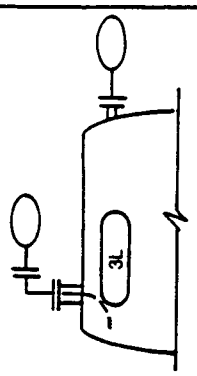
For material code suffix refer to the Instrument Unit Library.

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

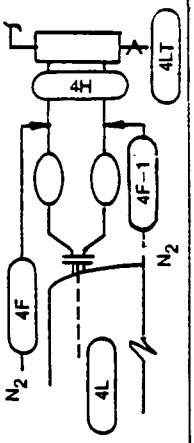
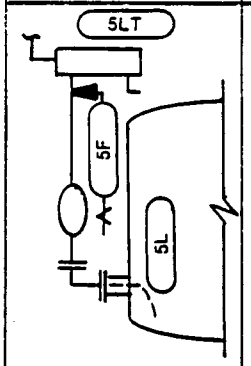
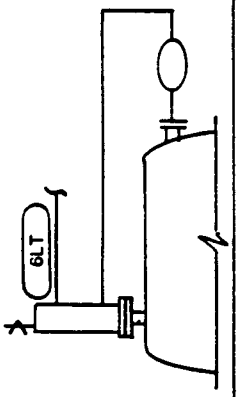
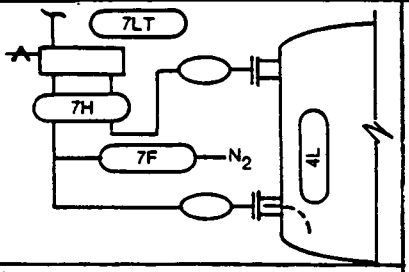
Pressure

Symbol	Legend	Material Code
	Pressure transmitter with capillary and chemical seal (pneumatic shown)	Pneumatic Line mount 743A Capillary for remote mount 740A Electronic Line mount 744A Capillary for remote mount 741A

Level

Symbol	Legend	Material Code
	Dip tube nonvented tank	601A 601C
	Dip tube vented tank	601A 601C
	Dip tube nonvented tank	601A 601C

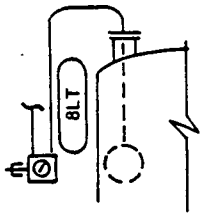
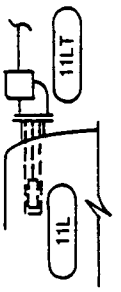
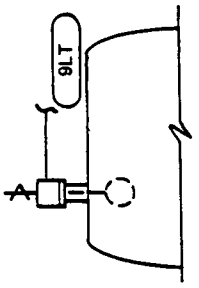
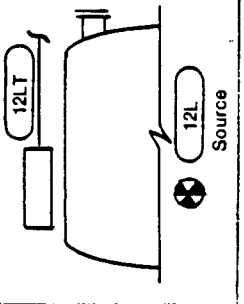
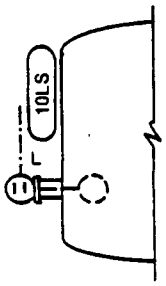
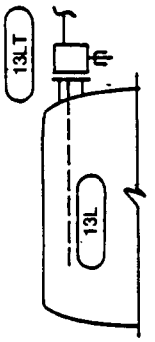
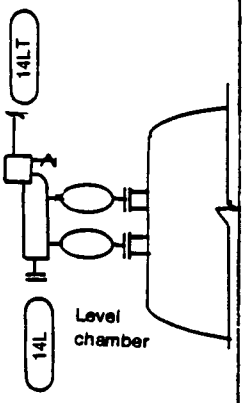
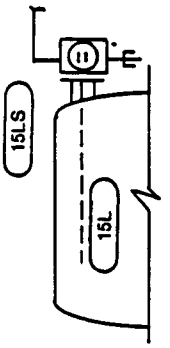
Level

Symbol	Legend	Material Code
	Level transmitter, differential-pressure type, nonvented tank (nitrogen purge shown). Manifold	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Dip tube 601A 601C Manifold 262A thru 262E Purge 417A thru 417D 418A thru 418E
	Level transmitter differential-pressure type, vented tank (air purge shown)	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Dip tube 601A 601C Purge 417A thru 417D 418A thru 418E
	Level transmitter flush diaphragm differential-pressure type, nonvented tank	Pneumatic 720A Electronic 722A
	Level transmitter, differential-pressure type, nonvented tank (nitrogen purge shown). Omit air supply for electronic transmitter	Pneumatic 723A 723C 723D 723E Electronic 724A 724C 724D 724E Dip tube 601A 601C Purge 417A thru 417D 418A thru 418E

Legend for material code suffix letters on this page: (except purge meters)

- A – Standard
- C – With corrosion-resistant pipe
- D – With steam trace
- E – With electric trace

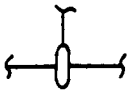
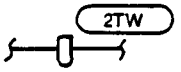
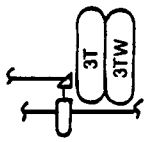
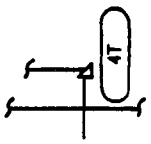
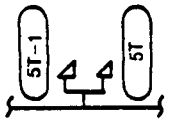
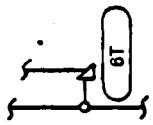
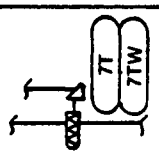
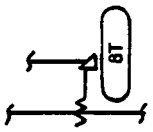
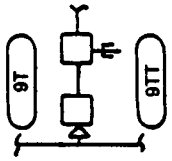
DUPONT

Level			Level		
Symbol	Legend	Material Code	Symbol	Legend	Material Code
	Level transmitter or indicator float or tape type Electronic Level indicator float and tape type	618A 619A 618A		Level transmitter displacement-type with displacer guard	Pneumatic 615A 615D 615E Electronic 616A 616D 616E Displacer guard 605A 605B
	Level controller or transmitter internal ball float type Pneumatic Level transmitter internal ball float type Pneumatic	607A 607B 607B		Level transmitter radiation type	145A 145B 147A Source 149A 149B 149E
	Level switch internal ball float type (specify high or low)	611A		Level transmitter electric-probe type	613A 613B Probe 613C
	Level controller or transmitter, displacement type with level chamber	Controller pneumatic 607A Transmitter pneumatic 615A 615D 615E Transmitter electronic 616A 616D 616E Chamber 603A 603C 603D 603E		Level switch electric-probe type	617A Probe 613C

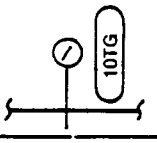
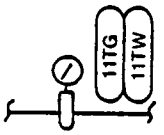
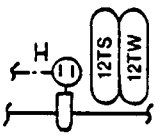
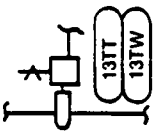
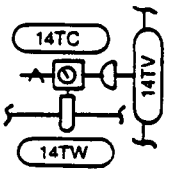
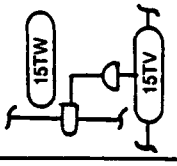
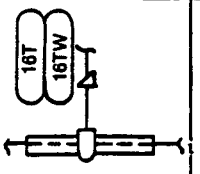
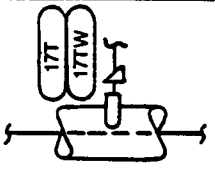
For material code suffix letters refer to the Instrument Unit Library.

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

Temperature

Symbol	Legend	Material Code
	Bare bulb, filled system	See respective device for proper material code
	Filled system in thermowell	Thermowell 823A thru 823J
	Thermowell	823A thru 823J
	Filled system, capillary element	See respective device for proper material code
	Thermocouple in thermowell	Thermowell 823A thru 823J Thermocouple 819A 819B Thermocouple and thermowell 825A
	Thermocouple, no thermowell	819A 819B
	Dual thermocouple, no thermowell	819C
	Thermocouple, surface type	819A 819B
	Resistance temperature detector in thermowell	RTD 807A Thermowell 823A thru 823J RTD & thermowell 807B
	Resistance temperature dector, no thermowell	807A
	Optical-type temperature element	Element 828A Sensor 829A Transmitter 829B

Temperature

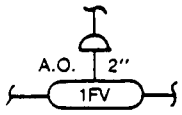
Symbol	Legend	Material Code
	Dial thermometer, no thermowell (see SR200T)	801A 801C
	Dial thermometer in thermowell	Thermometer 801A 801C Thermowell 823A thru 823J Thermometer with well 801B, 801D Remote with capillary 803A
	Temperature switch in thermowell (specify high or low)	815A 815B 823A thru 823J
	Temperature transmitter and thermowell, filled system	Pneumatic 817A with thermowell 817B 817C 817D Electronic 818A With thermowell 818B Thermowell 823A thru 823J
	Temperature control systems (indicating-type shown)	809A 809B Valve, see code page 11 Thermowell 823A thru 823J
	Temperature regulating valve (self-actuated)	249A 251A Thermowell 823A thru 823J
	Thermocouple and thermowell in jacketed pipe core	Thermocouple 819A 819B Thermowell 823A thru 823J Thermocouple with well 825A
	Thermocouple and thermowell in jacketed pipe jacket	Thermocouple 819A 819B Thermowell 823A thru 823J Thermocouple with well 825A

For material code suffix letter refer to the Instrument Unit Library.

DUPONT

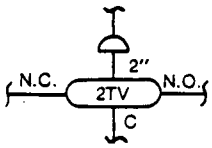
Valves

Control valve, pneumatically operated (action shown air to open)



In	Steel	Stainless Steel
2 and smaller	203A	205A
3	203B	205B
4	203C	205C
6	203D	205D
8	203E	205E
10	203F	205F
12 and up	203G	205G

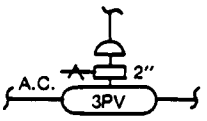
3-port control valve, pneumatically operated. Designations will be shown with no air pressure applied to the diaphragm:
N.C. – Normally closed
N.O. – Normally open
C – Common



In	Steel	Stainless Steel
2 and smaller	220A	Not in library
3	220B	
4	220C	
6 and larger	220D	

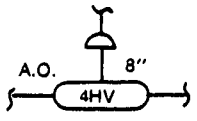
Note: Add prefix "P" for positioner on valve.
Add prefix "W" for I/P on valve.

Control valve, pneumatically operated with positioner (action shown air to close)



In	Steel	Stainless Steel
2 and smaller	P203A	P205A
3	P203B	P205B
4	P203C	P205C
6	P203D	P205D
8	P203E	P205E
10	P203F	P205F
12 and larger	P203G	P205G

Butterfly control valve, pneumatically operated (action shown air to open)



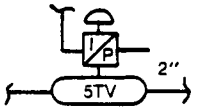
Butterfly

Butterfly valve shown, identify if special.

	6	201A
	8	201B
	10	201C
(In)	12	201D
	16	201E
	20	201F
	24	201G

Note: Add prefix "P" for positioner on valve
Add prefix "W" for I/P on valve.

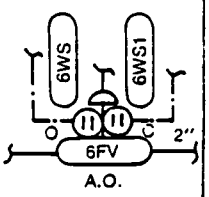
Control valve, pneumatically operated with electro-pneumatic positioner



A.C.

In	Steel	Stainless Steel
2	W203A	W205A
3	W203B	W205B
4	W203C	W205C
6	W203D	W205D
8	W203E	W205E
10	W203F	W205F
12 and up	W203G	W205G

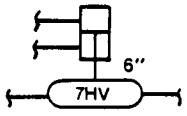
Control valve, pneumatically operated with two electric limit switches
O – Denotes valve fully open
C – Denotes valve fully closed



A.O.

1. When limit switches are mounted by valve manufacturer, use control valve codes plus 365B.
2. When limit switches are mounted by field, use control valve code plus 365A.

Control valve, piston-operated, pneumatic or hyudraulic
on–off shown

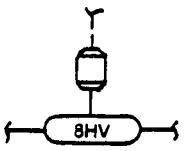
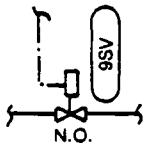
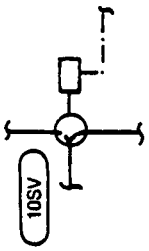
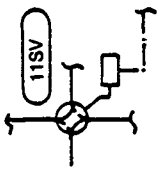
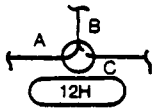


Same codes as pneumatically operated control valves, except for special, use 207A.
Note: Add prefix "P" for positioner on valve
Add prefix "W" for I/P on valve.

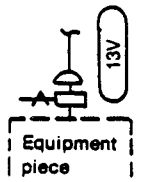
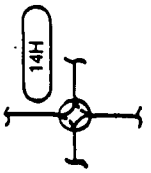
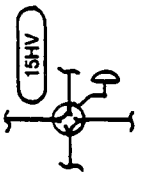
For additional control valve material codes refer to the Instrument Unit Library.

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

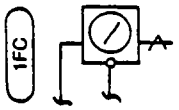
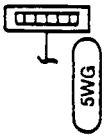
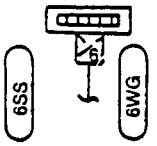
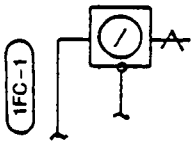
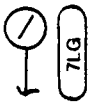
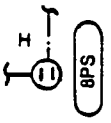
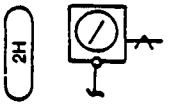
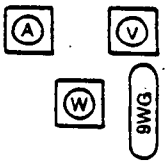
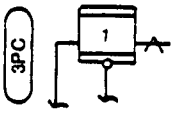
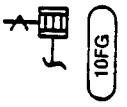
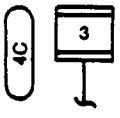
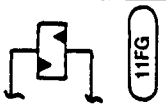
Valves

Symbol	Legend	Material Code
	Electric motor operated valve	209A
	Solenoid valve 2-port, normally open in the de-energized position shown	Pneumatic signal 263A 263B Service pipe 265A 266A
	Solenoid valve 3-port (ports to be shown connected in the de-energized state) N.C. – Normally closed N.O. – Normally open C – Common	263A With air supply 263B
	Solenoid valve 4-port (ports to be shown connected in the de-energized state) (Single coil shown)	263A With air supply 263B Dual coil 263C
	Manual 3-port selector valve	261A

Valves

Symbol	Legend	Material Code
	Actuator, pneumatic	P225A P225B
	Selector valve, multiport, manually operated	261A
	Selector valve, 4-port pneumatically operated (ports to be shown connected in the diaphragm unloaded state)	267A
	Instrument block valve	238B 238J
	Alternative valve symbols	238B

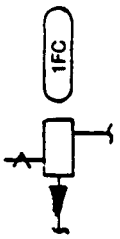
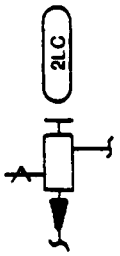
For material code suffix letters refer to the Instrument Unit Library.

Receivers			Receivers		
Symbol	Legend	Material Code	Symbol	Legend	Material Code
	Indicating automatic-to-manual station with controller	Automatic-to-manual Pneumatic 555A Electronic 571B Automatic-to-manual with controller Pneumatic 545A Electronic 554A		Single point digital indicator	569A 569B
				Multipoint digital indicator. Show number of points (six points shown)	Indicator 569A Selector switch 355A
	Ratio Station	Pneumatic 575A Electronic 576A		Indicator	Pneumatic 551A Electronic 552B
				Alarm, shutdown, etc, switch (specify high or low)	Pneumatic 559A – single 560A – dual Electronic 352A – single 352C – dual
	Manual loading station	Pneumatic 573A Electronic 574A		Electronic meter	Ammeter 321A Milliameter 325A Volts 327A Watts 322A
	Recording automatic-to-manual station with controller. Show number of pens	Automatic-to-manual Pneumatic 556A Electronic 556B Automatic-to-manual with controller Pneumatic 546A Electronic 547A		Integrator	Pneumatic 562A Electronic 567A
	Recorder. Show number of pens	Pneumatic 563A Electronic 564A		Vertical indicator	Pneumatic 553A Electronic 552A

Note: Apply prefix numbers to material codes of instruments installed by panel manufacturer as in following example:
On CCR panel – 8555A
On local panel – 9555A
A – Standard

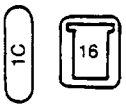
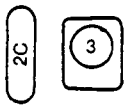
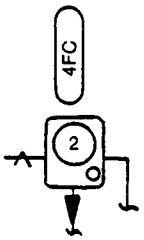
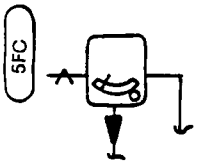
INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

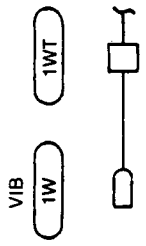
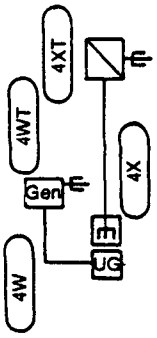
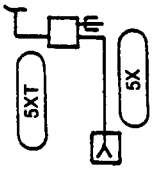
176

Controllers and Control Components			Controllers and Control Components		
Symbol	Legend	Material Code	Symbol	Legend	Material Code
	Nonindicating controller	Pneumatic controller 557A With housing 557B Electronic 557C			
	Nonindicating controller with manual set-point regulator	Pneumatic controller 557A With housing 557B			
	Rheostat	356A			
	Timer	357			

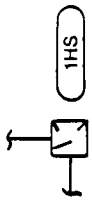
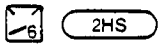
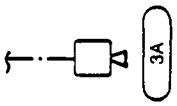
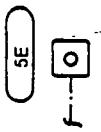
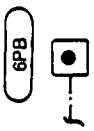
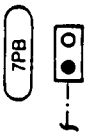
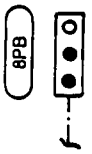
Note: Apply prefix numbers to material codes of instruments installed by panel manufacturer as in following example:
On CCR panel – 8555A
On local panel – 9555A

DUPONT

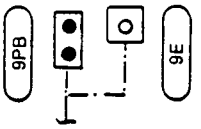
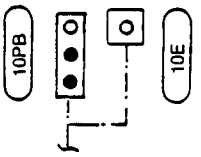
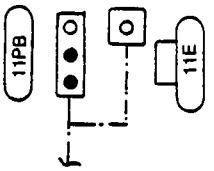
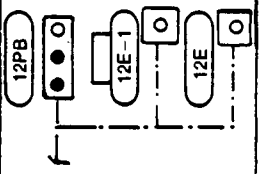
Recorders, Receivers, and Indicators			Recorders, Receivers, and Indicators		
Symbol	Legend	Material Code	Symbol	Legend	Material Code
	Strip chart recorder. Show number of points	Thermocouple 333A Resistance bridge 341A			
	Large case circular chart recorder. Show number of pens	561B			
	Large case single-point indicator or receiver	Thermocouple 331A potentiometer pneumatic or process variable 561C			
	Large case 2-pen recorder controller	561A Pneumatic or process variable			
	Large case indicating controller	561D			
	Special instrument cases				

Miscellaneous			Miscellaneous		
Symbol	Legend	Material Code	Symbol	Legend	Material Code
	Vibration or position (vibration probe with amplifier shown)	Transmitter 161C Sensor 161B			
	PH cell	131A			
	Conductivity cell	121A			
	PH cell with preamplifier, PH transmitter. Ultrasonic generator and cleaner (local power supply shown)	PH cell 131A PH transmitter 137A Ultrasonic generator and cleaner 132A			
	Conductivity cell and transmitter with preamplifier (local power supply shown)	Conductivity cell 121A Transmitter 127A			

Panel-Mounted Push Buttons, Switches, and Lights

Symbol	Legend	Material Code
	Selector switch	355A
	Multipoint selector switch. Show number of points	332A
	Audible alarm device	Buzzer 307A Horn 309A 309C 309D
	Alarm, audible and visual in an annunciator system	317A single 316A dual Hi–low
	Running light	Run light 363A Pilot light 363B
	Stop button	353A
	Stop button and running light	354A
	Start, stop buttons and running light	354A

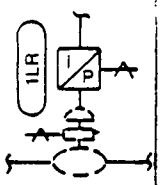
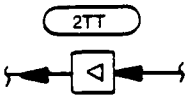
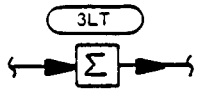
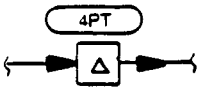
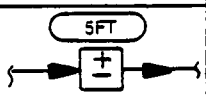
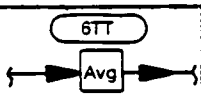
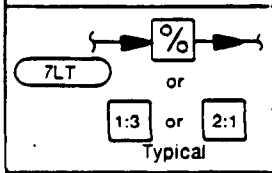
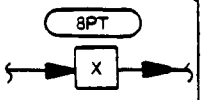
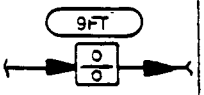
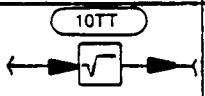
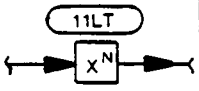
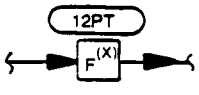
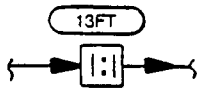
Panel-Mounted Push Buttons, Switches, and Lights

Symbol	Legend	Material Code
	Start, stop buttons plus running light in annunciator system	353A plus 317A
	Start, stop buttons, and running light plus running or not running light in annunciator system	354A plus 317A
	Start, stop buttons and running light plus running light at another location	354A plus 363A
	Start, stop buttons and running light plus running light at another location, plus running light or not running light in annunciator system	354A plus 363A plus 317A

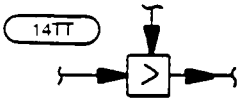
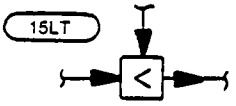
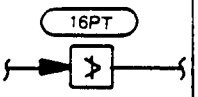
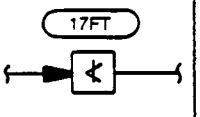
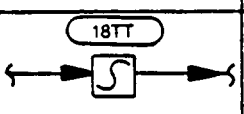
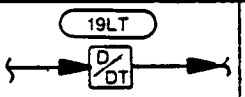
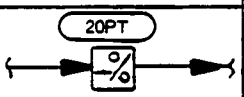
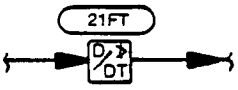
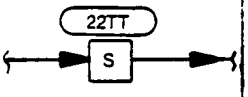
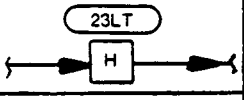
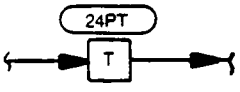
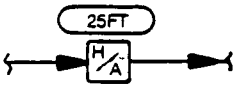
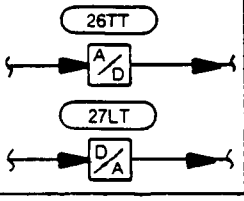
Note: Apply prefix numbers to material codes of instruments installed by panel manufacturer as in following example:
On CCR panel – 8555A
On local panel – 9555A

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS

Relays

Symbol	Legend	Material Code
	Relay (I to P) Electric to pneumatic for control valve	222A
	Signal amplifier	323A With meter 323B
	Add or totalize (add and subtract)	Pneumatic 762B Electronic 581B
	Difference (subtract)	Pneumatic 762C Electronic 581C
	Bias	Pneumatic 762D Electronic 581D
	Average	Pneumatic 762E Electronic 581E
 Typical	Gain or attenuate (input: output) proportions	Pneumatic 763B Electronic 579B
	Multiply	Pneumatic 763C Electronic 579C
	Divide	Pneumatic 763D Electronic 579D
	Extract square root	Pneumatic 777A Electronic 579A
	Raise to power	Pneumatic 762A Electronic 581A
	Characterize	Pneumatic 762A Electronic 581A
	Boost	Pneumatic 763A Electronic 582E

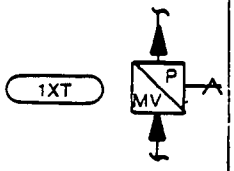
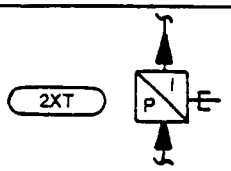
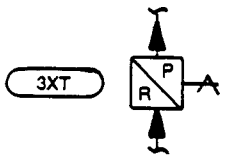
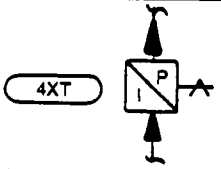
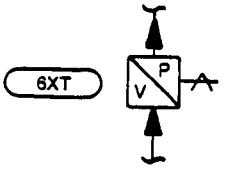
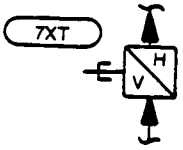
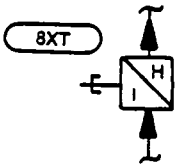
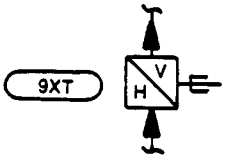
Relays

Symbol	Legend	Material Code
	High select	Pneumatic 765B Electronic 582C
	Low select	Pneumatic 765C Electronic 582D
	High limiting	Pneumatic 765D Electronic 582A
	Low limiting	Pneumatic 765E Electronic 582B
	Integrate	Pneumatic 763E Electronic 579E
	Derivative	Pneumatic 767A Electronic 580A
	Reverse proportional	Pneumatic 767B Electronic 580B
	Velocity limiter	Pneumatic 764C Electronic 580C
	Analog signal generator – automatic	Pneumatic 764A Electronic 580D
	Analog signal generator – manual	Pneumatic 764B Electronic 580E
	Transfer	Pneumatic 764D Electronic 580F
	Hand/auto station	Pneumatic 764E Electronic 580G
	For input/output sequences of the following A Analog D Digital	Electronic 583A 584A

Note: Apply prefix numbers to material codes of instruments installed by panel manufacturer as in following example:
On CCR panel – 8555A On local panel – 9555A
Show air or power supply if required, rack units share power supply.

DUPONT

Transducers and Converters

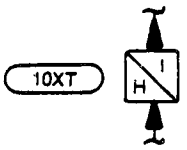
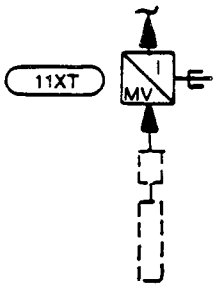
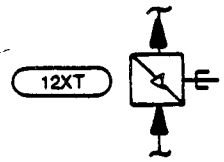
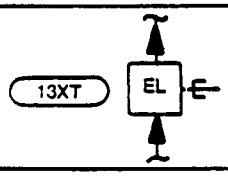
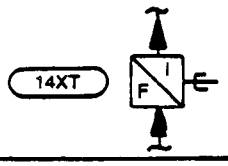
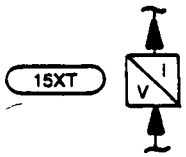
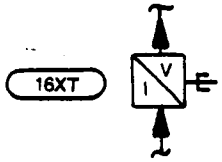
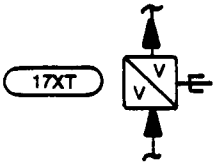
Symbol	Legend	Material Code
	Millivolt to pneumatic	565A
	Pneumatic to current	565B
	Resistance to pneumatic	565C
	Current to pneumatic	565D
	Voltage to pneumatic	565E
	Voltage to hydraulic	565F
	Current to hydraulic	565F
	Hydraulic to voltage	565G

Transducers and Converters

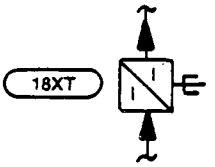
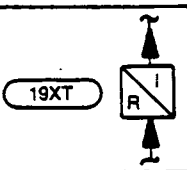
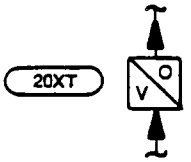
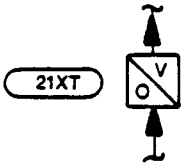
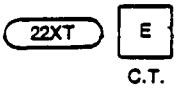
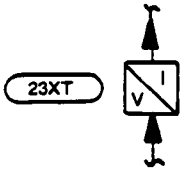
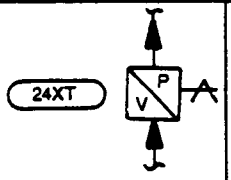
Symbol	Legend	Material Code

Note: Show air or power supply if required, rack units share power supply.

Transducers and Converters

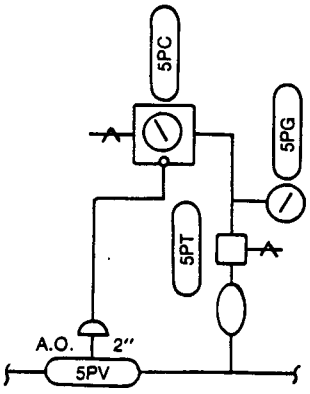
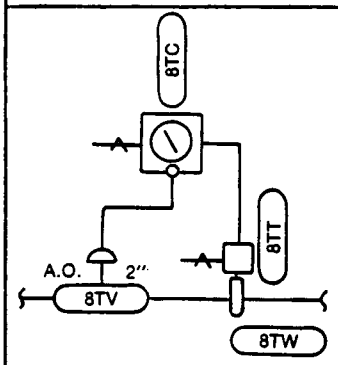
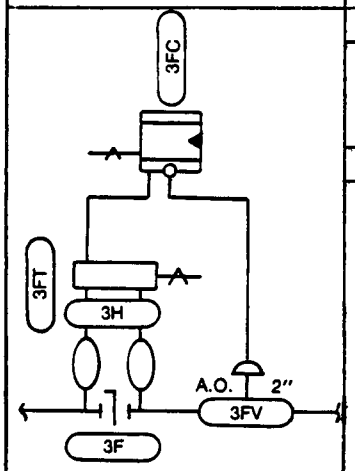
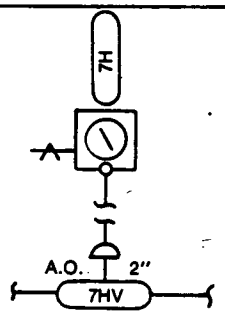
Symbol	Legend	Material Code
	Hydraulic to current	565G
	Millivolt to current	566A
	Converter with preamplifier	566B
	Electronics	566C
	Frequency to current (mag meter converter)	566D
	Voltage to current converter	566E
	Current to voltage	567B
	Voltage to voltage	567C

Transducers and Converters

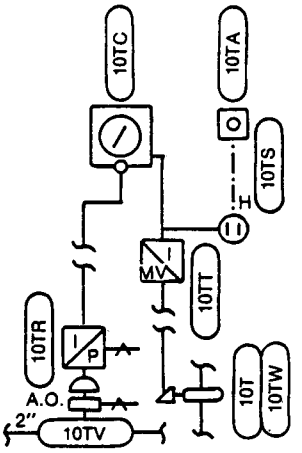
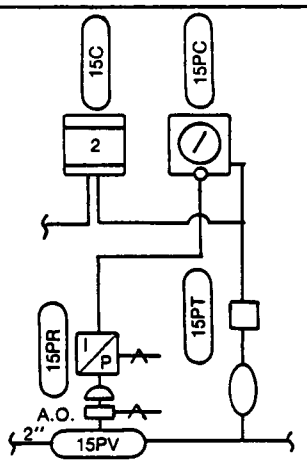
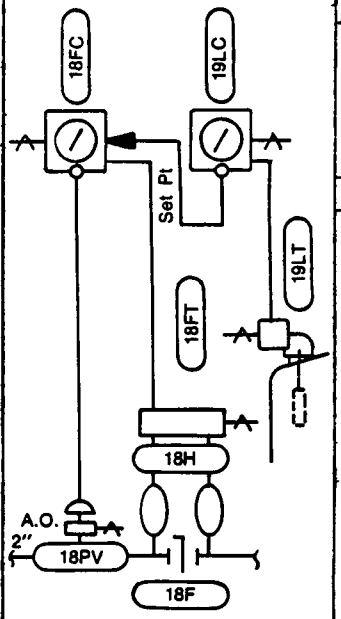
Symbol	Legend	Material Code
	Current to current	567D
	Resistance to current	567E
	Voltage to optics	568B
	Optics to voltage	568C
	Current transformer	379B
	Current transmitter voltage to current	380A
	Current transmitter voltage to pneumatic	380B

Note: Apply prefix numbers to material codes of instruments installed by panel manufacturer as in following example:
On CCR panel – 8555A On local panel – 9555A
Show air or power supply if required, rack units share power supply.

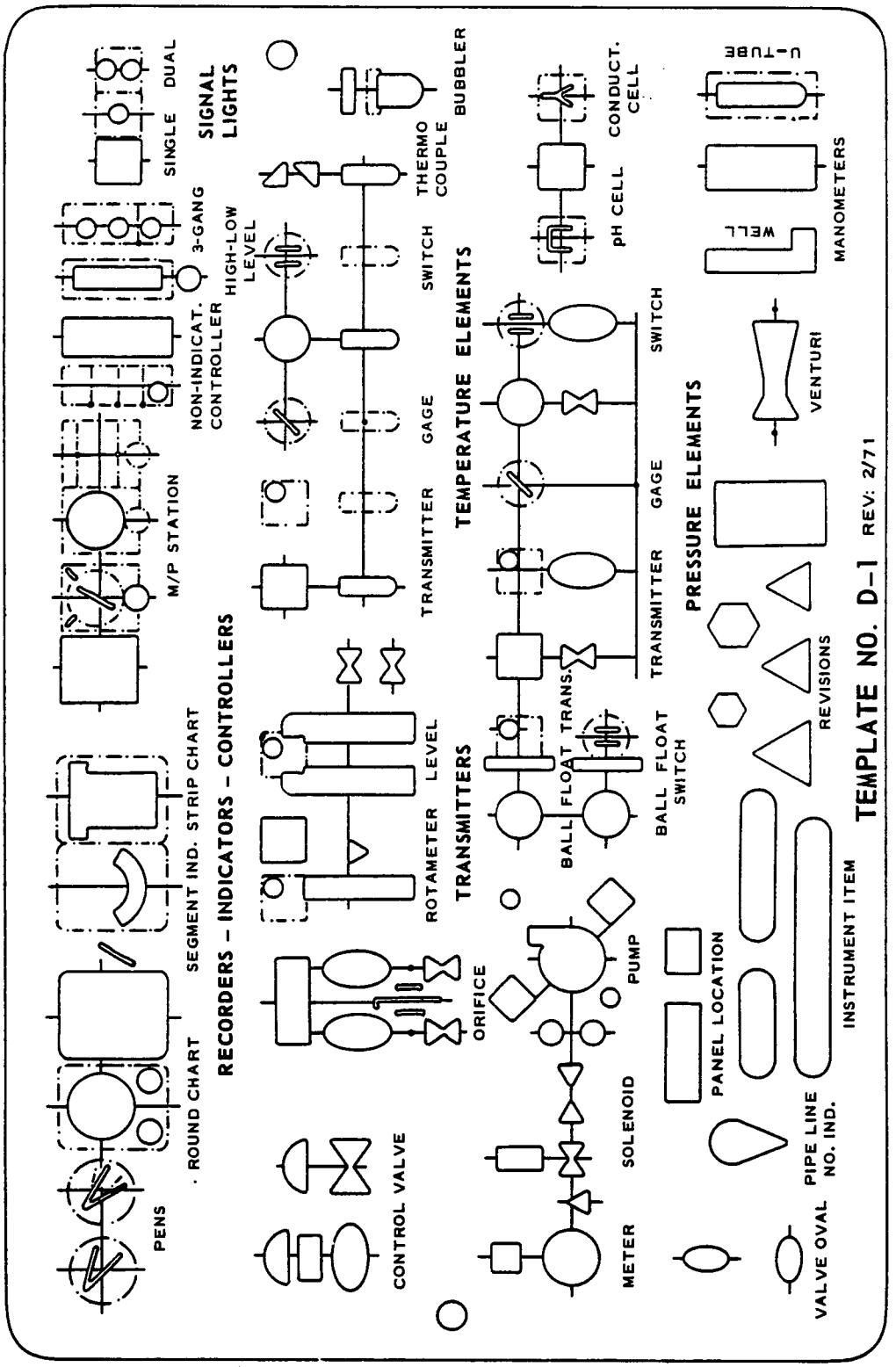
Typical Control Loop

Symbol	Legend
	Pneumatic pressure control loop (panel-mounted indicating automatic-to-manual station with plug-in controller) **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops.
	**Legend** Pneumatic temperature control loop (panel-mounted indicating automatic-to-manual station with plug-in controller) **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops
	**Legend** Pneumatic flow control loop (panel-mounted recording automatic-to-manual controller) **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops.
	**Legend** Manual loading station positioning pneumatically operated valve **Material Code** Station – 573A Valve – see valve material code

Typical Control Loop

Symbol	Legend
	Electronic temperature control loop (panel mounted indicating automatic-to-manual station high temperature alarm, MV/I converter back of panel, field-mounted I/P converter) **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops.
	**Legend** Electronic pressure control loop (panel-mounted automatic-to-manual controller and separate two-pen recorder, field mounted I/P converter **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops.
	**Legend** Pneumatic cascade system flow control with level reset. (Two panel-mounted automatic-to-manual stations with plug-in controllers.) **Material Code** See individual instrument symbols for material code. Also see "X" loops and "Y" loops in the instrument unit library for estimating typical control loops.

INSTRUMENT SYMBOLS FOR INSTRUMENT DIAGRAMS



THIS TEMPLATE MAY BE OBTAINED FROM THE REPRODUCTION SECTION, LOUVIERS BLDG, WILMINGTON, DE

CODE	P103A	P103B	P103C	P103D	P103E
DESIGN PRESSURE, PSIG	150.				
DESIGN TEMPERATURE, F	150.				
DESIGN TEMPERATURE, C	66.				
MAX TEST PRESS., PSIG	155.				
MIN TEMPERATURE, F	-20.				
MIN TEMPERATURE, C	-29.				
MAX DIFFERENTIAL PRESS (EXT MINUS INT), PSI					

ALLOWANCE FOR CORROSION AND EROSION = 0.030 IN.
BASIS FOR STRESSES: ANSI/ASME B31.3

PIPE REFERENCE STANDARDS SW2F

SIZE(IN.)	SCHED	ASTM SPECIFICATIONS
.50 - 4.0	40*	ERW TO SW2F ASTM A53 BUTT-WELDED OR API 5L BUTT-WELDED.
6.0 - 6.0	40	ASTM A135 ELECTRIC-RESISTANCE WELDED GRADE B OR
8.0 - 12.	20	ASTM A53 ELECTRIC-RESISTANCE WELDED GRADE B OR
14. - 24.	10	ASTM A139 ELECTRIC-FUSION WELDED GRADE B OR API 5L ELECTRIC-WELDED GRADE B.

* NIPPLES 4" AND LESS IN LENGTH SHALL BE SCHEDULE 80.

QUALIFICATIONS

SEAMLESS GRADE B TO ASTM A53, ASTM A106, OR API 5L MAY BE SUBSTITUTED IN ALL SIZES.

FITTINGS REFERENCE STANDARDS P36E, SP1.1B

NPS	WEIGHT	SPECIFICATIONS
.50 - 2.0	150 LB	SCREWED MALLEABLE IRON, ANSI B16.3, EXCEPT BUSHINGS AND PLUGS TO BE FORGED STEEL, ANSI B16.11.
.50 - 6.0	SCH.40	BUTT-WELDING CARBON STEEL, ANSI B16.9, ASTM A234, GRADE WPB OR WPBW. TAPER MACHINE NPS 8 THRU NPS 12 STANDARD TO MATCH SCHEDULE 20 PIPE AND NPS 14 THRU NPS 24 STANDARD TO MATCH SCHEDULE 10 PIPE.
8.0 - 12.	SCH.20 OR STD	
14. - 24.	SCH.10 OR STD	

QUALIFICATIONS

COLD BENDS ARE ACCEPTABLE, PROVIDED THEY MEET THE REQUIREMENTS OF P36E, WITH MINIMUM BENDING RADIUS IN ACCORDANCE WITH THE FOLLOWING TABLES.

P103A (150. PSIG AT 150. DEG F)

		MINIMUM BENDING RADIUS							
SIZE(IN)		.5	.75	1.	1.5	2.	3.	4.	6.
MATERIAL	SCHED								
ERW SW2F	40	3D	1.5D	1.5D	1.5D	1.5D	1.5D	1.5D	
A106 GR B	40	3D	3D	3D	3D				
A53S GR B	40					3D	3D	3D	
A139 GR B	40								5D

WELDING ELBOWS SHALL BE LONG-RADIUS UNLESS OTHERWISE SPECIFIED.

BRANCH WELDS ARE ACCEPTABLE. THE BRANCH WELDS IN THE FOLLOWING TABLES MUST BE REINFORCED IN ACCORDANCE WITH SP1.1B.

P103A (150. PSIG AT 150. DEG F)

RUN (NPS)	45 DEGREE BRANCH	60 DEGREE BRANCH	75 DEGREE BRANCH	90 DEGREE BRANCH
14	14	-	-	-
16	16	-	-	-
18	16-18	-	-	-
20	12-20	20	-	-
24	.75,1.5-2,6-24	8-24	10-24	12-24

JOINTS REFERENCE STANDARDS SP8C, P34E

NPS	TYPE	SPECIFICATIONS
.50 - 2.0	RUNS	BUTT-WELDED OR THREADED, WITH TAPER-TAPPED EXTRA-HEAVY SEAMLESS STEEL NONRECESSED COUPLINGS WITH UNIONS FOR MAINTENANCE OF SCREW PIPE.
3.0 - 24.	RUNS	BUTT-WELD
.50 - 2.0	MAINTENANCE (ALTERNATE)	CLASS 300 MALLEABLE IRON UNIONS WITH IRON-TO-BRASS SEATS, THREADED ENDS: ANSI B16.39
.50 - 4.0	MAINTENANCE AND FIT-UP TO FLANGES (EXCEPT CAST IRON).	LAPS MADE ON ERW PIPE TO SW2F WITH DIMENSIONS TO P34E. DUCTILE IRON BACKUP FLANGES TO SP8C, CLASS I; OR WITH CLASS 150 FORGED STEEL SLIP-ON FLANGE AS BELOW EXCEPT GRIND 1/8-IN BEVEL ON CORNER BETWEEN BORE AND FACE OF STEEL FLANGE.
.50 - 24.		CLASS 150 FORGED STEEL WELDING-NECK OR SLIP-ON FLANGES: ANSI B16.5; ASTM A105. WELDING-NECK FLANGES SHALL BE BORED TO MATCH THE INSIDE DIAMETER OF ABUTTING PIPE.
.50 - 24.	FIT-UP TO CAST IRON FLANGES.	FLAT-FACED CLASS 150 FORGED STEEL WELDING-NECK OR SLIP-ON FLANGES: ANSI B16.9, ASTM A105. WELDING-NECK FLANGES SHALL BE BORED TO MATCH THE INSIDE DIAMETER OF ABUTTING PIPE.
.50 - 2.0	FIT-UP TO THREADED EQUIPMENT	MINIMUM LENGTH, SEAMLESS THREADED NIPPLE AND UNION AS SPECIFIED FOR MAINTENANCE. THREAD SEALANT TO BE TEFLON TAPE.

GENERAL

FINISH ON STUB-ENDS AND WELDING FLANGES SHALL BE "SERRATED-CONCENTRIC" OR "SERRATED SPIRAL" PER ANSI B16.5.

FINISH ON FACES OF ROLLED LAPS SHALL BE "SMOOTH"

BOLTING REFERENCE STANDARDS

DESCRIPTION	MATERIAL	ASTM	GRADE	QUALIFICATIONS
BOLTS	CARBON STEEL	A307	B	HEAVY HEX HEADS, ANSI B18.2.1
NUTS	CARBON STEEL	A563	A	HEAVY HEX, ANSI B18.2.2

QUALIFICATIONS

THREAD LUBRICANT - NEVER SEEZ

GASKETS REFERENCE STANDARDS

MAT'L: SU2A, SU1C
SIZES: U9A OR ANSI BI6.21

LINE SIZE(IN.)	THICK(IN.)	CODE	QUALIFICATIONS
.50 - 8.0	1/16	G-1	BETWEEN FLAT FACES, USE FULL-FACE
10. - 24.	1/8	G-1	GASKET.

VALVE BONNET GASKETS

ORIGINAL	MAINTENANCE
VENDOR'S STANDARD	NPS 2 AND SMALLER, VENDOR'S STANDARD NPS 3 AND LARGER, G-1

VALVE STEM PACKING

ORIGINAL	MAINTENANCE
VENDOR'S STANDARD	NPS 2 AND SMALLER R-6 OR R-50, NPS 3 AND LARGER R-50

VALVES REFERENCE STANDARDS P1V

THE VALVES LISTED IN THIS SPECIFICATION ARE SATISFACTORY FOR THE SERVICES AS INDEXED; HOWEVER, THE PROPER SELECTION OF VALVES FOR A PROJECT IS INDICATED ON PIPING DIAGRAMS, DRAWINGS, OR VALVE LISTS.
SEE PROJECT SPECIFICATION FOR VALVES ON CONTRACT WORK.

NPS	ENDS	GATE	GLOBE	CHECK	BALL	BUTTERFLY
.50-2.	SW	G37C		C37H	B32F	
.50-2.	FL	G32K(2)	T32H			
3.-24.	FL	G21F	T21H	C21D(1)		
3.-24.	FL			C21E(3)		
.5-2.	SCRD				X11A	
3.-24.	FL					W22K
3.-24.	WAFER					W22A
3.-24.	WAFER			C22C		W22C
.5-2.	SW/THD	G37AB				
.5-2.	THD		T13E	C13A		

QUALIFICATIONS

(1) SWING-TYPE.
(2) FOR USE IN BRANCHES AT MAIN HEADERS.
(3) TILTING, DISK TYPE.

WELDING

DU PONT WELDING: SW13W, SW41W, SW47.1W

WELDING PROCEDURE AND WELDER SHALL BE QUALIFIED IN ACCORDANCE WITH SW60W, SECTION 4.

WELD EXAMINATION TO SW60W, CLASS IIR

CONTRACT WELDING: ANSI/ASME B31.3 SECTION 327.

WELDING PROCESSES LIMITED TO GAS TUNGSTEN ARC (GTAW), GAS METAL ARC (GMAW) AND SHIELDED METAL ARC (SMAW).

BACKING RINGS ARE NOT PERMITTED.

QUALIFIED PROCEDURES SHALL BE APPROVED BY DU PONT PRIOR TO WELDING.

WELD EXAMINATION TO ANSI/ASME B31.3, PAR. 336.5.1(a), PAR. 336.5.1(b), (ONLY RADIOGRAPHY PERMITTED), PAR. 336.5.1(c), AND PAR. 336.5.4.

LIMITS ON IMPERFECTIONS SHALL BE IN ACCORDANCE WITH TABLE 327.4.1A

FABRICATION & ERECTION REFERENCE STANDARDS : SP1B, SP1.1B

STRESS RELIEVE - NONE

CLEANING

SEE SECTION 8 OF THIS SPECIFICATION

ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM	PART	NAME	REF. DWG. NO.	REMARKS
113592	880	101	1		PUMPING WELL NO.1 INSTALLATION		
↓	↓	THRU			↓		
113592	880	134	1		PUMPING WELL NO.34 INSTALLATION		
113592	880	101	1	1	PUMPING WELL NO.1 SUBMERSIBLE PUMP		
↓	↓	THRU					
113592	880	134	1	1	PUMPING WELL NO.34 SUBMERSIBLE PUMP		
113592	880	135	1	1	SPARE SUBMERSIBLE PUMP		
113592	880	101	1	2	DISCHARGE HOSE		
↓	↓	THRU					
113592	880	134	1	2	DISCHARGE HOSE		

NOTES:

1. PUMPING WELL TYPICAL FOR 34 WELLS (EN 880-101-1 THRU 880-134-1).
2. ALL WELL PUMP DISCHARGES ARE INSULATED AND ELECTRICALLY TRACED.
3. REMOVABLE/REUSABLE INSULATION PROVIDED AT EACH WELL FOR PORTABLE FLOW METER.
4. RECYCLE LINE NOS. FOR WELLS 2 THRU 34 INCREMENT BY A FACTOR OF TEN.
5. LOOPS 140,141 AND 142 ARE NOT TYPICAL. THEY ARE SINGLE LOOPS.
6. LOCATE FLOW MEASUREMENT STATION AS CLOSE AS POSSIBLE TO JUNCTION OF LINE NOS. 405 & 403.
7. HIGH EQUALIZATION TANK LEVEL (205LS) INTERLOCKS WELL LEVEL SETPOINTS TO 100% OF SPAN TO PREVENT EQUAL. TANK OVERFILL.

Steams Catalytic
DELAWARE VALLEY DESIGN OFFICE

Preliminary	VSW	08/21/86	Contract Number	SCC 39950 DP 3592
Design Release	V.S. BRONIEWICZ	10/10/86	Drawn by	AJA 10/09/86
			Checked by	J. BRADSHAW 08/28/86
Construction Release Review			Drawing No.	A-201 Rev. 9

INSTR. LOOP NUMBER 400-499	
LAST NO.	NO. CANCELED
142	135-139 AVAILABLE

W951176 LAST 9 REV

SPECIFICATIONS

PIPING 5779 INSULATION 8575 PAINT 8572

LINE NUMBERS

PROJ	DA	TYPE	ALLOTTED	LASTNO.	NO. CANCELED
113592	880	WELL NO. 1	10 - 19	12	
↓	↓	THRU			
113592	880	WELL NO. 34	340 - 349	342	
113592	880	HEADERS	400 - 406	406	
113592	880	HEADERS	350 - 399	351	

LINE LEGEND

———	PROCESS ON PROCESS OR COMB.	- - - -	TRACED
———	SERVICE ON SERVICE	— · — · —	JACKETED
———	SERVICE ON PROCESS OR COMB.	———	INSTRUMENT
———	PROCESS ON SERVICE	— · — · —	ELECTRICAL

M/F	BLDG	PROJ	DA	TYPE	W951176	LAST 9 REV
	-	113592	880	21C		
				71C		

NIAGARA PLANT
REMEDIATION PROJECT
PUMPING WELL SYSTEM
PUMPING WELL COLLECTION SYSTEM
PROCESS AND INSTRUMENTS

PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE
113592	1	ADDED VALVE SIZE				
113592	2	ADDED LINE NO. AND SIZE				
113592	3	ADDED DISCHARGE HOSE DA NO. AND PG SIZE				
113592	4	CORRECT VALVE CODES				
113592	5	DELETE RESTRICTIVE ORFICE				
113592	6	ADD HEADER ISOLATION VALVES				
113592	7	CHANGE LT TO LIT				
113592	8	ADDED NOTE 7				
113592	9	COMBINE LEVEL INDICATION				

STANDARDS	REFERENCE DRAWINGS	
	W951177	P & I
	W951178	P & I
	W951179	P & I
	W941615	PLOT
	W941614	PLOT

PROJECT 113592
SCALE NONE DATE
DRAWN
CHECKED
APPROVED-W.T. SPERRY 10/16/86
DESIGN RELEASE
APPROVED-
CONSTR. RELEASE

W951176

INTERGRAPH-COMPUTER DRAWING

ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN

CCR PANEL — FRONT OF PANEL / REAR OF PANEL

FROM 301FT W951178

TO 201LR DWG.NO. W951178

FROM 142LT DWG.NO. W951176

TO 101LC-134LC DWG.NO.W951176

4" EFFLUENT RECYCLE 437 PI03B W951178

2" 451 PI01E W951179

1" RECYCLE AQUEOUS PHASE FROM DECANTER 438 PI03B W951179

6" GROUND WATER COLLECTION HEADER 401 PI03B W951176

6" COLUMN BOTTOMS 426 PI01E W951178

4" TO PREHEATER COLD SIDE 415 PI03B W951178

4" TO PREHEATER HOT SIDE 414 PI01E W951178

OUTSIDE L.D.T. — INSIDE ANALYTICAL SHED — WHITEY SS-6NB56

880-1-1 — 880-2-1 — 880-2-2 — 880-2-1-1 — 880-2-1-2 — 880-2-2-1 — 880-2-2-2

880-7-1 — 880-7-1-1 — 880-7-1-2 — 880-8-1 — 880-8-1-1 — 880-8-1-2

880-5-1 — 880-6-1 — 880-3-1

NOTE 1 — NOTE 2 — NOTE 3

TO ORGANICS SUMP 6" 409 PI03B W951179

SAMPLE 286FV-1 — SAMPLE 286FV-2

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM	PART	NAME	REF. DWG. NO.	REMARKS
113592	880	1	1		EQUALIZATION TANK		
113592	880	1	1	1	EQUALIZATION CONSERVATION VENT		PRESSURE/VACUUM
113592	880	2	1		CARBON CANNISTER "A"		
113592	880	2	1	1	CANNISTER "A" FEED HOSE		
113592	880	2	1	2	CANNISTER "A" DISCHARGE HOSE		
113592	880	2	2		CARBON CANNISTER "B"		
113592	880	2	2	1	CANNISTER "B" FEED HOSE		
113592	880	2	2	2	CANNISTER "B" DISCHARGE HOSE		
113592	880	3	1		STRIPPER FEED PUMP		
113592	880	3	61		STRIPPER FEED PUMP MOTOR		
113592	880	5	1		STATIC MIXER		
113592	880	6	1		COMMON SPARE PUMP		
113592	880	6	61		COMMON SPARE PUMP MOT		
113592	880	7	1		SCALE INHIBITOR METERING PUMP		
113592	880	7	1	1	METERING PUMP RELIEF VALVE		
113592	880	7	1	2	SUCTION HOSE		
113592	880	8	1		ANTI-FOAM METERING PUMP		
113592	880	8	1	1	METERING PUMP RELIEF VALVE		
113592	880	8	1	2	SUCTION HOSE		

NOTES:
1. LOCATE CONTAINERS INSIDE HEATED ANALYTICAL SHED.
2. LOCATE CARBON CANNISTERS AT GRADE.
3. SEAL LEG FOR ETHYLENE GLYCOL SEAL IN INTERNAL OVERFLOW LN. NO.409

Stearns Catalytic — DELAWARE VALLEY DESIGN OFFICE

Preliminary	VSW	08/21/86	Contract Number	SCC 39950 DP 3592	
Design Release	V.S. WRONIEWICZ	10/10/86	Drawn by	J. DI MENTO	08/20/86
Construction Release Review			Checked by	J.D. BRADSHAW	08/20/86
			Drawing No.	A-202	Rev. 10

INSTR. LOOP NUMBER 200-299

LAST NO.	NO. CANCELED
207	

W951177 — LAST 10 REV

SPECIFICATIONS

PIPING 5779 INSULATION 8575 PAINT 8572

LINE NUMBERS

PROJ	DA	TYPE	ALLOTTED	LASTNO.	NO. CANCELED
113592	880	PROCESS	407 - 419	419	419

LINE LEGEND

———	PROCESS ON PROCESS OR COMB.	———	TRACED
———	SERVICE ON SERVICE	———	JACKETED
- - - -	SERVICE ON PROCESS OR COMB.	———	INSTRUMENT
- - - -	PROCESS ON SERVICE	—·—·—	ELECTRICAL

M/F	BLOG	PROJ	DA	TYPE	W951177	LAST 10 REV
		113592	880	21C		
				71C		

NIAGARA PLANT
REMEDIATION PROJECT
PUMPING WELL SYSTEM
EQUALIZATION & SCALE CONTROL
PROCESS AND INSTRUMENTS

PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE
113592	1	ADDED LINE NOS. 418 & 419				
113592	2	REVISED PIPE SPEC. CODE				
113592	3	CHANGED LINE NO. FROM 419 TO 428				
113592	4	ADDED SUCTION HOSE DA NO.				
113592	5	REVISE CARBON CANNISTER PIPING				
113592	6	ADD ANTI-FOAM FEED SYSTEM				
113592	7	CHANGE VALVE CODE				
113592	8	COMBINE LEVEL INDICATORS				
113592	9	ADDED PANEL STOP PB				
113592	10	CHANGE LINE SIZE				

STANDARDS

REFERENCE DRAWINGS: W951176 KEY

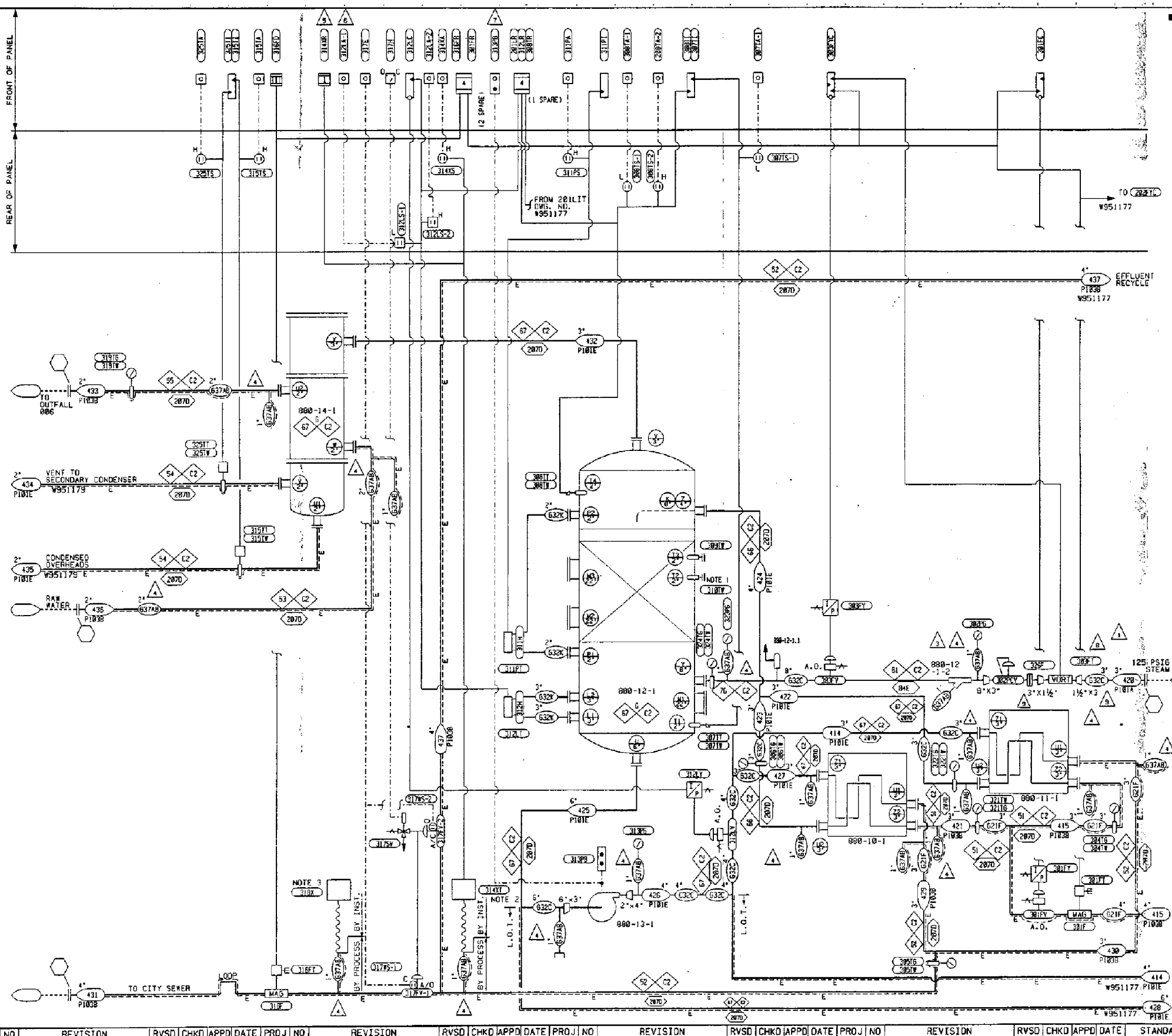
PROJECT 113592
SCALE NONE DATE
DRAWN
CHECKED
APPROVED - W.T. SPERRY 10/16/86 DESIGN RELEASE
APPROVED - CONSTR. RELEASE

E.I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT

W951177

INTERGRAPH COMPUTER-DRAWING

W951177. 12/15/86 :JJD : (05)



➡ ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN ⬅

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM PART	NAME	REF. DWG. NO.	REMARKS
113592	880	10	1	FEED PREHEATER 'A'		
113592	880	11	1	FEED PREHEATER B		
113592	880	12	1	STRIPPER COLUMN		
113592	880	12	1 1	STEAM RELIEF VALVE		
113592	880	12	1 2	STRAINER		
113592	880	13	1	STRIPPER BOTTOMS PUMP		
113592	880	13	61	STRIPPER BOTTOMS PUMP MOTOR		
113592	880	14	1	OVERHEAD CONDENSER		

NOTES:

1. PROVIDE TWO THERMOWELLS 2 & 4 FT. FROM TOP OF PACKING.
2. LOCATE ON-LINE GAS CHROMATOGRAPH IN HEATED ANALYTICAL SHED.
3. LOCATE COMPOSITE SAMPLER IN HEATED ANALYTICAL SHED.

Stearns Catalytic
DELAWARE VALLEY DESIGN OFFICE

Preliminary	VSH	08/21/86	Contract Number	SOC 29358 OP 3982	
Design Release	V.S. KRANIEWICZ	10/15/86	Drawn by	J. DI MENTO	08/26/86
Construction Release Review			Checked by	J.D. BRADSHAW	09/26/86
			Drawing No.	A-203	Rev. 9

INSTR. LOOP NUMBER 300-399

LAST NO.	NO. CANCELED
326	

W951178 | LAST 9 REV

SPECIFICATIONS

PIPING 5279 INSULATION 5575 PAINT 5572

LINE NUMBERS

PROJ	DA	TYPE	ALLOTTED	LAST NO.	NO. CANCELED
113592	880	PROCESS	428 - 437	437	

LINE LEGEND

———	PROCESS ON PROCESS OR COMB.	- - - -	TRACED
———	SERVICE ON SERVICE	———	JACKETED
·····	SERVICE ON PROCESS OR COMB.	———	INSTRUMENT
-·-·-	PROCESS ON SERVICE	-·-·-	ELECTRICAL

M/F	BLDG	PROJ	DA	TYPE	W951178	LAST 9 REV
		113592	880	21C		
				71C		

NIAGARA PLANT
REMEDIATION PROJECT
PUMPING WELL SYSTEM
STRIPPER COLUMN
PROCESS AND INSTRUMENTS

PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE
113592	1	CHANGED LINE NO. FROM 418 TO 428				
113592	2	CHANGED LINE NO. FROM 419 TO 429				
113592	3	ADDED STRAINER DA NO.				
113592	4	CHANGE VALVE CODE				
113592	5	ADD SEPARATE RECORDER FOR 314XT				
113592	6	ADD LOW COLUMN LEVEL ALARM				
113592	7	ADD PANEL STOP PB				
113592	8	ADD RESTRICTING ORIFICE				
113592	9	ADD REDUCERS				

STANDARDS

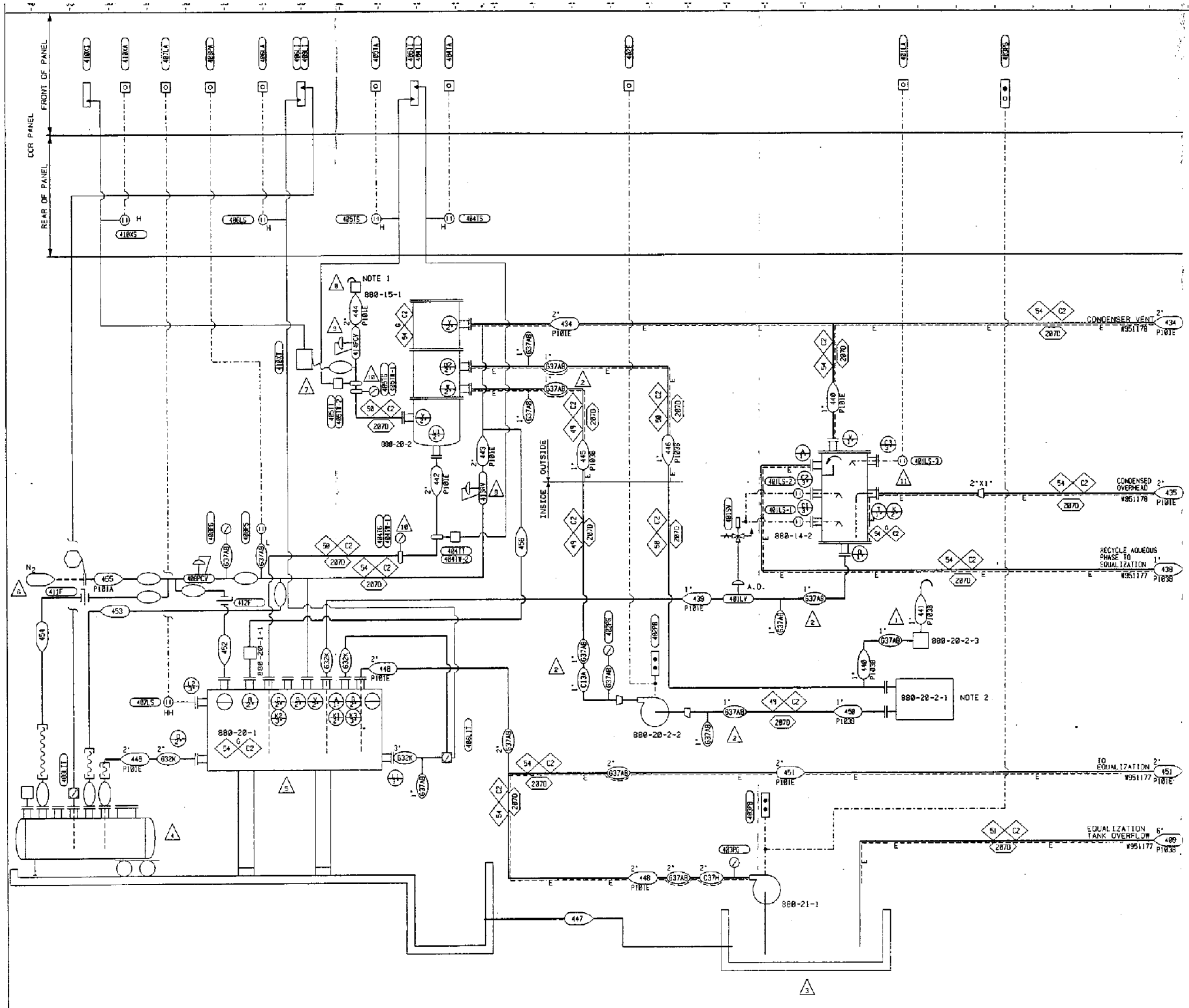
REFERENCE DRAWINGS

W951176 KEY

PROJECT 113592
SCALE NONE DATE
DRAWN
CHECKED
APPROVED - W.T. SPERRY 10/16/86
DESIGN RELEASE
APPROVED -
CONSTR. RELEASE

E.I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W951178

INTERGRAPH COMPUTER-DRAWING



! ➡ ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN ⬅

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM	PART	NAME	REF. DWG. NO.	REMARKS
113592	880	14	2		DECANTER		
113592	880	20	2		SECONDARY CONDENSER		SELF-CONTAINED
113592	880	20	1		ORGANICS STORAGE TANK		
113592	880	20	2	1	ICE BUILDER PACKAGE		
113592	880	20	2	2	CHILLED WATER PUMP		
113592	880	21	1		SUMP PUMP		
113592	880	20	2	3	EXPANSION TANK		
113592	880	15	1		FLAME ARRESTER		
113592	880	20	1	1	RELIEF VALVE		

NOTES:
1. RUN SECONDARY CONDENSER (EN 880-20-2) VENT 100 FT. ABOVE GRADE OR 20 FT. ABOVE HCL TOP FLOOR, WHICHEVER IS HIGHER.
2. LOCATE ICE BUILDER (EN 880-20-2-1) INSIDE ANALYTICAL SHED.

Stearns Catalytic
DELAWARE VALLEY DESIGN OFFICE

Preliminary	VSW	09/21/86	Contract Number	SCC 33950 DP 3592	
Design Release	W.S. BRENNERIZ	10/15/86	Drawn by	S.W.BIGGE	09/20/86
			Checked by	J.BRADSHAW	09/20/86
Construction Release Review			Drawing No.	A-204	Rev. 11

INSTR. LOOP NUMBER 400-499

LAST NO.	NO. CANCELED
414	

W951179 LAST 11 REV

SPECIFICATIONS

PIPING 5779 INSULATION 9575 PAINT 9572

LINE NUMBERS

PROJ	DA	TYPE	ALLOTTED	LASTNO.	NO. CANCELED
113592	880	PROCESS	438-456	456	

LINE LEGEND

———	PROCESS ON PROCESS OR COMB.	———	TRACED
———	SERVICE ON SERVICE	———	JACKETED
- - - -	SERVICE ON PROCESS OR COMB.	———	INSTRUMENT
- - - -	PROCESS ON SERVICE	———	ELECTRICAL

M/F	BLDG	PROJ	DA	TYPE	W951179	LAST 11 REV
		113592	880	21C		
				71C		

NIAGARA PLANT
REMEDIATION PROJECT
PUMPING WELL SYSTEM
ORGANICS STORAGE
PROCESS AND INSTRUMENTS

PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE
113592	11	ADD DECANTER HIGH LEVEL ALARM				
113592	1	ADD LINE NOS. 440 & 441				
113592	2	CORRECT VALVE CODES				
113592	3	ADD REMOTE SUMP W/PUMP				
113592	4	ADD ORGANICS TRAILER				
113592	5	REPLACE HORIZ.TANK W/VERT.TANK				
113592	6	ADD NITROGEN BLANKET SYSTEM				
113592	7	ADD OXYGEN ANALYZER ON VENT				
113592	8	ADD FLAME ARRESTER ON VENT				
113592	9	ADD BACK PRESSURE VALVE				
113592	10	ADD TEMP WELL AND GAGE				

STANDARDS:

REFERENCE DRAWINGS: W951176(KEY)

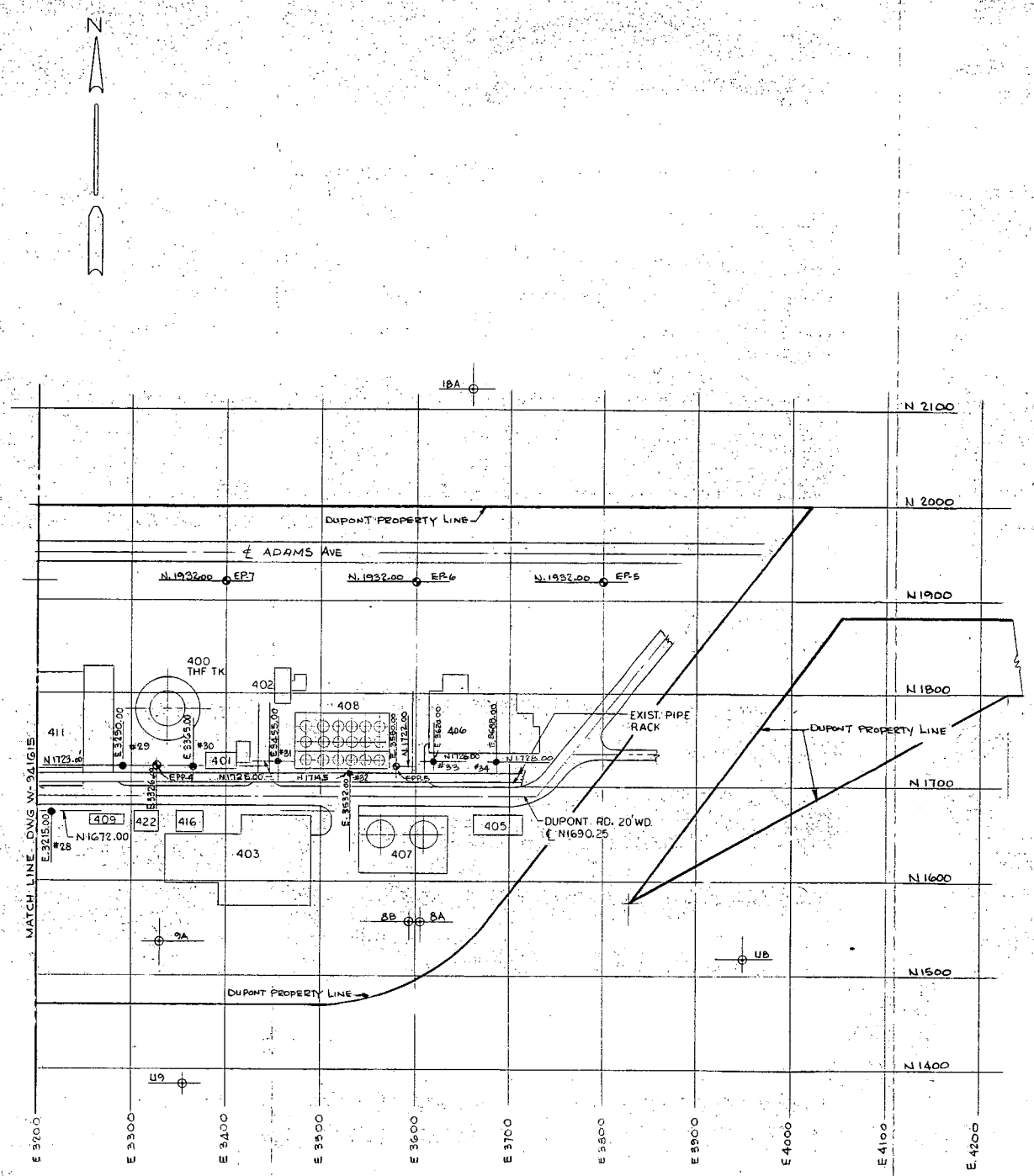
PROJECT 113592
SCALE NONE DATE
DRAWN
CHECKED
APPROVED - W.T. SPERRY 10/15/86
DESIGN RELEASE
APPROVED -
CONSTR. RELEASE

E.I.DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W951179

W951179 12/15/86 BSG (003)

INTERGRAPH COMPUTER DRAWING

ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN



CRITERIA FOR PUMPING WELL SPACING

1. WELL TO WELL SPACING SHALL BE 75' PREFERRED, 90' MAX.
2. CLEARANCE FROM ANY RAILROAD SPUR CENTER-LINE SHALL BE 8.5'
3. CLEARANCE FROM ANY BUILDING, SUMP, TANK, COLUMN, POLE FOUNDATION OR UNDERGROUND LINES SHALL BE 5' MIN.
4. OVERHEAD CLEARANCES TO PIPE RACKS, ELECTRICAL LINES, ETC. SHALL BE 16' MIN.

NOTES

1. ◆ INDICATES PUMPING WELL LOCATION.
2. ⊕ INDICATES PIEZOMETERS
3. ⊕ INDICATES EXISTING MONITORING OR UTILITY WELLS.

W 941614 | LAST REV. C

DUPLICATE TRACING

Steams Catalytic
DELAWARE VALLEY DESIGN OFFICE

DRAWN BY	J.WOOD	2-28-84	SCC CONTRACT NO.	39950
SCC CHECKED	L.F.N./A.L.	9-23-86	SCC DRAWING NO.	REV. C
SCC APPROVED		11-13-86		

M/F	BLDG.	PROJ.	DA	TYPE		LAST
		113592	9999	28P	W 941614	C REV.

NIAGARA PLANT REMEDIATION PROJECT PLOT PLAN SHEET Nº 2

PROJ NO.	REVISION	RVSD	CHKD	APPD	DATE
113592	A PRELIMINARY FOR COMMENT	LFN 6-5-86			
113592	B DESIGN RELEASE	LFN 10/1/86			
113592	C RELEASED FOR CONST. OF WELLS & PIEZOMETERS				11/13/86

STANDARDS	REFERENCE DRAWINGS	
	W 941615	PLOT PLAN

PROJECT 113592
SCALE 1"=60' DATE:
DRAWN J.WOOD 2-28-86
CHECKED L.F.N./A.L. 9-23-86
APPROVED-I.C.R. 11-13-86
APPROVED-FINAL:

E. I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W 941614

ORIGINAL DRAWING MADE ON DU PONT POLYESTER FILM

NOTES
1. ● INDICATES PUMPING WELL LOCATION
2. SEE DWG W941614 FOR CRITERIA FOR SPACING & CLEARANCES.
3. ⊕ INDICATES PIEZOMETERS.
4. ⊙ INDICATES EXISTING MONITORING OR UTILITY WELLS.

Stearns Catalytic
PHILADELPHIA, PA.

DRAWN BY	J. WOOD	3-3-86	SCC CONTRACT NO.	39950
SCC CHECKED	L.F.N. / A.L.		SCC DRAWING NO.	REV D
SCC APPROVED		11-13-83		

M/F	BLDG.	PROJ.	DA	TYPE
		113592	9999	28 P.

W 941615 LAST D REV.

NIAGARA PLANT
REMEDIATION PROJECT
PLOT PLAN
SHEET Nº 1

PROJ	NO.	REVISION	RVSD	CHKD	APPD	DATE
113592	A	PRELIMINARY, FOR COMMENT	LFN 6-5-86			
113592	B	DESIGN RELEASE	LFN 10-1-86			
113592	C	RELEASED FOR CONST. OF WELLS & PIEZOMETERS				11/25/86
113592	D	ADDED STAUB RD.	RSB	1/16/87		1/1/87

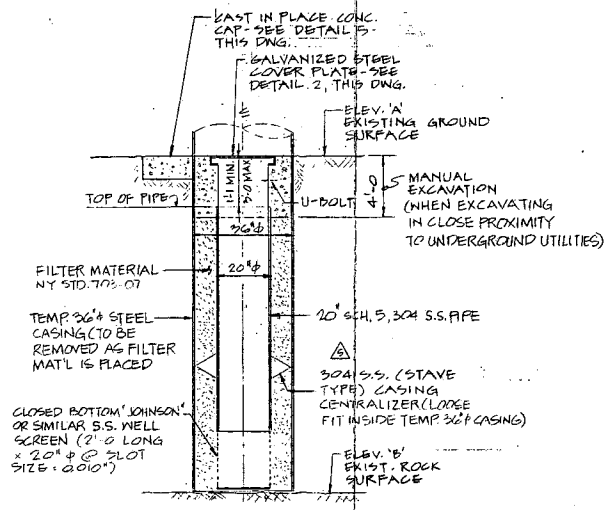
STANDARDS		REFERENCE DRAWINGS	
		W941614	PLOT PLAN

THIS DRAWING HAS BEEN FURNISHED BY E. I. DU PONT DE NEMOURS & CO. THE INFORMATION AND KNOW-HOW THEREON MAY NOT BE USED NOR THE DRAWING REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DU PONT. ALL REPRODUCTIONS IN WHOLE OR IN PART, INCLUDING VENDOR'S SHOP DRAWINGS, SHALL BEAR OR REFER TO THIS STAMP.

PROJECT	113592	
SCALE	1" = 60	DATE
DRAWN	J. WOOD	3-3-86
CHECKED	L.F.N. / A.L.	9-23-86
APPROVED-I.C.R.		11/25/86
APPROVED-FINAL		

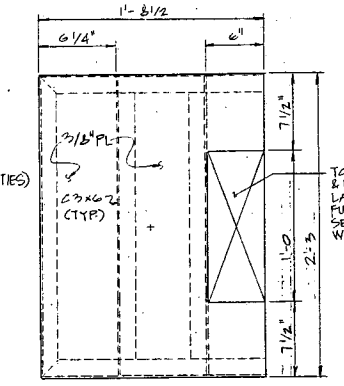
E. I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W 941615

ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN



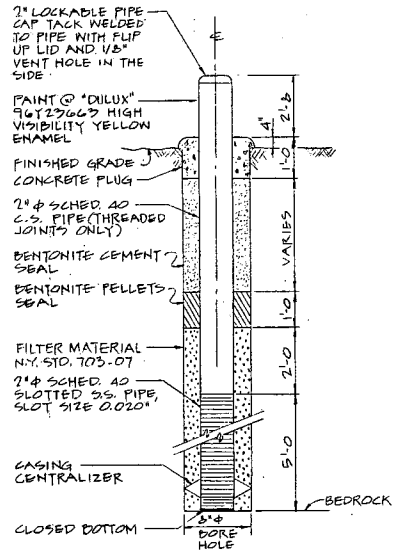
ELEVATION

DETAIL 1
EXCAVATION WELL

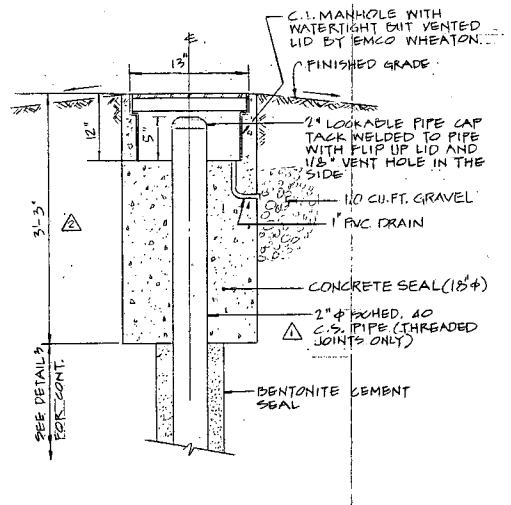


NOTE: TACK WELD COVER PLATE TO WELDED CHANNEL FRAME

DETAIL 2
COVER PLATE



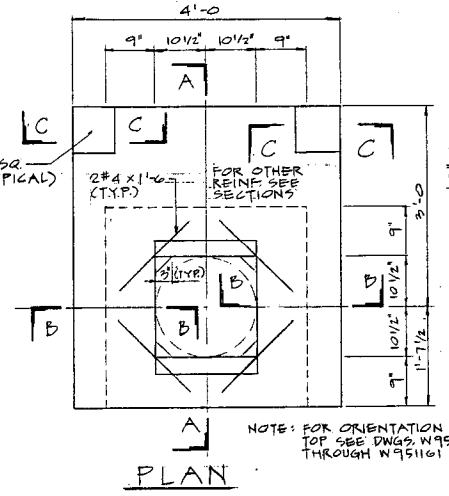
DETAIL 3
PIEZOMETER



DETAIL 4
PIEZOMETER - FLUSH MOUNT TOP

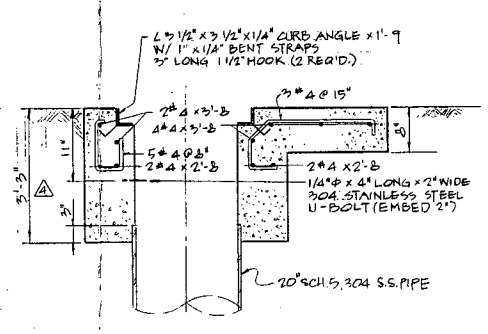
NOTES:

1. STEEL FOR THE COVER PLATE SHALL BE A36 (GALVANIZED). LIFTING HOLES SHALL BE PROVIDED AND SHOP DRAWINGS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FABRICATION.
2. CONCRETE FOR WELL COVER SHALL BE 3000 PSI, REINFORCING BARS SHALL BE A615, GRADE 60 (EPOXY COATED) WITH A MIN. OF 2" CONCRETE COVER.

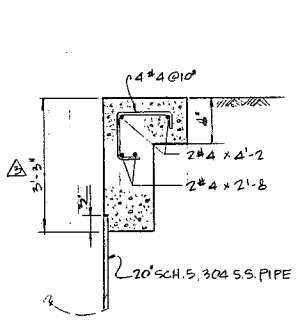


NOTE: FOR ORIENTATION OF TOP SEE DWGS. W951156 THROUGH W951161

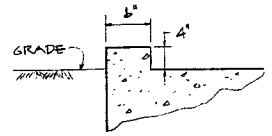
PLAN



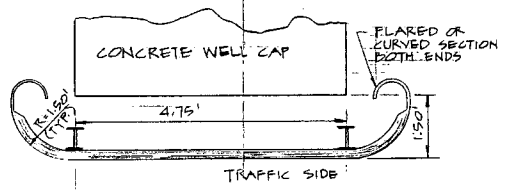
SECTION A-A



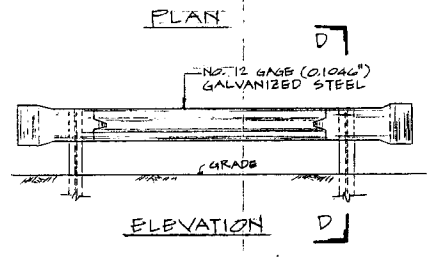
SECTION B-B



SECTION C-C



PLAN



ELEVATION D

SECTION D-D

DETAIL 5 CAST-IN-PLACE CONCRETE WELL CAP

DETAIL 6 - GUARDRAIL

W 942188 | LAST REV. 5

Stearns Catalytic
DELAWARE VALLEY DESIGN OFFICE

Preliminary			Contract Number	SCC 39950 DP 3179
Design Release		11/3/86	Drawn by	M. GERVASE
			Checked by	F.T. CAMPBELL
Construction Release Review			Drawing No.	A-21001 Rev. 5

M/F	BLDG.	PROJ.	DA	TYPE		LAST REV.
		113592	9999	42	W 942188	5
			880			

NIAGARA PLANT
REMEDIATION PROJECT
WELL SHAFT & PIEZOMETER
DETAILS
CIVIL

PROJ NO.	NO.	REVISION	RVSD	CHKD	APPD	DATE
113592	A	FOR APPROVAL	MG	FTC		
113592	B	INC. CLIENT COMMENTS	MG	FTC		
113592	0	RELEASED FOR CONSTRUCTION			HN	11-26-86
	1	△ WAS 35'-0" △ WAS 21'-6"				
	2	WAS 1'-0" MIN., 3'-3" MAX.				
	5	ADDED 304 S.S. (STAVE TYPE)				

STANDARDS	REFERENCE DRAWINGS

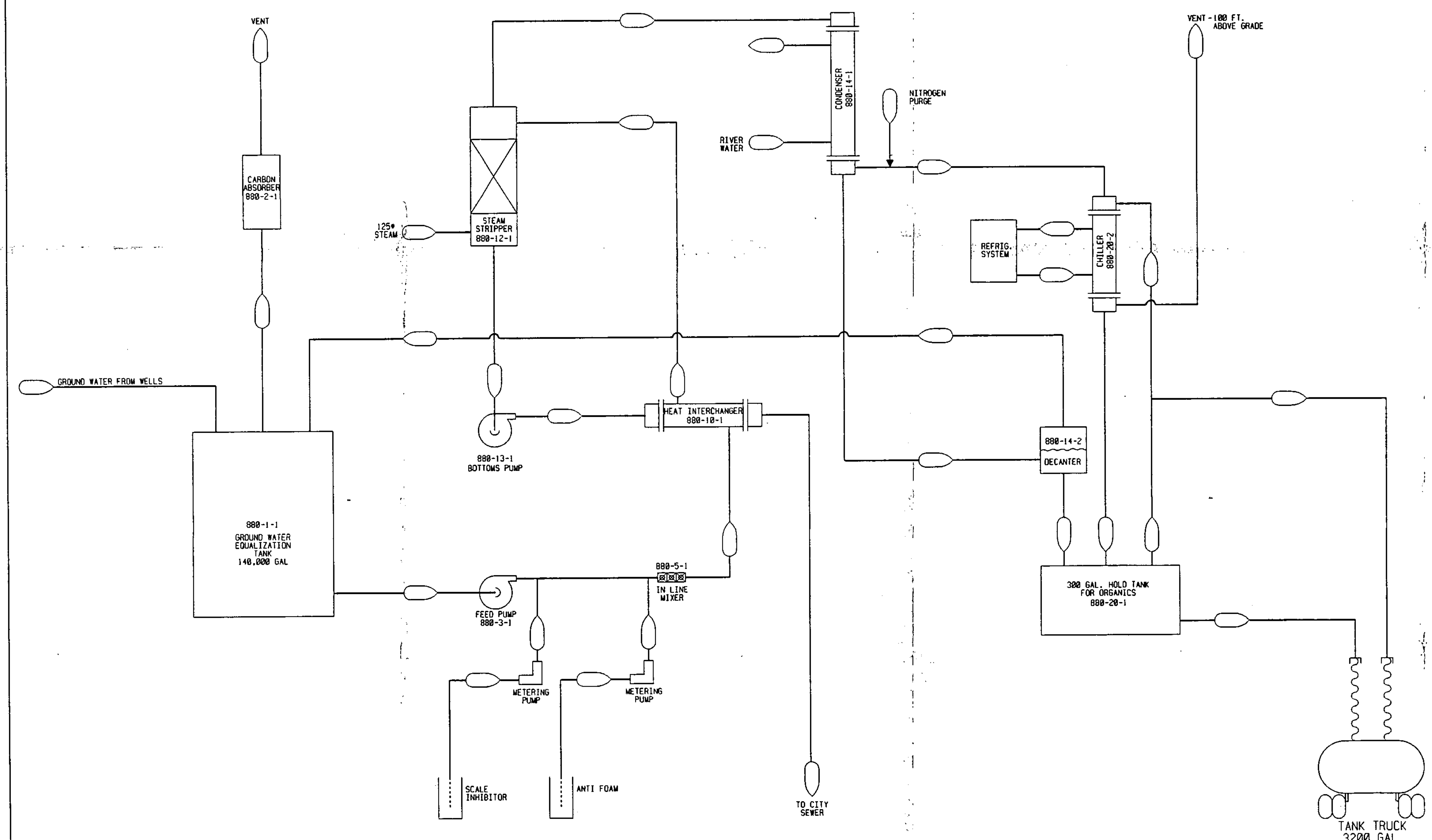
PROJECT	113592	
SCALE	NONE	DATE
DRAWN	M. GERVASE	7/15/86
CHECKED	F.T. CAMPBELL	11/12/86
APPROVED-I.C.R.	H.E.N. /JWS	11-26-86
APPROVED-FINAL	H.E.N. /JWS	11-26-86

E. I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W 942188

ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM	PART	NAME	REF. DWG. NO.	REMARKS



CODED INSTR. LOOP NUMBER

TYPE	LAST USED	NO. CANCELED
TG		
TW		
PG		

W965159 LAST REV

SPECIFICATIONS

PIPING ____ INSULATION ____ PAINT ____

LINE NUMBERS

PROJ	DA	TYPE	ALLOTTED	LASTNO.	NO. CANCELED

LINE LEGEND

———	PROCESS ON PROCESS OR COMB.	———	TRACED
———	SERVICE ON SERVICE		JACKETED
- - - -	SERVICE ON PROCESS OR COMB.	———	INSTRUMENT
- - - -	PROCESS ON SERVICE	-·-·-	ELECTRICAL

M/F	BLDG	PROJ	DA	TYPE	W965159	LAST REV
		113592	880	21C		

NIAGARA PLANT
REMEDIATION TREATMENT FACILITY
BLOCK DIAGRAM

PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE	PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE	PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE	PROJ	NO	REVISION	RVSD	CHKD	APPD	DATE	STANDARDS	REFERENCE DRAWINGS

PROJECT 113592
SCALE NONE DATE
DRAWN JOHN CHITTICK JR. 12/23/86
CHECKED
APPROVED - DESIGN RELEASE
APPROVED - CONSTR. RELEASE

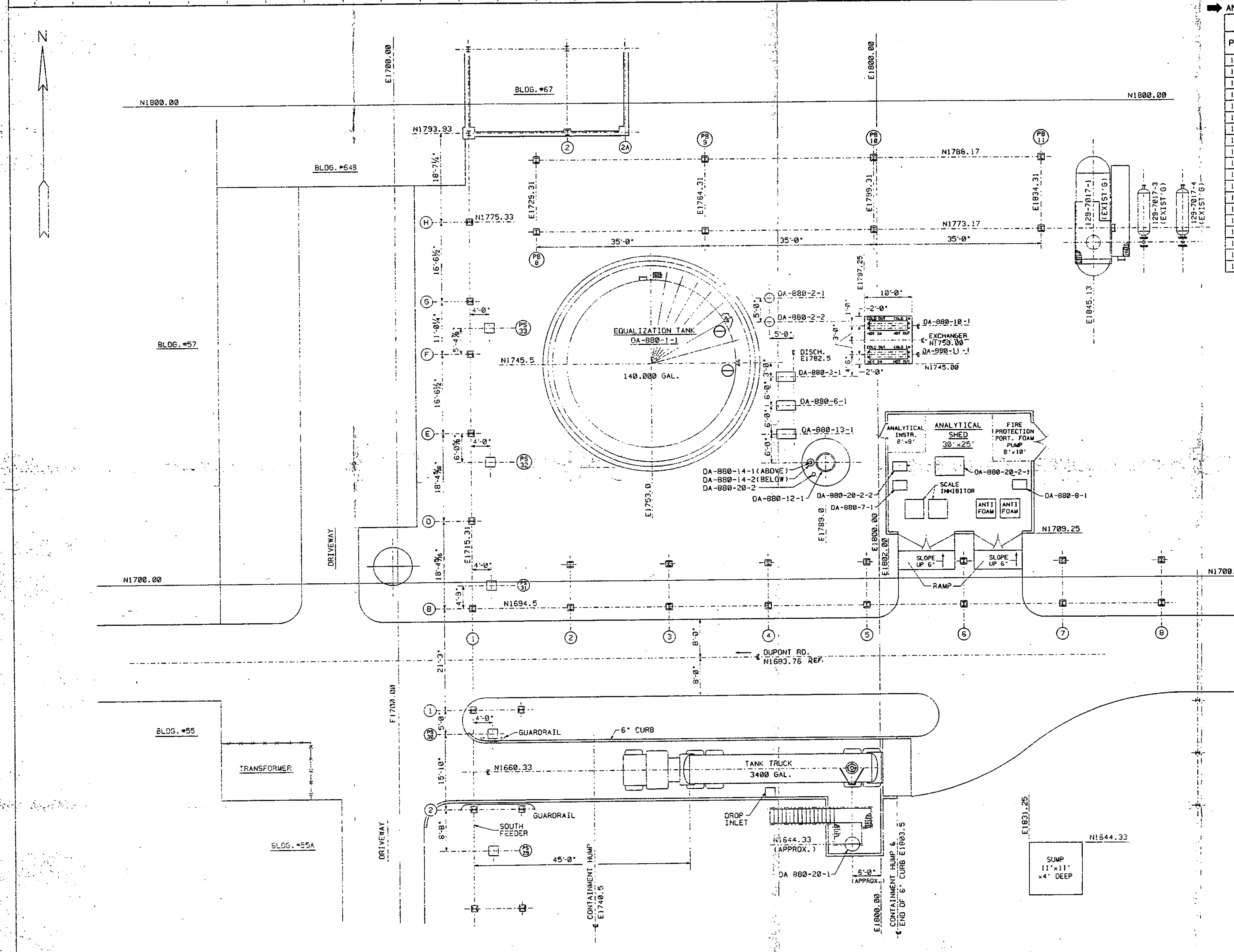
THIS DRAWING HAS BEEN FURNISHED BY E.I. DU PONT DE NEMOURS & CO. THE INFORMATION AND KNOW-HOW THEREON MAY NOT BE USED NOR THE DRAWING REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DU PONT. ALL REPRODUCTIONS IN WHOLE OR IN PART, INCLUDING VENDOR'S SHOP DRAWINGS, SHALL BEAR OR REFER TO THIS STAMP.
INTERGRAPH COMPUTER DRAWING PLOTTED

E.I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W965159

C. DOWNEY 1-22-87

THIS DRAWING WAS CREATED AS TYPE 21 BASED ON DESIGN DIV. LEVEL GUIDELINES REV. 003

22-JAN-1987 13:54:59 Drawing : PV1:W965159.DGN Drawing type : 2465
Designer : C.J. DOWNEY Location : 62N13 Telephone : 2465
Plot submitted from : WS_26 DPV Prf name : W965159B2



➡ ANALYZE FOR SAFETY, ECOLOGY, AND MINIMUM ESSENTIAL DESIGN ⬅

EQUIPMENT TABULATION

PROJ	DA	UNIT	ITEM	PART	NAME	REF. DWG. NO.	REMARKS
113592	880	1	1		EQUALIZATION TANK		
113592	880	2	1		CARBON CANNISTER A		
113592	880	2	2		CARBON CANNISTER B		
113592	880	3	1		STRIPPER FEED PUMP		
113592	880	5	1		STATIC MIXER		
113592	880	6	1		COMMON SPARE PUMP		
113592	880	7	1		SCALE INHIBITOR METERING PUMP		
113592	880	8	1		ANTI FOAM METERING PUMP		
113592	880	10	1		FEED PREHEATER A		
113592	880	11	1		FEED PREHEATER B		
113592	880	12	1		STRIPPER COLUMN		
113592	880	13	1		STRIPPER BOTTOMS PUMP		
113592	880	14	1		OVERHEAD CONDENSER		
113592	880	14	2		DECANTER		
113592	880	20	1		ORGANICS STORAGE TANK		
113592	880	20	2		SECONDARY CONDENSER		
113592	880	20	2	1	ICE BUILDER PACKAGE		
113592	880	20	2	2	CHILLED WATER PUMP		
113592	880	21	1		SUMP PUMP		

Stearns Catalytic
DELAWARE VALLEY DESIGN OFFICE

Preliminary		Contract Number	SCC 39950 DP	
Design Release	V.S. [signature] 1-23-87	Drawn by	JLR	01/08/87
		Checked by	A.L./ L.F.N.	01/22/87
Construction Release Review		Drawing No.		Rev. B

W957143 LAST B REV

DUPLICATE TRACING

NOTE
THIS DWG. SUPERCEDES DWG. W911041.

M/F	BLDG	PROJ	DA	TYPE	W957143	LAST B REV
		113592	880	24C		

NIAGARA PLANT
GROUND WATER TREATM'T FACILITY
EQUIPMENT ARRANGEMENT
PLAN
PROCESS

PROJ NO		REVISION	RVSD	CHKD	APPD	DATE
113592	A	FOR APPROVAL D.R	A.L.	[initials]	[initials]	1/14/87
115592	B	INCORPORATE CLIENT COMM.	A.L.	[initials]	[initials]	1/26/87

STANDARDS

REFERENCE DRAWINGS
W902519 PIPE RACK S.L.

PROJECT 113592
SCALE 1/8"=1'-0" DATE
DRAWN LANCELLOTTI 01/15/87
CHECKED L.F.N. 01/22/87
APPROVED- DESIGN RELEASE 1/26/87
APPROVED- CONSTR. RELEASE

THIS DRAWING HAS BEEN FURNISHED BY E.I. DU PONT DE NEMOURS & CO. THE INFORMATION AND KNOW-HOW THEREON MAY NOT BE USED NOR THE DRAWING REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DU PONT. ALL REPRODUCTIONS IN WHOLE OR IN PART, INCLUDING VENDOR'S SHOP DRAWINGS, SHALL BEAR OR REFER TO THIS STAMP.

E.I. DU PONT DE NEMOURS & CO., INC.
WILMINGTON, DELAWARE
ENGINEERING DEPARTMENT
W957143

INTERGRAPH COMPUTER DRAWING