3. ENGINEERING DATA

3.1 Process Description and Design Basis

Wastewater effluent from the pretreatment system is pumped to the granular activated carbon adsorption system. The carbon adsorption system consists of a three-train, two stage carbon adsorber vessel.

Design data for the carbon adsorber vessels shall be as follows:

Number of vessels	Six, T-301 A&B, T-302 A&B, T-303 A&B
Weight of carbon/adsorber vessel	40,000 lbs.
Carbon Density	26 lbs./cu.ft.
Contact Time	24 min./train @ 2870 gpm (average) 20 min./train @ 2500 gpm (maximum)

Wastewater Analysis

The wastewater feed to the carbon adsorption system will be as follows:

Flow rate	2870 gpm average 3500 gpm maximum
Temperature	105 F.
COD	25 mg/1
TOC	10 mg/1
Dissolved solids	450,000 lbs./day
Chlorine	1510 mg/1
Phenolics	100 mg/1
Suspended solids	5 mg/1

3.2 General Design

1. Carbon adsorption vessels shall be designed and constructed in accordance with the latest edition of Section VIII, Division I, of the ASME Pressure Vessel Code.

2. The design pressure and temperature shall be 75 psig and 175 F.

3. The maximum allowable working pressure shall be based on the active metal thickness less corrosion allowance.

12747

4. Corrosion allowance shall be 1/16-inch (.0625 in.).

5. The minimum shell and head thickness for the vessels shall be 5/16-inch.

6. Each vessel shall be vertical and mounted on four legs adequate for support of the operating weight, plus 15 psf of wind loading.

7. All bolt holes in manholes, handholes and nozzles shall straddle the normal vessel centerline.

8. All flanging shall comply with ANSI B16.5 pertaining to dimensions and pressure-temperature ratings.

9. Manholes shall be circular and shall be complete with blind flange, bolting, gaskets, davits or hinges. Davits shall always be used where lifting the manhole cover is required.

10. Access ladders to manholes shall be furnished.

11. Carbon adsorption vessels shall be shop fabricated.

12. The vessels and appurtenances shall be designed as specified on Calgon Dwg. No. 2914600-301, Revision 1.

3.3 Materials

1. All materials shall be of those listed under subsections of Section VIII of ASME Code and as specified on the adsorber vessel drawing.

2. The complete vessel interiors shall be lined with 40 to 60 mils of Durikane 4030 vinyl ester.

3. Pipe shall be Grade B seamless and in accordance with ASTM A-53.

4. Gaskets shall be 1/8-inch thick neoprene (45 to 55 Durometer)

3.4 Testing

1. All vessels shall be hydrostatically tested at 1-1/2 times the maximum allowable design pressure. The hydrostatic test shall be held for a minimum of one hour. Hydrostatic test water shall be clean and neutral.

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2. Contractor shall notify Purchaser seven days in advance of final testing and inspection in event Purchaser elects to witness tests.

3. Contractor shall submit three copies of certified test data and computations along with all test conditions, serial numbers of all parts and necessary detailed description of entire pump units to Purchaser for acceptance. Certified test report must be approved by Purchaser before shipment.

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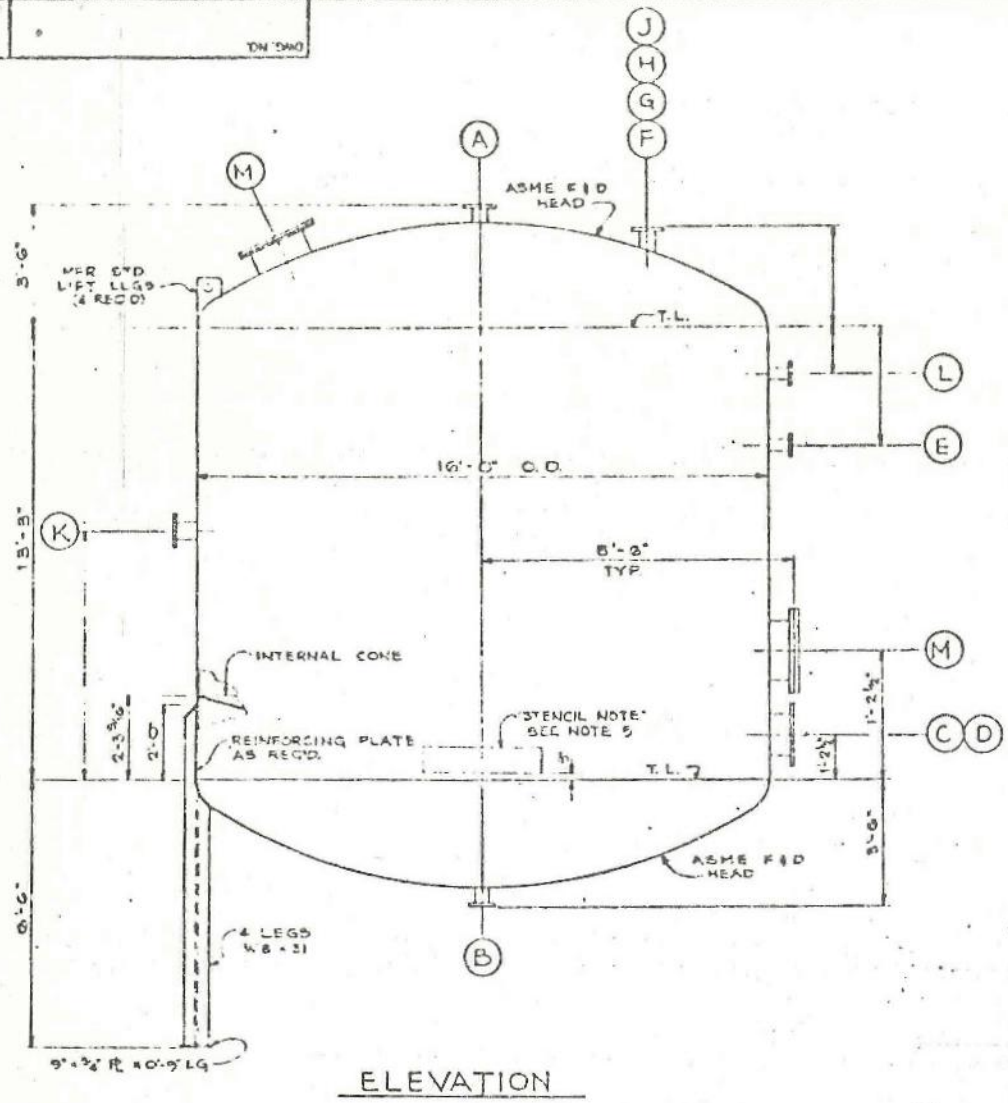
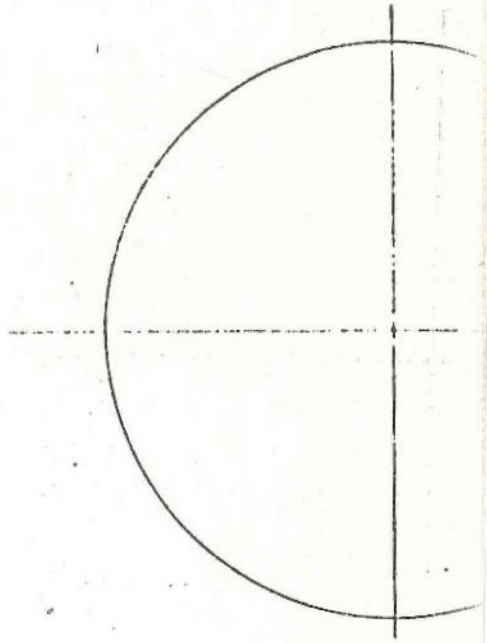
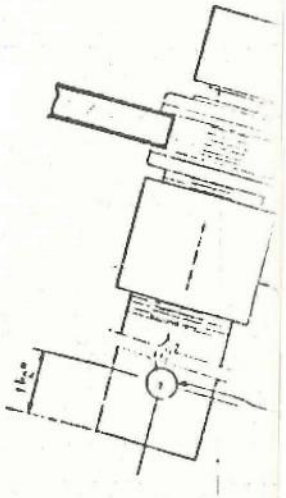


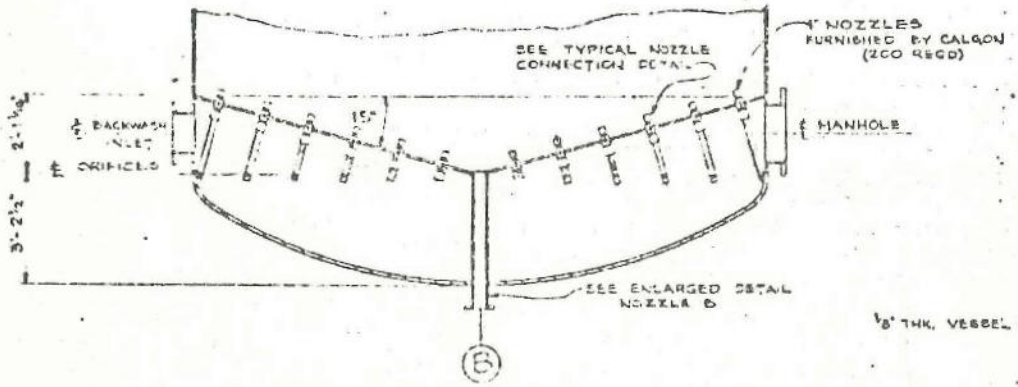
ELEVATION



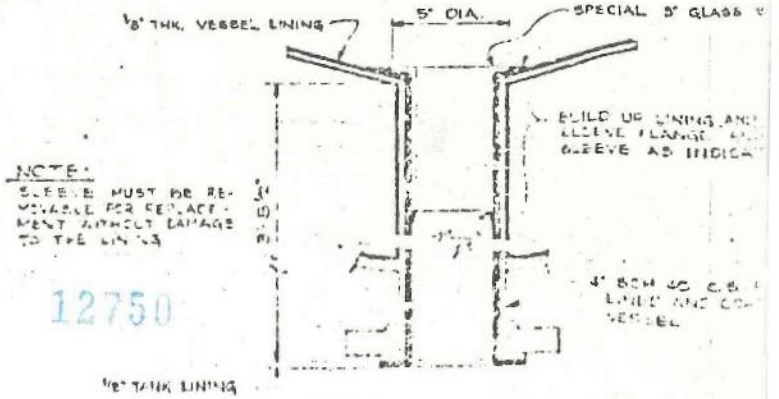
ORIENTATION



TYPICAL NOZZLE CON



SECTIONAL ELEVATION



NOTE:
SLEEVE MUST BE REMOVABLE FOR REPLACEMENT WITHOUT DAMAGE TO THE LINING

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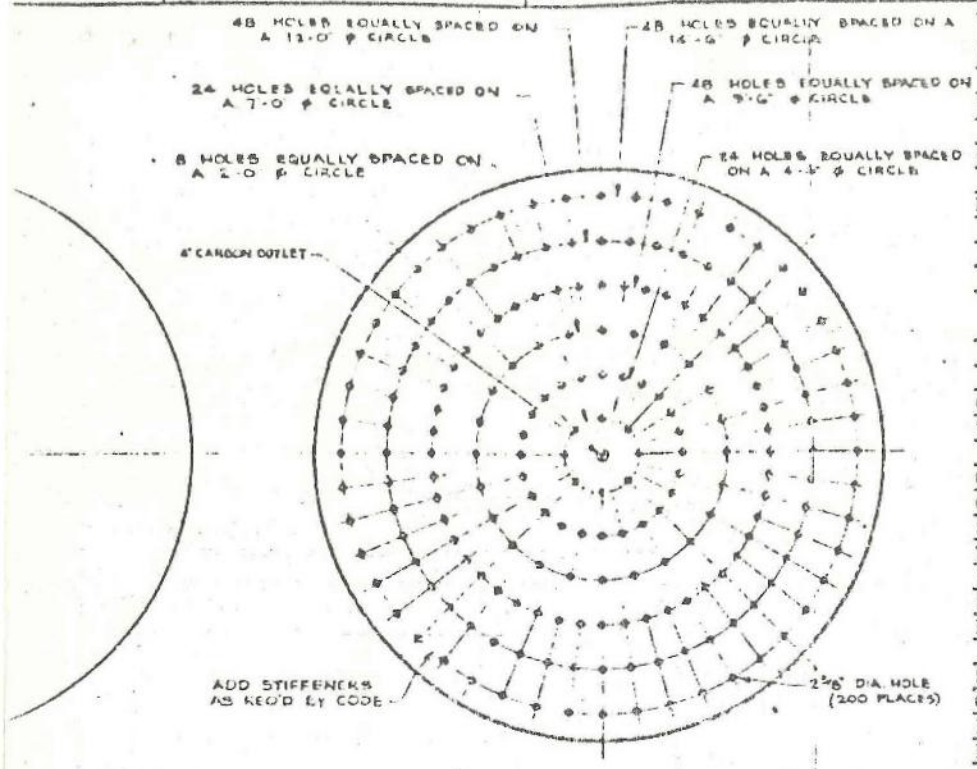
DETAIL - NOZZLE "B"



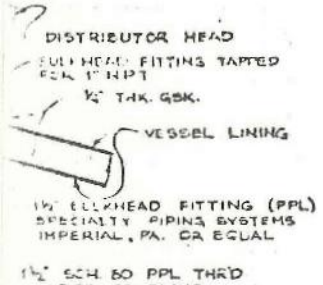
ORIENTATION

OPENINGS IN THE INTERNAL CONE

ITEM NO. V-47	NO. REQD. Six (6)
REFERENCE	
VESSEL SPECIFICATION 7209A-751	
DESIGN CONDITIONS	
SHELL FULL VACUUM & 75 PSIG @ 175°F	
OPERATING CONDITIONS	
SHELL 40 PSIG 105°F	
MATERIALS	
SHELL, HEADS CARBON STEEL	
NOZZLES, ETC. CARBON STEEL	
LINING BY OTHERS	
GASKETS 1/8" THK. NEOPRENE (45 to 55 Durometers)	
BOLTING A-307 GRADE B	
SUPPORTS CARBON STEEL ASTM A36	
CORROSION ALLOWANCE 1/16"	
THICKNESS - MINIMUM TO BE	
SHELL Per Code Requirement	
CONSTRUCTION FUSION WELDED	
CODE ASME Sect. VIII Div.1	
STRESS RELIEF RADIOGRAPH Optional	
TESTING HYDROSTATIC PER CODE	
INSPECTION BY BUYER & CODE AGENCY	
STAMPING ASME	
PAINT-CLEAN ALL EXPOSED CARBON STEEL SURFACES AND SHOP COAT IN ACCORDANCE	
SPECIFICATION 7209A-85	
OPERATING CAPACITY 25,000 Gal.	% FILL 100
FULL CAPACITY 25,000 Gal.	PROD.SP.GR. 1.2
ESTIMATED WEIGHT	
EMPTY 55,000 lb	FULL H_2O 263,000 lb
OPERATING 271,000 lb	FULL PRODUCT 278,000 lb
INSULATION SUPPORTS	
SEISMIC LOADING ZONE 1	
LOCATION - INDOORS	

NOZZLE SCHEDULE

MARK	REQD	SIZE	DRILLING	FACING	DESCRIPTION
A	1	4"	150#	R.F.	SPRAY WATER INLE
B	1	4"	150#	F.F.	CARBON OUTLET
C	1	12"	150#	R.F.	WATER OUTLET
D	1	8"	150#	R.F.	AIR INLET
E	1	4"	150#	F.F.	CARBON FILL
F	1	8"	150#	R.F.	WASTE WATER INLE
G	1	12"	150#	R.F.	BACKWASH OUTLET
H	1	4"	150#	R.F.	VENT
J	1	3"	150#	R.F.	LEVEL PROBE
K	1	4"	150#	F.F.	CARBON OUTLET
L	1	8"	150#	R.F.	OVERFLOW
M	2	20"	MFR. STD.		MANWAY



NOTES:

1. L.J. IN SCHEDULE INDICATES LAP JOINT FLANGES.
2. ALL INTERIOR WELDS AND EDGES TO BE GROUND SMOOTH.
3. ALL NOZZLES MUST BE FLUSH ON INSIDE OF SHELL.
4. MANWAYS SHALL BE MFRS. STANDARD WITH DAVIT & 150# DRILLING. TO BE COMPLETE WITH BOLTS, NUTS AND FULL FACE GASKET.
5. THE FOLLOWING NOTE MUST BE STENCILED ON THE VESSEL AFTER PAINTING. "LINED VESSEL WELDING ON VESSEL NOT PERMITTED". STENCIL LETTERS TO BE APPLIED IN TWO LOCATIONS AS SHOWN ON ORIENTATION.

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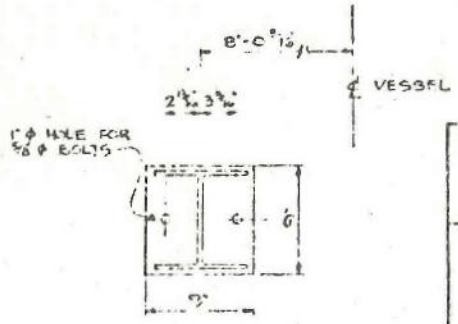

TYPICAL BASE PLATE DETAIL

NO	REVISION	BY	DATE
1	ADDED WEIGHT [illegible] ON	[illegible]	[illegible]

CALGON ENVIRONMENTAL SYSTEMS DIVISION

CALGON

SUBSIDIARY OF MERCK & CO. INC.

P.O. BOX [illegible] PITTSBURGH PA 15230

U. S. STEEL CORP.

PLANT GARY, INDIANA

TITLE ADSORBER

[illegible] CARBON STEEL

DRAWN [illegible] CHECKED [illegible] APPROVED [illegible] SCALE [illegible]

PROJECT [illegible] DRAWING NO. [illegible] REV 1