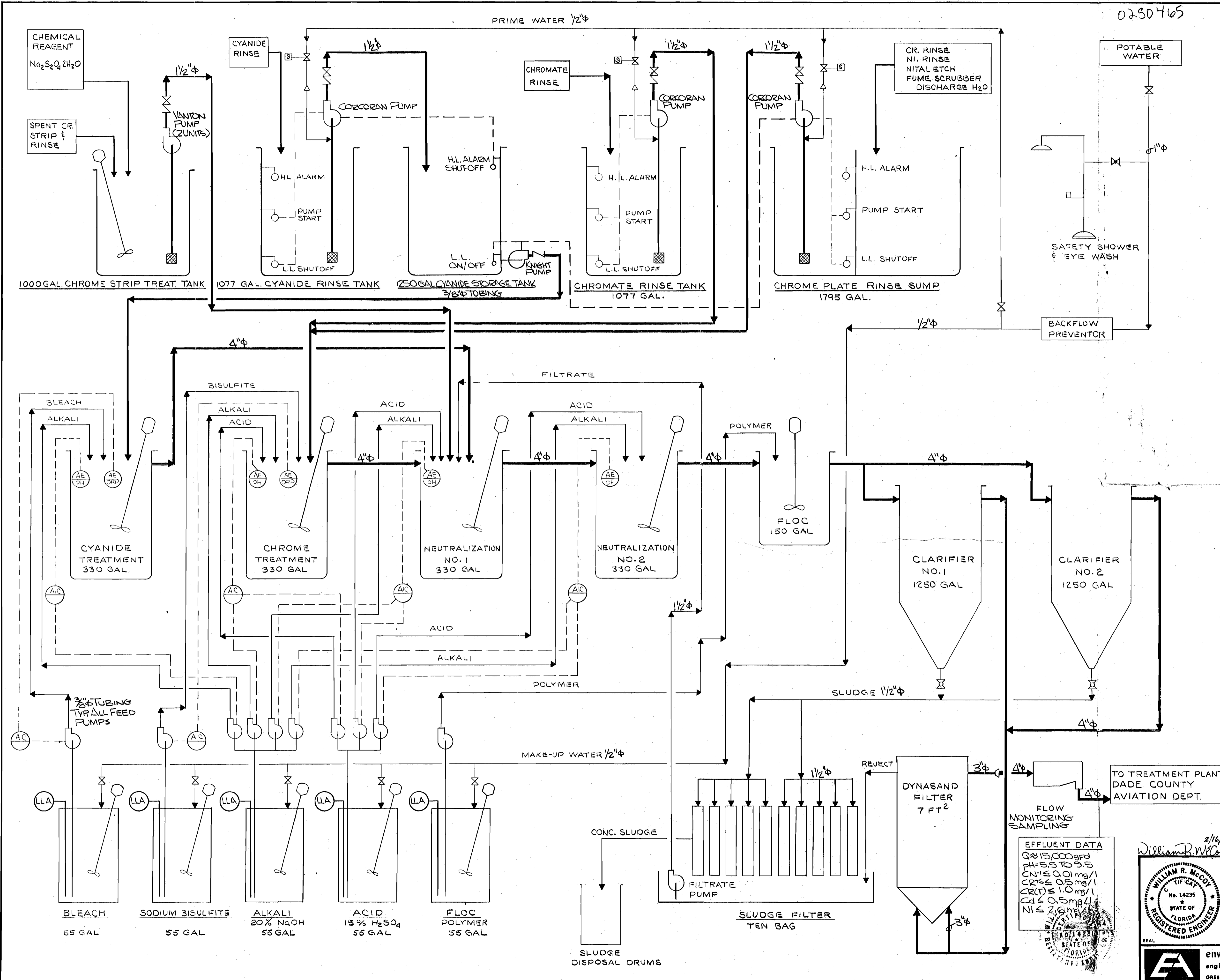


0250465

- NOTES:**
- LEGEND**
- BALL VALVE
 - GLOBE VALVE
 - CHECK VALVE
 - GATE VALVE
 - SOLENOID VALVE
 - PIPE REDUCER
 - LEVEL FLOAT SWITCH
 - STRAINER
 - pH PROBE ELEMENT
 - OXID.-REDUCT. POTENT. ELEMENT
 - CONTROL INSTRUMENT
 - WASTEWATER, CHEMICALS, WATER
 - MAIN WASTE STREAM
 - INSTRUMENT/CONTROL SIGNAL
 - PUMP - MOTOR DRIVEN
 - PUMP - AIR DRIVEN DIAPHRAM
- REFERENCE DRAWING
DMP CORP. DRAWING TITLED
FLOW SCHEMATIC, DRG. NO. 809R1-370
DATED, 7-23-80



PRINTED
MAR 10 1981
ENWRIGHT ASSOCIATES, INC.
REPRODUCTION DEPT.

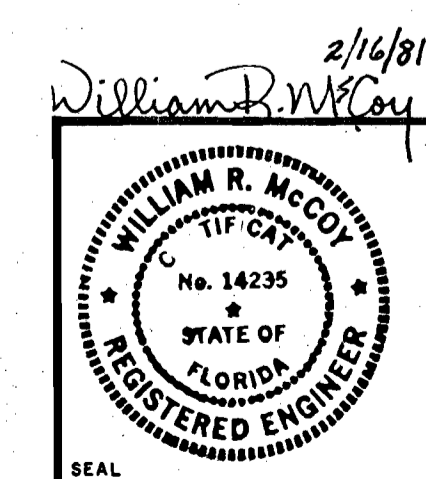
ISSUED FOR APPROVAL

REV.	DATE	BY	DESCRIPTION	APP.
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2	FEB 16 1981	LDL	ISSUED FOR DADE COUNTY ERM & AVIATION DEPT. APPROVAL	WMB

REVISION

PROCESS & INSTRUMENTATION DIAGRAM

PROPOSED WASTEWATER PRETREATMENT
CLEVELAND PNEUMATIC
PRODUCT SERVICE DIVISION, INC.
MIAMI INTERNATIONAL AIRPORT



EFFLUENT DATA
Q @ 15,000 gpd
pH = 5.5 TO 9.5
CN = 0.01 mg/l
CR(T) = 0.5 mg/l
Cd = 0.5 mg/l
Ni = 2.6 mg/l

enwright associates, inc.		LDL	LDL	RCW	EN-A
engineers planners surveyors	GREENVILLE, SOUTH CAROLINA	DRAWN FEB 1981	DESIGN NONE	CHECK DATE	FILE 81004-CE-1

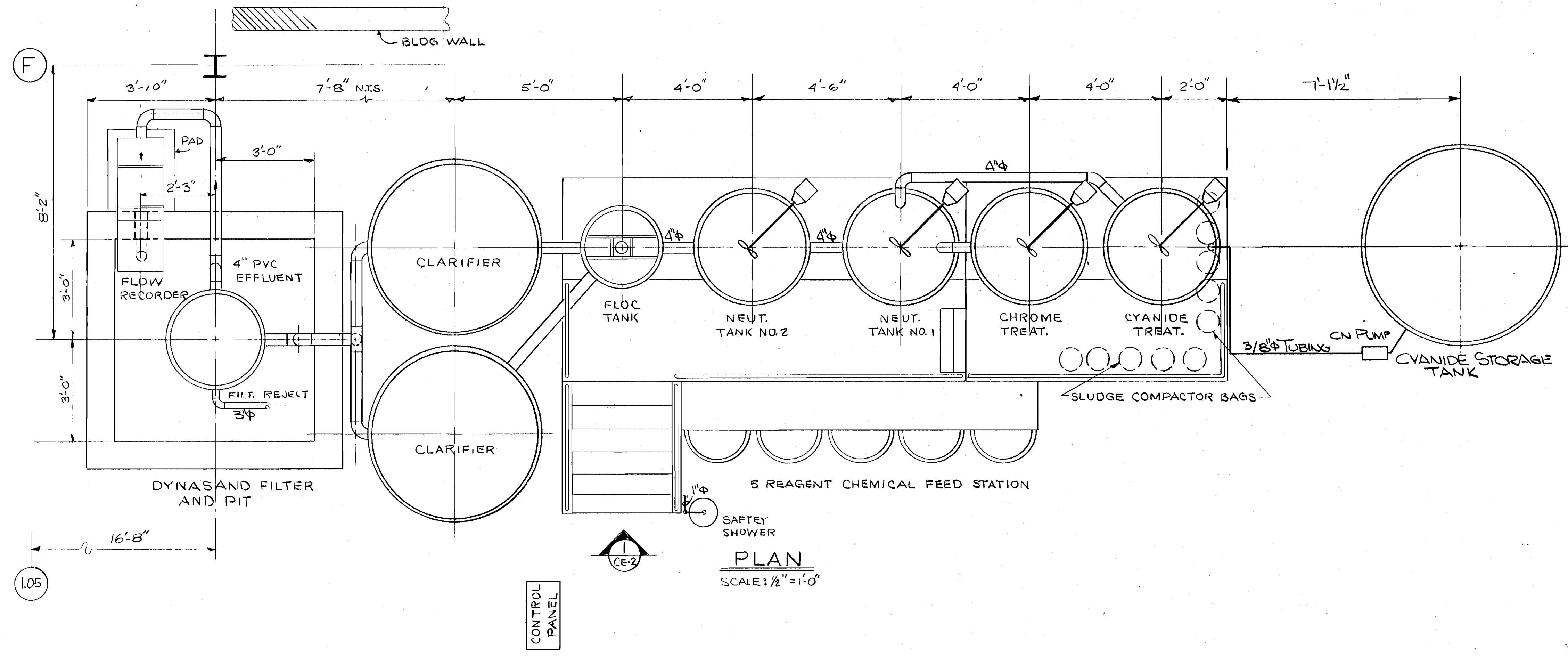
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REFERENCE DRAWINGS
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 EQUIPMENT LAYOUT, DWG. NO. PL-010
 DATED, 8-8-80

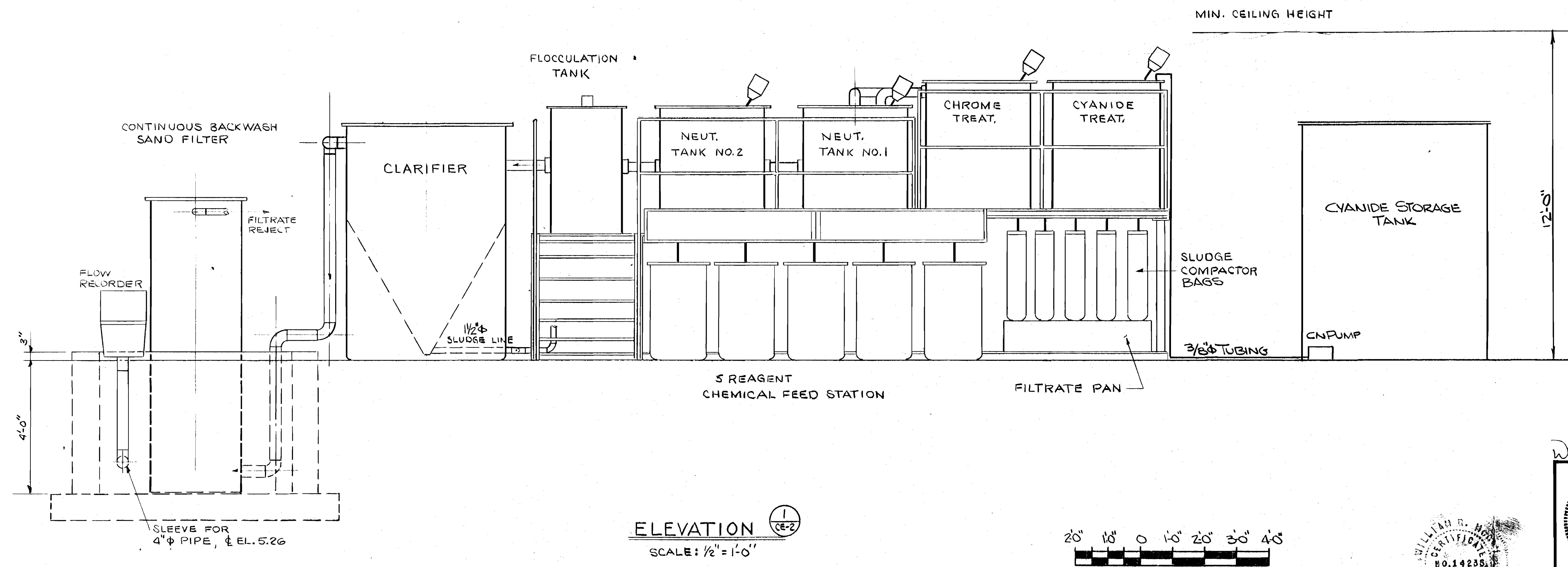
KUNDE, DRIVER, SIMPSON & ASSOC., INC.
 DRAWING TITLED, PIT PLAN & SECTIONS
 DWG. NO., S-1, DATED 8-6-80

KUNDE, DRIVER, SIMPSON & ASSOC., INC.
 DRAWING TITLED, EQUIPMENT FOUNDATION
 AND PIT DETAILS, DWG. NO. S-4,

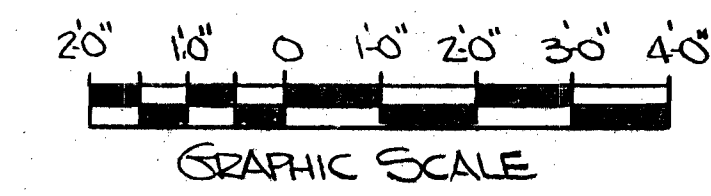
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PLAN
 SCALE: 1/2" = 1'-0"



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



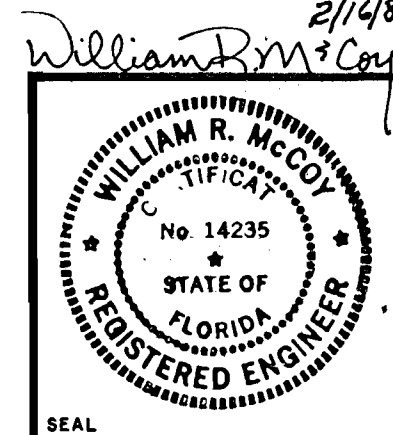
ISSUED FOR APPROVAL

REV.	DATE	BY	DESCRIPTION	APP
3-5	81	B	ADDED CN STORAGE TANK REVISED FLOWRATES.	LDL
			REISSUE FOR DADE COUNTY APPROVAL	
	FEB 16 1981	LDL	ISSUED FOR DADE COUNTY ERM & AVIATION DEPT. APPROVAL	LDL

REVISION

GENERAL ARRANGEMENT

PROPOSED WASTEWATER PRETREATMENT
 CLEVELAND PNEUMATIC
 PRODUCT SERVICE DIVISION, INC.
 MIAMI INTERNATIONAL AIRPORT



enwright associates, inc.
 engineers planners surveyors
 GREENVILLE, SOUTH CAROLINA

LDL DRAWN
 FEB 1981
 DATE

LDL DESIGN
 FEB 1981
 DATE

RCW CHECK
 FILE

EN-A RETIRED

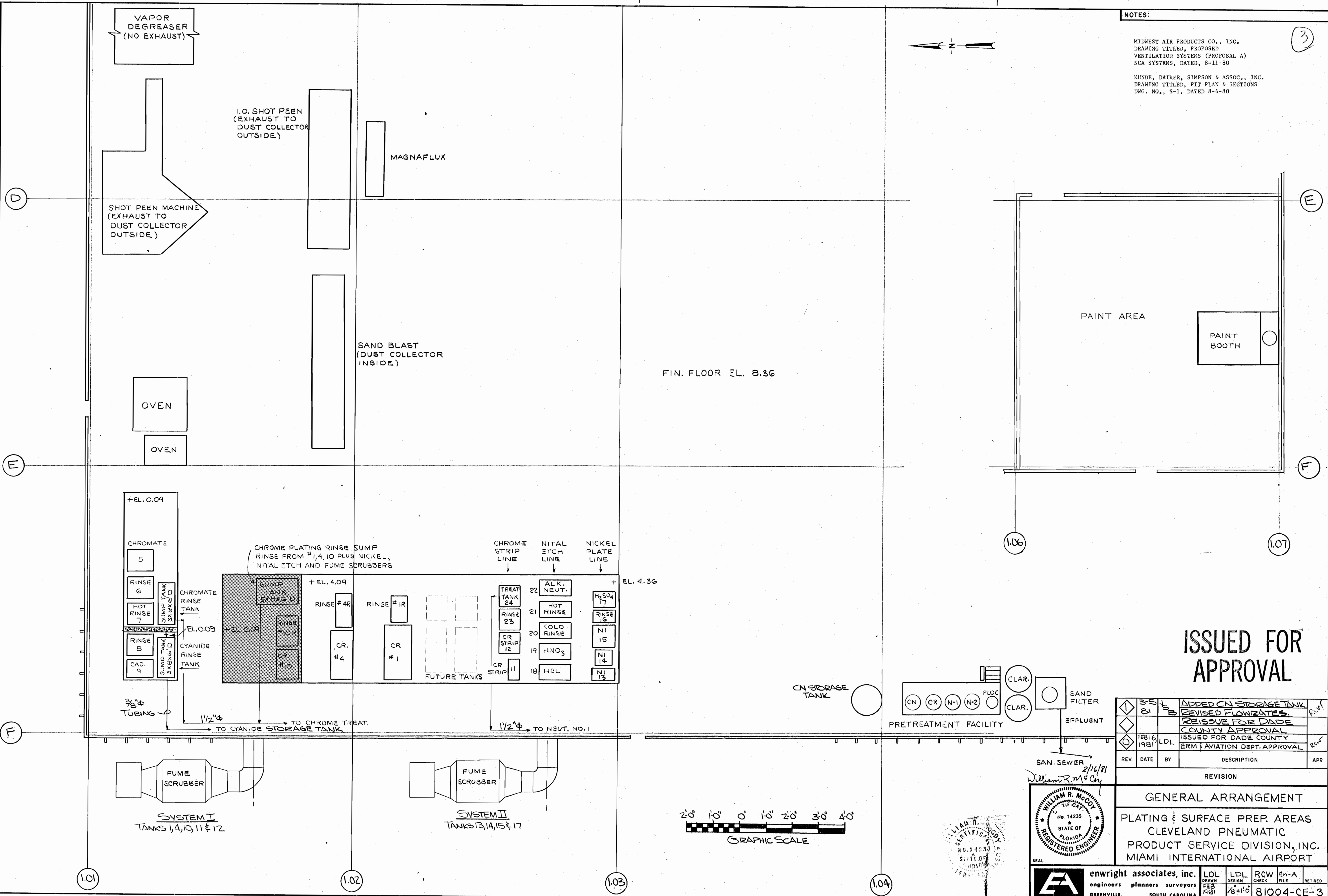
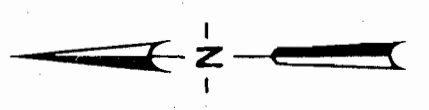
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 DWG. NO. 81004-CE-2

NOTES:

MIDWEST AIR PRODUCTS CO., INC.
DRAWING TITLED, PROPOSED
VENTILATION SYSTEMS (PROPOSAL A)
NCA SYSTEMS, DATED, 8-11-80

KUNDE, DRIVER, SIMPSON & ASSOC., INC.
DRAWING TITLED, PIT PLAN & SECTIONS
DWG. NO., S-1, DATED 8-6-80

3

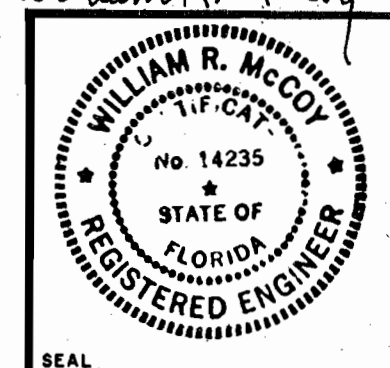


ISSUED FOR APPROVAL

REV.	DATE	BY	DESCRIPTION	APP.
3-5	81		ADDED CN STORAGE TANK	
81			REVISED FLOWZATES	
			REQUEST FOR DADE COUNTY APPROVAL	
FEB 16 1981		LDL	ISSUED FOR DADE COUNTY ERM AVIATION DEPT. APPROVAL	

GENERAL ARRANGEMENT

PLATING & SURFACE PREP. AREAS
CLEVELAND PNEUMATIC
PRODUCT SERVICE DIVISION, INC.
MIAMI INTERNATIONAL AIRPORT

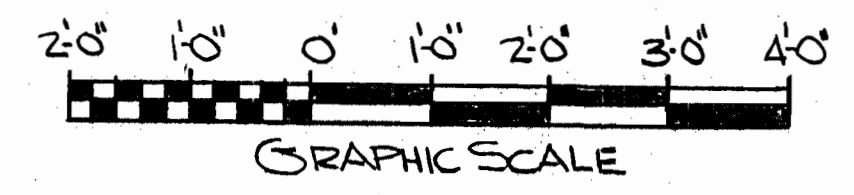


enwright associates, inc.
engineers planners surveyors

GREENVILLE, SOUTH CAROLINA

LDL DRAWN FEB 1981
LDL DESIGN 1/8 1981
RCW CHECK 1/8 1981
En-A FILE 1/8 1981
RETIRED

SCALE: 1/8" = 1'-0"
DWG. NO.: 81004-CE-3





ENWRIGHT ASSOCIATES, INC.

To Bruce

Date 10-6 Time 10:58

WHILE YOU WERE OUT

M. Dan Prope

of Cleveland Pneumatic

Phone 305-871-3428

Area Code Number Extension

TELEPHONED	PLEASE CALL
CALLED TO SEE YOU	WILL CALL AGAIN
WANTS TO SEE YOU	URGENT
RETURNED YOUR CALL	

Message _____

Bea
 Operator

ENGINEERING REPORT
FOR
WASTEWATER PRETREATMENT FACILITIES
AND
AIR POLLUTION CONTROL FACILITIES

PROJECT: CLEVELAND PNEUMATIC PRODUCT SERVICE DIVISION, INC.
MIAMI INTERNATIONAL AIRPORT
MIAMI, FLORIDA

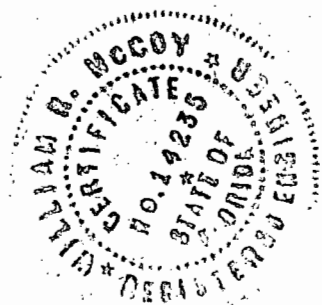
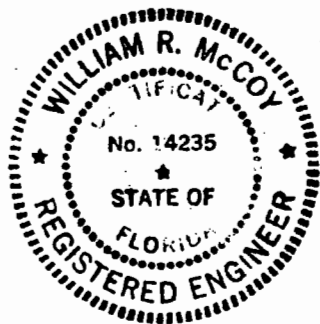
CLIENT: METALS APPLIED, INC.
DIVISION OF CLEVELAND PNEUMATIC
CLEVELAND, OHIO

REVISED MARCH 1981

FEBRUARY, 1981

ENWRIGHT ASSOCIATES, INC.
ENGINEERS
GREENVILLE, SOUTH CAROLINA

PROJECT NO. 81004-00-2-00



William R. McCoy
William R. McCoy, PE
Vice President

Rick C. Wilkey
Rick C. Wilkey, PE
Project Manager

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WASTEWATER PRETREATMENT FACILITIES

AND

AIR POLLUTION CONTROL FACILITIES

CLEVELAND PNEUMATIC PRODUCT SERVICE DIVISION, INC.

MIAMI, FLORIDA

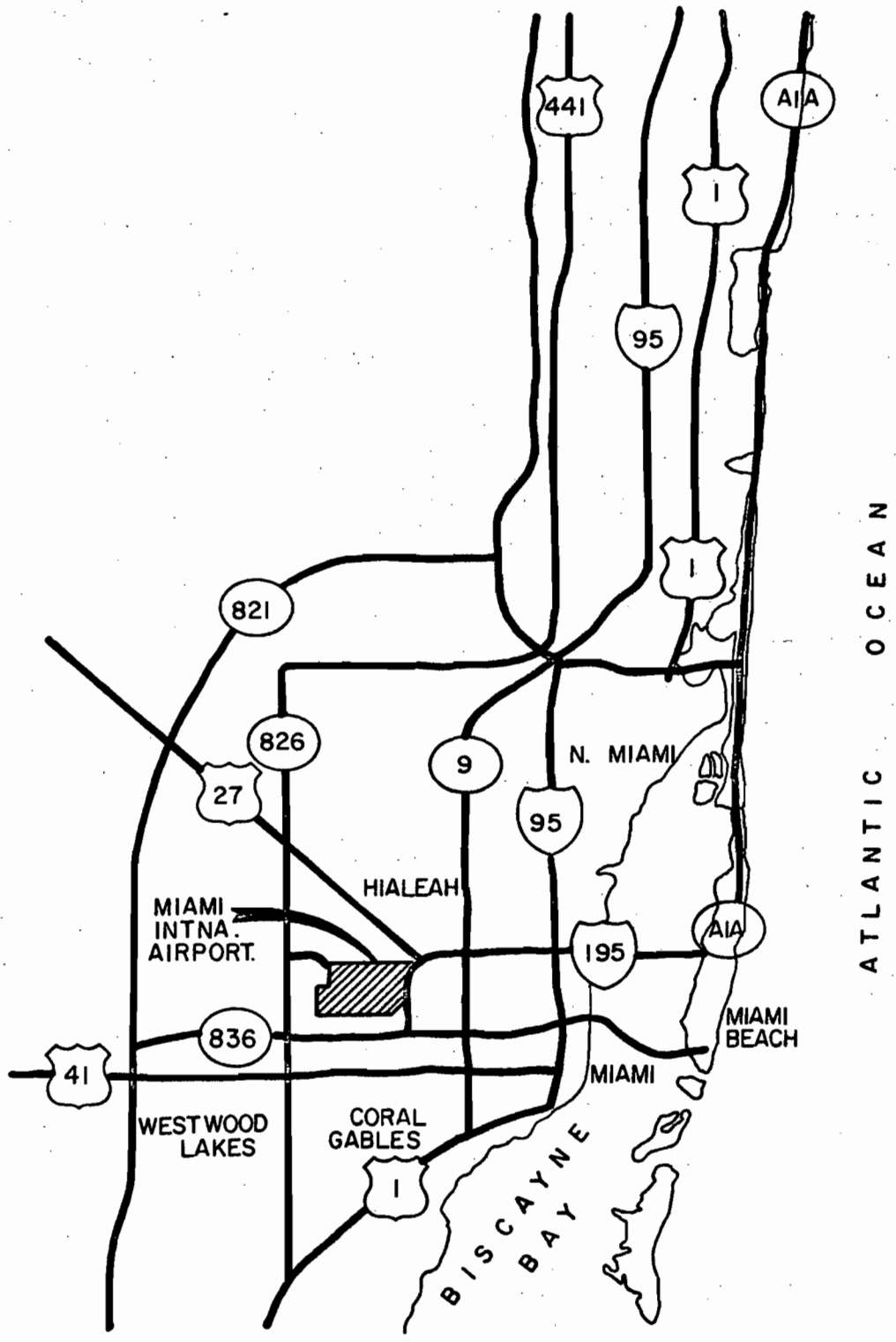
I. INTRODUCTION

Cleveland Pneumatic is currently remodeling an existing hangar building at the Miami International Airport in Miami, Florida. The remodeled building will house the equipment necessary to disassemble, rebuild and reassemble aircraft landing gear parts. The Standard Industrial Code for this facility is 3728. The plant has a tentative start-up date of April, 1981. Mr. Ned Angene, Vice President of Operations, will be responsible for all operations at the plant. The facility will be operational 16 hours per day, 5 days per week. Approximately 55 people will be employed on the first shift and approximately 45 people on the second shift.

General location of the Miami Airport is shown on Exhibit 1, page 2. Location of Cleveland Pneumatic's facility relative to the airport layout is shown on Exhibit 2, page 3.

Process wastewater will result from rinse waters and periodic tank dumps from the various chemical stripping, cleaning and metal plating operations. The estimated average process wastewater flow rate will be approximately 15,000 gallons per 24 hour day. The process and sanitary wastewater flows will be discharged to the Dade County Aviation Department sewer system.

NOTES:



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**EXHIBIT I
GENERAL LOCATION
CLEVELAND PNEUMATIC
MIAMI INT. AIRPORT**

REV.	DATE	BY	DESCRIPTION	APP.
REVISION				

	enwright associates, inc.		FORM	DESIGN	CHECK	FILE	REVISION
	engineers planners surveyors		DATE	SCALE	SHEET NO.		
GREENVILLE, SOUTH CAROLINA							

NOTES:

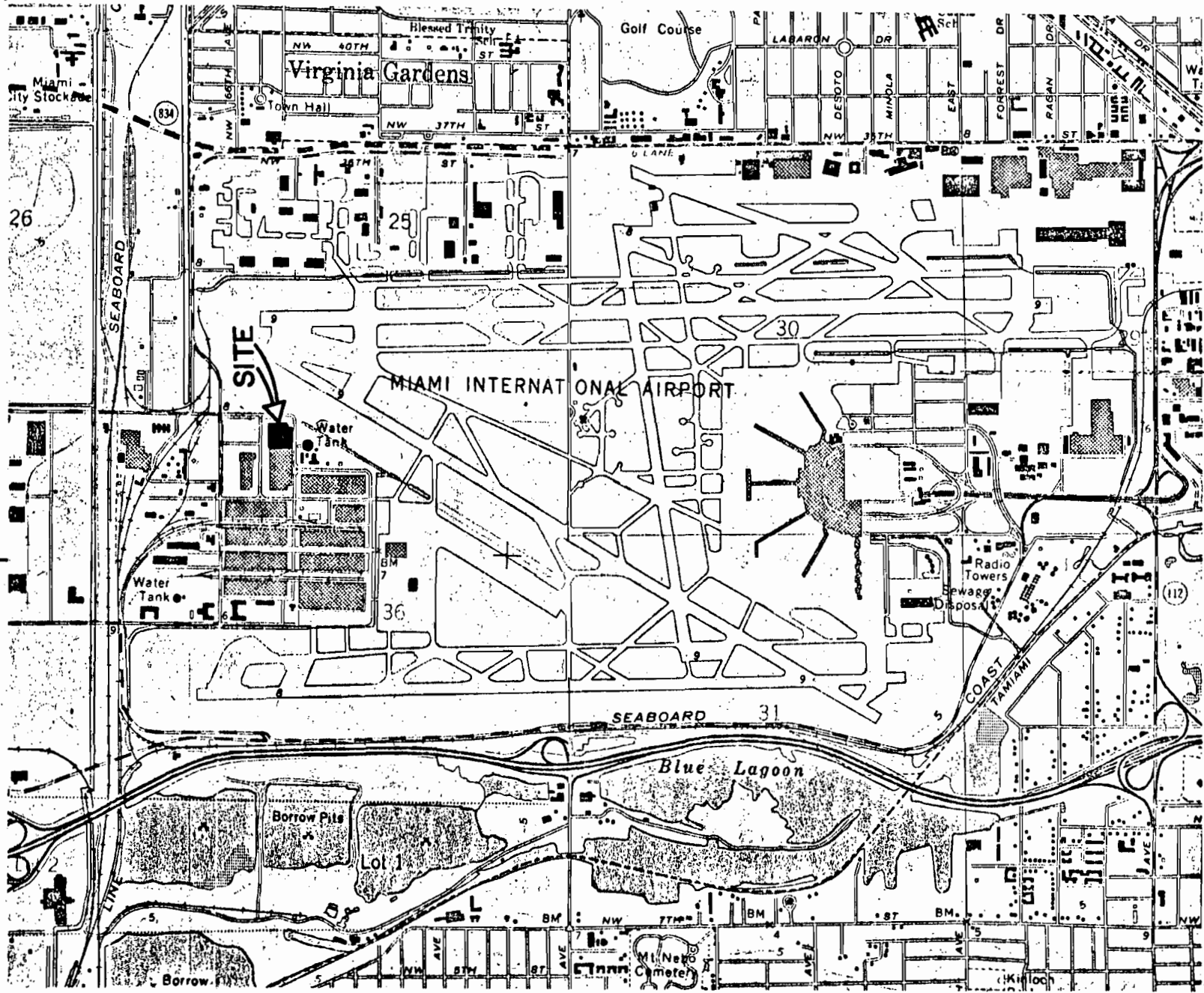


EXHIBIT 2
SITE LOCATION
CLEVELAND PNEUMATIC

MIAMI INT AIRPORT



enwright associates, inc.
 engineers architects surveyors
 south carolina
 andover, mississippi

REV	DATE	BY	DESCRIPTION	REVISION	APP.

Cleveland Pneumatic is planning to purchase a wastewater pretreatment system manufactured by DMP Corporation of Fort Mill, South Carolina. This system is designed for chromium reduction, cyanide treatment, heavy metal precipitation and wastewater neutralization.

Air pollution sources at the plant will be metal plating bath fumes, sandblasting/shot peen dust, and spray paint fumes. Air pollution control equipment will consist of fume scrubbers, dust collectors and paint spray arrestors as manufactured by Midwest Air Products Company (MAPCO), Pangborn Division of Carborundum, and De Vilbiss, respectively.

Enwright Associates, Inc. (EA) has been retained to prepare an Engineering Report meeting the requirements of the Dade County Aviation Department and the Dade County Environmental Resources Management and to prepare plans and specifications for the wastewater pretreatment and air pollution control systems. EA's obligation is for a process and instrumentation diagram and general arrangement drawings of the pollution control systems only. Electrical, structural and architectural design will be accomplished by others.

II. MANUFACTURING PROCESS DESCRIPTION

A. Introduction

Cleveland Pneumatic's proposed Miami facility will be capable of accomplishing the complete rebuild of landing gear assemblies from heavy jet aircraft. The overhaul facility will disassemble all hydraulic and control components from the structural members. The structural members will then be sandblasted, shot peened, plated, machined, and reworked as necessary to ensure structural and metallurgical reliability.

The rebuild facility is not a regimented continuous flow assembly line. The actual rebuild operations required will vary as a function of the aircraft manufacturer, material composition and material protective coating.

Wastewaters will be generated from the various chemical cleaning, coating, and plating operations. Wastewater flows will be intermittent due to the "job-shop" nature of the rebuild facility.

All plating tanks will be located in pits below the manufacturing floor level. Any spillage or overflows will be contained. Cyanide bearing tanks will be physically separated from acid tanks for safety.

A General Arrangement drawing (No. 81004-CE-3) showing portions of the manufacturing area is presented as page 10.

B. Plating and Coating Processes

1. Nital Etch Line

A flow diagram of the nital etch line is presented as Exhibit 3, page 11. The tank contents summary is

presented as Table 1. This process is used to highlight metallic and structural imperfections on selected gear components. Excess water from the static rinse tanks flows to the chrome rinse sump tank. The wastewater is then pumped to the DMP waste treatment system for treatment.

TABLE 1
NITAL ETCH LINE

<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK-NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
19	750 gal.	Nital Etch	Nitric Acid	None	None
18	750 gal.	Hydrochloric Acid	Hydrochloric Acid	None	None
22	750 gal.	Alkaline Neutralization	Sodium Hydroxide		
20	750 gal.	Cold Rinse	Water	None	200-300 GPD
21	750 gal.	Hot Rinse	Water	None	200-300 GPD

2. Nickel Plating Line

A flow diagram of this line is presented as Exhibit 4, page 12. The tank contents summary is presented as Table 2. Contents of the nickel plating bath will be purified by continuous recirculating carbon filter. Overflow from the rinse tank will go to the chrome rinse sump tank.

TABLE 2
NICKEL SULFAMATE PLATING LINE

<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
17	500 gal.	Acid Acti- vation	H ₂ SO ₄ & HF1	None	None
16	500 gal.	Rinse	H ₂ O	None	To Chrome Rinse Sump
15	1200 gal.	Nickel Plate	Nickel Metal Boric Acid Additives	None	None
14	500 gal.	Nickel Plate	Metallic	None	None
13	500 gal.	Nickel Plate	Nickel	None	None

3. Chrome Stripping Line

The chrome stripping line will remove chrome plating from some gear components prior to remanufacture. A flow diagram and tank summary are presented as Exhibit 5 and Table 3, respectively.

Rinse water and tank dumps will be batch treated for chrome reduction prior to precipitation in the DMP waste treatment system.

TABLE 3
CHROME STRIPPING LINE

<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
11	500 gal.	Chrome Strip	NaOH*	2 Weeks	None
12	1000 gal.	Chrome Strip	NaOH*	2 Weeks	None
23	1000 gal.	Rinse	H ₂ O	None	Cr Reduction Tank
24	1000 gal.	Chrome Reduction	Spent Chrome	2 Weeks	To DMP System (Tank N-1)

(*Proprietary Product)

4. Chrome Plating

The chrome plating line is a "hard chrome" process. A flow diagram is presented as Exhibit 6 and the tank summary is shown as Table 4.

Gear components will be rinsed over the plating and rinse tanks by a hand held hose. Excess rinse tank water will flow to the plating tank for make-up. Occasionally, excess rinse water not needed for make-up will flow to the chrome rinse sump tank. This operations sequence will minimize the quantity of chrome wastewater requiring waste treatment.

TABLE 4
CHROME PLATING LINE

<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
1	1375 gal.	Cr Plate	Chromic Acid	None	None
4	990 gal.	Cr Plate	& Sulfuric	None	None
10	1732 gal.	Cr Plate	Acid	None	None
1R	1375 gal.	Rinse	Water	None	To Plating Tank as Makeup; excess to Chrome Rinse Sump
4R	990 gal.	Rinse	Water	None	
10R	1732 gal.	Rinse	Water	None	

5. Cadmium Plating and Chromating

A flow diagram for these processes is presented as Exhibit 7. Tank summaries are presented as Tables 5 and 6.

Cadmium/Cyanide rinse water will flow to a sump tank and storage tank prior to treatment in the DMP System. Chromate rinses will flow to a separate sump tank for treatment. The cadmium plating tanks and chromating tanks are physically separated (by a concrete wall) for safety considerations.

TABLE 5
CADMIUM PLATING LINE

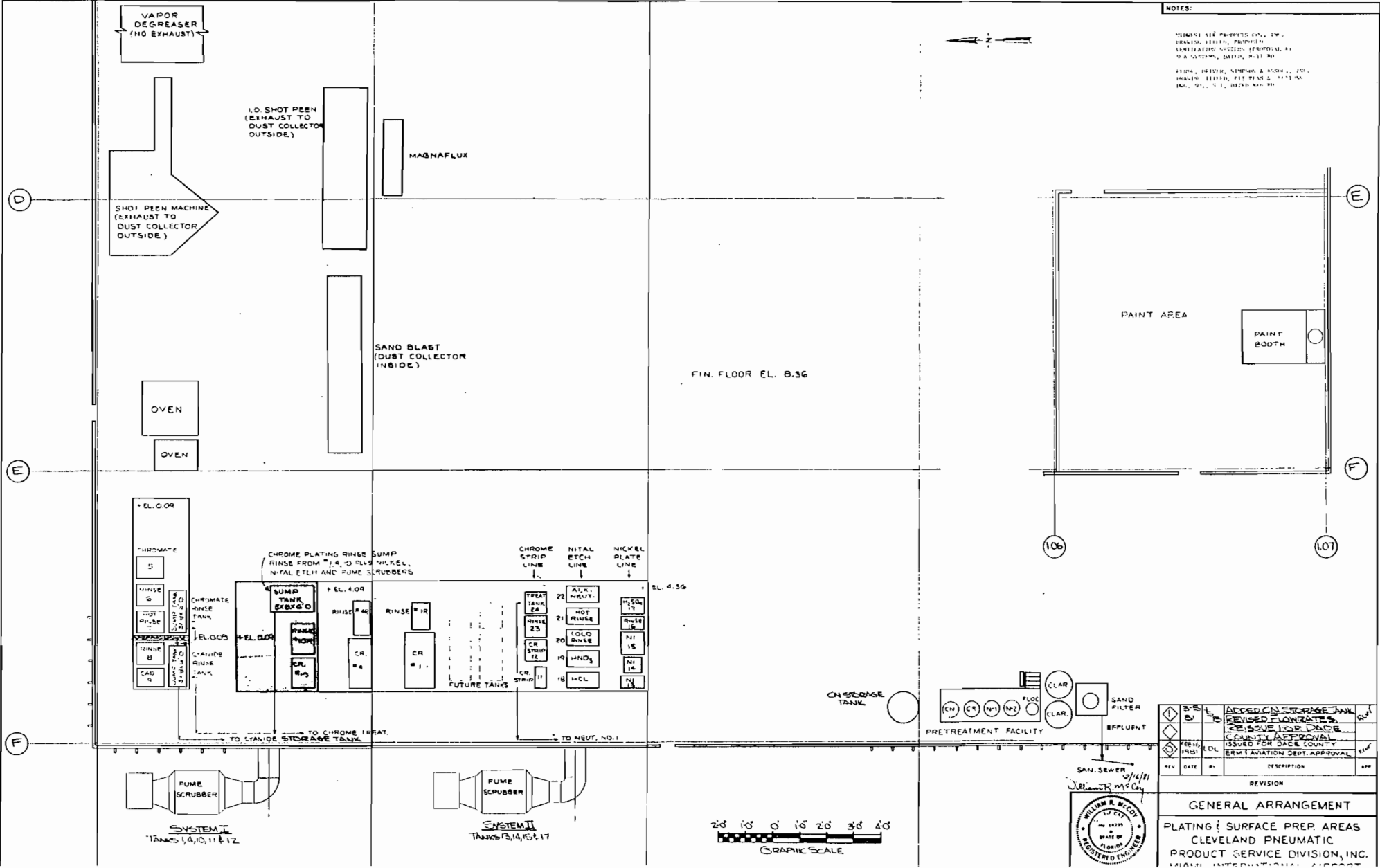
<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
9	1800 gal.	Cd Plate	Cadmium Sodium Cyanide Sodium Carbonate Sodium Hydroxide	None	None
8	1800 gal.	Rinse	Water	None	To DMP System (CN Reactor) (100 gpd)

TABLE 6
CHROMATE CONVERSION COATING LINE

<u>TANK NO.</u>	<u>VOLUME</u>	<u>TANK NAME</u>	<u>CONTENTS</u>	<u>DUMP</u>	<u>OVERFLOW</u>
7	1800 gal.	Hot Rinse	Water	None	To Chromate Sump
6	1800 gal.	Rinse	Water	None	To Chromate Sump
5	1800 gal.	Chromate	Sodium Dichromate	None	None

NOTES:

DESIGNED BY: WILSON & BECON, INC.
 DRAWING NO.: 17-001
 DATE: 11/11/81
 PROJECT: PLATING & SURFACE PREP AREAS
 CLEVELAND PNEUMATIC
 PRODUCT SERVICE DIVISION, INC.
 14000 INTERNATIONAL AVENUE
 CLEVELAND, OHIO 44130

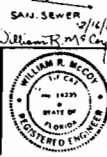
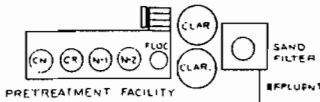
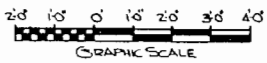


FIN. FLOOR EL. 8.36

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SYSTEM I
TANKS 1, 4, 10, 11 & 12

SYSTEM II
TANKS 13, 14, 15 & 17

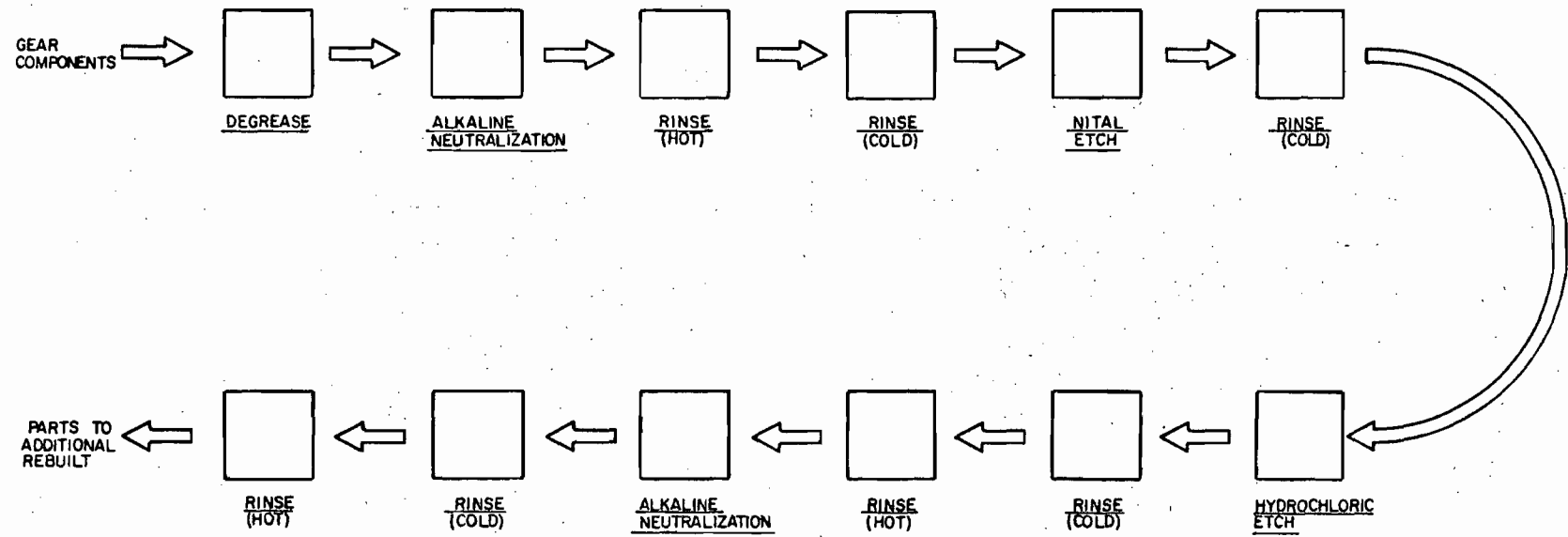


REV	DATE	BY	DESCRIPTION	APP
1	11/11/81	W.R.B.	ISSUED FOR COUNTY APPROVAL	
2			ISSUED FOR OHIO DEPT. APPROVAL	
3			REVISED FLOOR PLAN	
4			ADDED ON STORAGE TANK	

REVISION

GENERAL ARRANGEMENT
 PLATING & SURFACE PREP AREAS
 CLEVELAND PNEUMATIC
 PRODUCT SERVICE DIVISION, INC.
 14000 INTERNATIONAL AVENUE

NOTES:



FLOW DIAGRAM
NITAL ETCH LINE

REV	DATE	BY	DESCRIPTION	APP

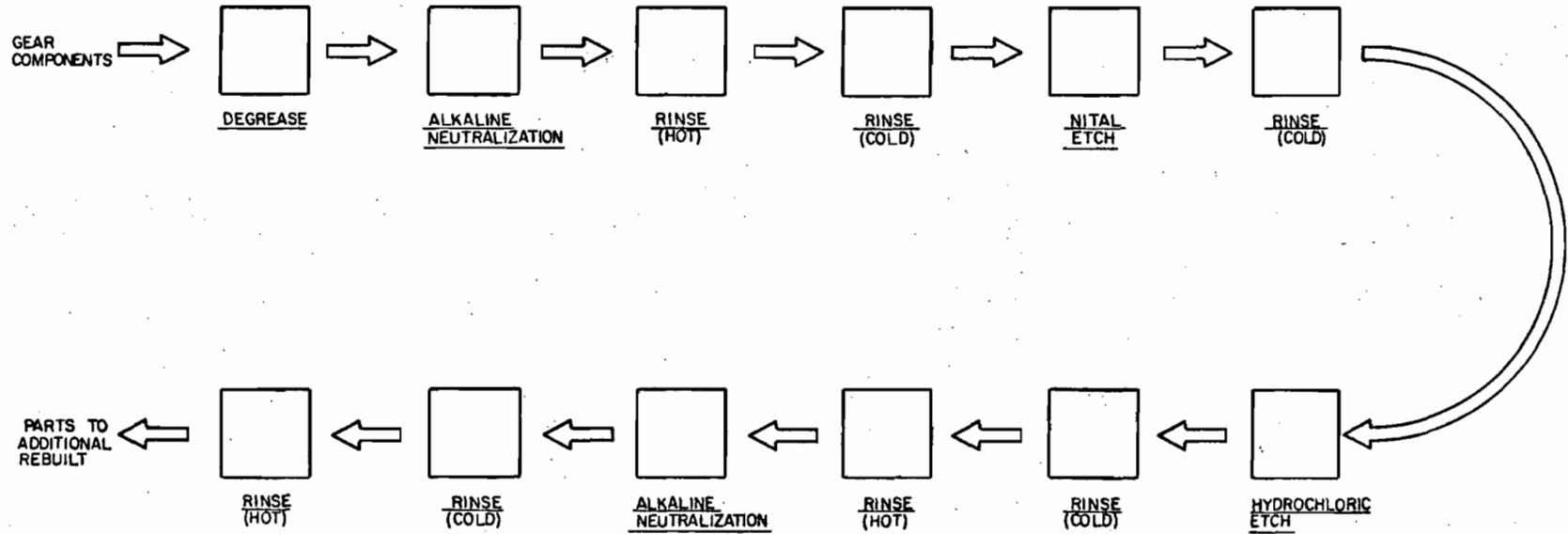
REVISION

EXHIBIT 3

CLEVELAND PNEUMATIC - MIAMI, FLA.

	emwright associates, inc.	DESIGN	ENGINEER	PLANNING	SURVEYOR	INSPECTION	TESTING
	emwright associates, inc.	DESIGN	ENGINEER	PLANNING	SURVEYOR	INSPECTION	TESTING

NOTES:



FLOW DIAGRAM
NITAL ETCH LINE

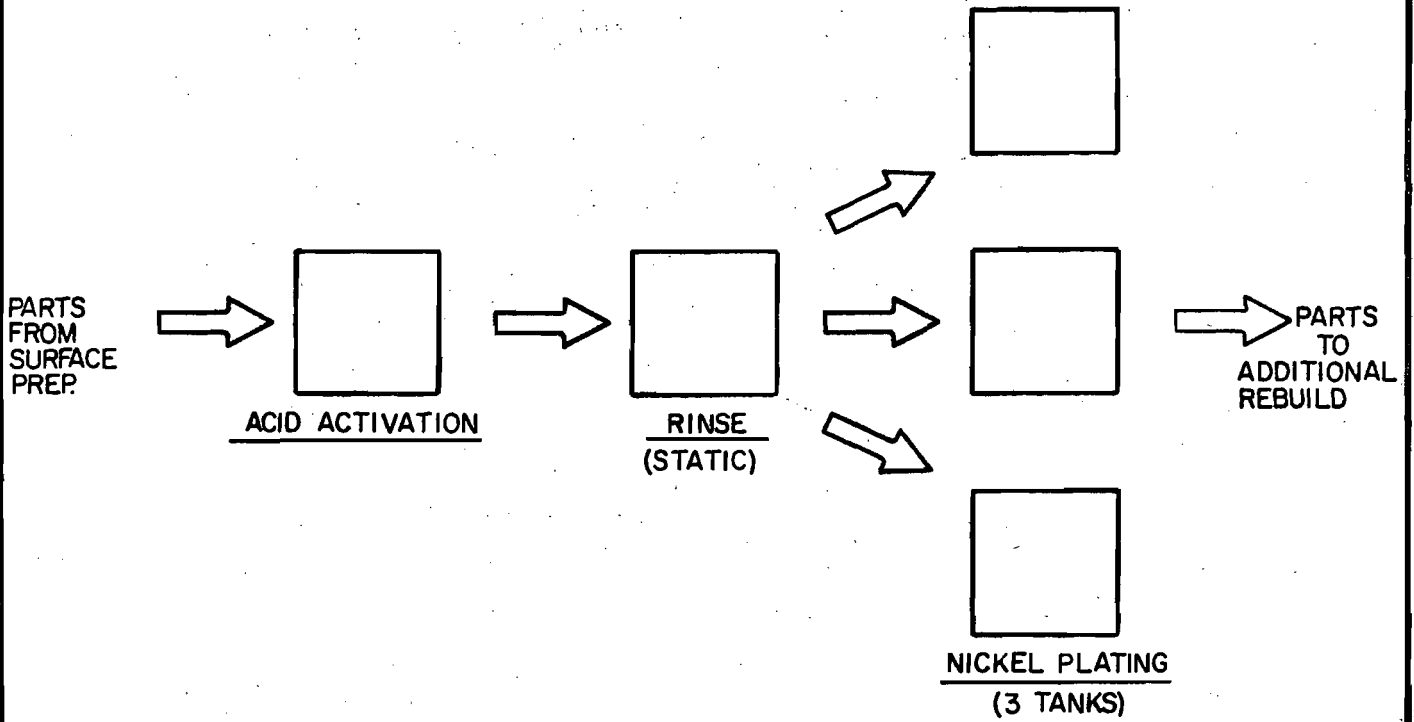
REV	DATE	BY	DESCRIPTION	APP

REVISION

EXHIBIT 3

CLEVELAND PNEUMATIC - MIAMI, FLA.

	enwright associates, inc.	OWNER	DESIGN	CONSTR	OPER
	engineers plumbers electricians drafters architects architects	10000 N.W. 11th Ave. Miami, FL 33157	305-551-1111 305-551-1112	305-551-1113 305-551-1114	305-551-1115 305-551-1116



FLOW DIAGRAM
NICKEL PLATING LINE

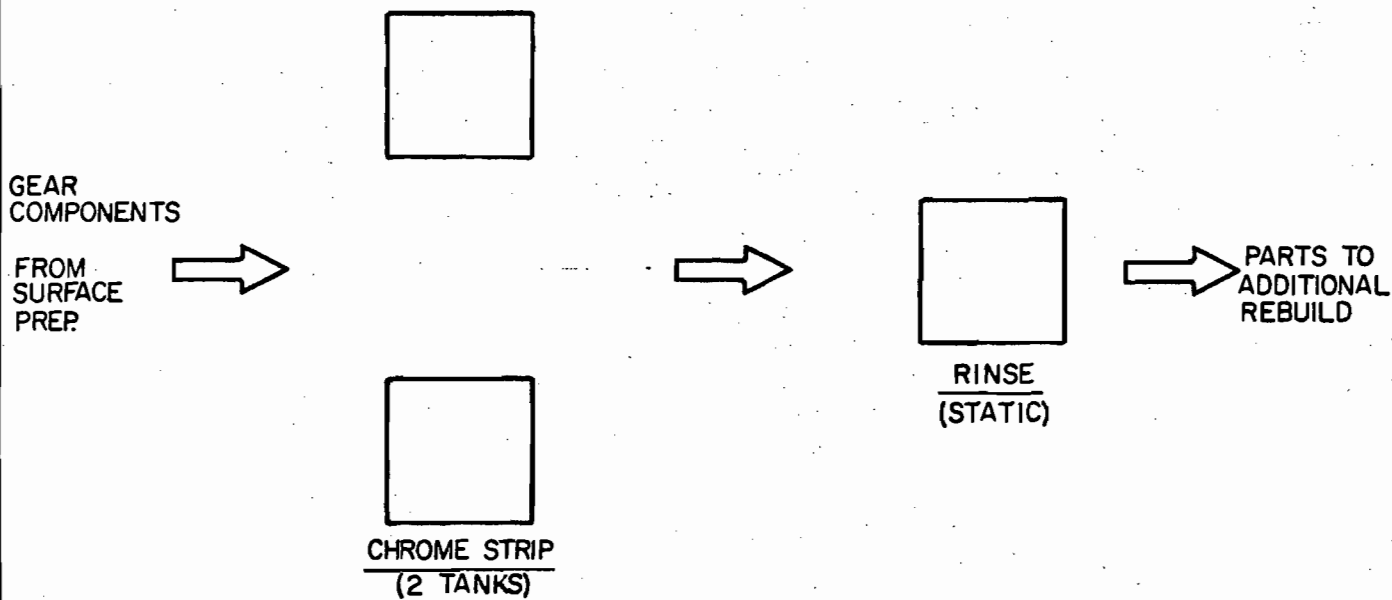
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REV.	DATE	BY	DESCRIPTION	APP.	
REVISION					

EXHIBIT 4

CLEVELAND PNEUMATIC - MIAMI, FLA


	enwright associates, inc.		PAGE	REVISION	CHECK	FILE	DATE
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GREENVILLE, SOUTH CAROLINA		DATE		SCALE	BY	NO.	REV.

NOTES:

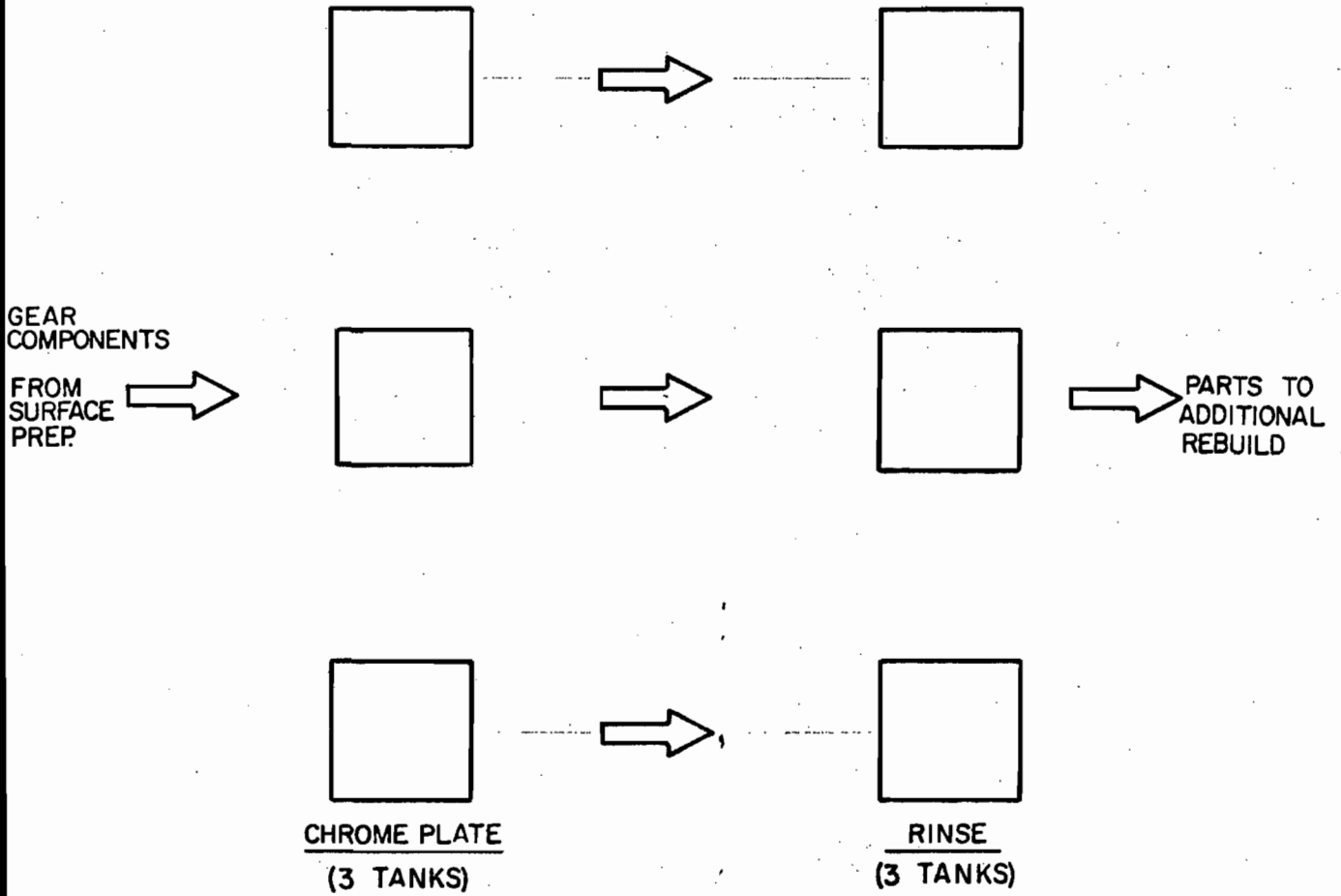


FLOW DIAGRAM
CHROME STRIPPING

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REV.	DATE	BY	DESCRIPTION	APP.
REVISION				


EXHIBIT 5	
CLEVELAND PNEUMATIC - MIAMI, FLA.	
 enwright associates, inc. engineers planners surveyors GREENVILLE, SOUTH CAROLINA	DRAWN: _____ CHECKED: _____ DATE: _____ SCALE: _____ PPS: 22

NOTES:



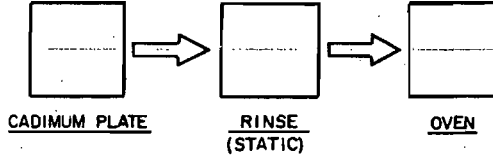
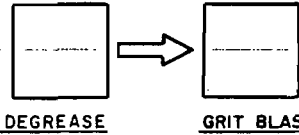
FLOW DIAGRAM
CHROME PLATING

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REV.	DATE	BY	DESCRIPTION	APP.
REVISION				

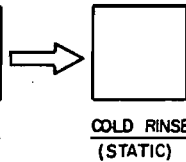
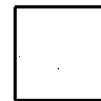
EXHIBIT 6	
CLEVELAND PNEUMATIC - MIAMI, FLA.	
 enwright associates, inc. engineers planners surveyors GREENVILLE, SOUTH CAROLINA	DRAWN DESIGNED CHECKED FILED DATED

NOTES:

GEAR COMPONENTS



PARTS TO ADDITIONAL REBUILD



**FLOW DIAGRAM
CADMIUM PLATING AND
CHROMATE COATING PROCESSES**

REV	DATE	BY	DESCRIPTION	APP	
REVISION					

EXHIBIT 7
CLEVELAND PNEUMATIC - MIAMI, FLA.

 enwright associates, inc.
engineers planners surveyors
mechanical electrical plumbing

III. WASTEWATER CHARACTERIZATION

A. Wastewater Flowrates

The majority of wastewater generated at Cleveland Pneumatic will be overflows from the fume scrubbers. Estimated flowrates are:

System I: 6.25 gpm.

System II: 3.75 gpm.

As previously described, wastewater flows from the plating area will be intermittent. The majority of the rinse tanks are "dead" (e.g., non-continuous) rinses. Most excess rinse waters are used as make-up supplies for the plating tanks.

Estimated average process flowrate to the pretreatment facilities is 10.4 gpm or approximately 15,000 gallons per 24 hours. The DMP pretreatment system is capable of handling 20 gpm (28,800 gals/24 hours) on a continuous basis. Sump holding tanks, sump pumps and the pump controls are designed to accommodate either intermittent or continuous wastewater flows.

B. Wastewater Analysis

1. Cadmium/Cyanide (CN) Wastewater

The untreated Cd/CN wastewater will contain varying concentrations of the following compounds/elements:

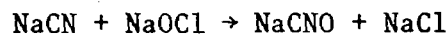
- a) Metallic Cadmium
- b) Sodium Cyanide
- c) Sodium Carbonate
- d) Sodium Hydroxide

2. Chromate Wastewater
 - a) Sodium Dichromate
 - b) Sulfuric Acid
3. Chrome Rinse Wastewater
 - a) Nitric Acid
 - b) Hydrochloric Acid
 - c) Sodium Hydroxide
 - d) Metallic Nickel
 - e) Boric Acid
 - f) Wetting Agents/Additives
 - g) Chromic Acid
4. Chrome Stripping Wastewater
 - a) Chromium (+3)
 - b) Sodium Hydrosulfite
 - c) Sodium Hydroxide

C. Wastewater Treatability

1. Cyanide Treatment

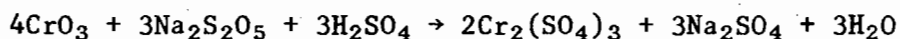
Cyanide wastes will be treated through the use of alkaline chlorination. Cyanide will be converted to sodium cyanate in a one-step process by feeding caustic soda (NaOH) for pH adjustment and sodium hypochlorite for oxidation of the cyanide. The chemical equation for conversion of cyanide to sodium cyanate is:



The optimum pH for this reaction is in the range 10.0 to 11.0.

2. Chromium Treatment

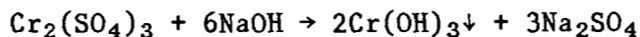
Chromium wastes will be treated by standard reduction and precipitation. Hexavalent chromium (Cr^{+6}) must be reduced to trivalent chromium (Cr^{+3}) prior to precipitation. Sodium metabisulfite ($\text{Na}_2\text{S}_2\text{O}_5$) or sodium bisulfite can be utilized for chromium reduction. The following equation presents reduction of chromic acid:



This reaction is instantaneous at a pH of 1 and essentially instantaneous at a pH of 2.0 to 2.5.

Alkaline chrome stripping wastewater will be reduced while in the alkaline condition. Sodium hydrosulfite will be utilized as the reducing agent. The chrome will be mixed with other wastewaters for precipitation.

Heavy metals such as chromium can be precipitated as metal hydroxides. Typically, sodium hydroxide is used. The chemical equation for precipitation of chromium is:



The solubility of metals is pH dependent. Graphs (from EPA publication) showing the relation between pH and metals solubility are presented in Appendix 1.

IV. WASTEWATER PRETREATMENT SYSTEM

A. Required Effluent Quality

Effluent quality at the new Cleveland Pneumatic plant in Miami, Florida will be governed by regulations of the Metro-Dade County Code [Section 24-11(9)], regulations of the Miami-Dade Water and Sewer Authority and the Environmental Protection Agency (EPA) Pretreatment Standards.

Local Pretreatment guidelines affecting Cleveland Pneumatic are presented in Table 7. Excerpts from these guidelines are included as Appendix 7.

TABLE 7

LOCAL PRETREATMENT GUIDELINES DADE COUNTY, FLORIDA

<u>Parameter</u>	<u>Section 24-11(9) Metro-Dade County Code</u>	<u>Miami-Dade Water and Sewer Authority</u>
pH (units)	5.5 to 9.5	5.5 to 9.5
CN (mg/l)	0.01	2.0
Cr (mg/l)	0.5	0.5
Cr (T)	1.0	10.0
Cd (mg/l)	0.5	2.0
Ni (mg/l)	None	10.0

The Federal (EPA) pretreatment guidelines for discharge of more than 10,000 gallons per calendar day are given in Table 8. The pretreatment guidelines for less than 10,000 gpd are presented as Table 9.

TABLE 8

FEDERAL PRETREATMENT GUIDELINES
ELECTROPLATING OF COMMON METALS SUBCATEGORY
10,000 GPD OR MORE DISCHARGE
(Effective Regulation Date: March 16, 1981)

Pollutant or pollutant property	Pretreatment standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed-
CN,T.....	1.9	1.0
Cu.....	4.5	2.7
Ni.....	4.1	2.6
Cr.....	7.0	4.0
Zn.....	4.2	2.6
Pb.....	0.6	0.4
Cd.....	1.2	0.7
Total metals.....	10.5	6.8

TABLE 9

FEDERAL PRETREATMENT GUIDELINES
ELECTROPLATING OF COMMON METALS SUBCATEGORY
10,000 GPD OR LESS DISCHARGE
(Effective Regulation Date: March 16, 1981)

Pollutant or pollutant property	Pretreatment standard (mg/l)	
	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed-
CN,A.....	5.0	2.7
Pb.....	0.6	0.4
Cd.....	1.2	0.7

The Metro-Dade County Code, Section 24-11(9), Table 7, presents the most stringent guidelines, with the exception of nickel. Thus, Cleveland Pneumatic's wastewater will be governed by the Dade County Code for all parameters except nickel. Effluent nickel concentrations will be governed by the EPA guidelines presented in Table 8.

Considerable research has been conducted concerning the chemistry and fate of cyanide in wastewaters and the environment. Research shows that cyanide toxicity is associated with molecular hydrogen cyanide (HCN). Consequently, effluent guidelines should be based on free or molecular cyanide, not on total cyanide. This is particularly important to the metal finishing/electroplating industry due to possible presence of cyanide/iron complexes.

Analyses for cyanide at the 0.01 mg/l level is difficult. A number of substances, including sulfides and fatty acids, can interfere with the analyses. Confidence levels at the 0.01 mg/l level are questionable.

Excerpts from an EPA cyanide report and excerpts from an Inter-Industry Cyanide Group Report are presented as Appendix 8. These excerpts present information concerning cyanide toxicity and analyses problems.

The DMP pretreatment system, when properly operated, contains the equipment necessary to pretreat Cleveland Pneumatic's wastewater (as herein described) within compliance of the local pretreatment guidelines.

B. Proposed Pretreatment Facilities

The overall concept for the proposed system for Cleveland Pneumatic wastewater treatment system is presented in the Process and Instrumentation Diagram, drawing number 81004-CE1, page 23. The pretreatment system layout and arrangement is shown on the General Arrangement, drawing number 81004-CE2, page 24.

The proposed pretreatment system will be designed to handle three separate wastestreams as follows:

1. Cyanide

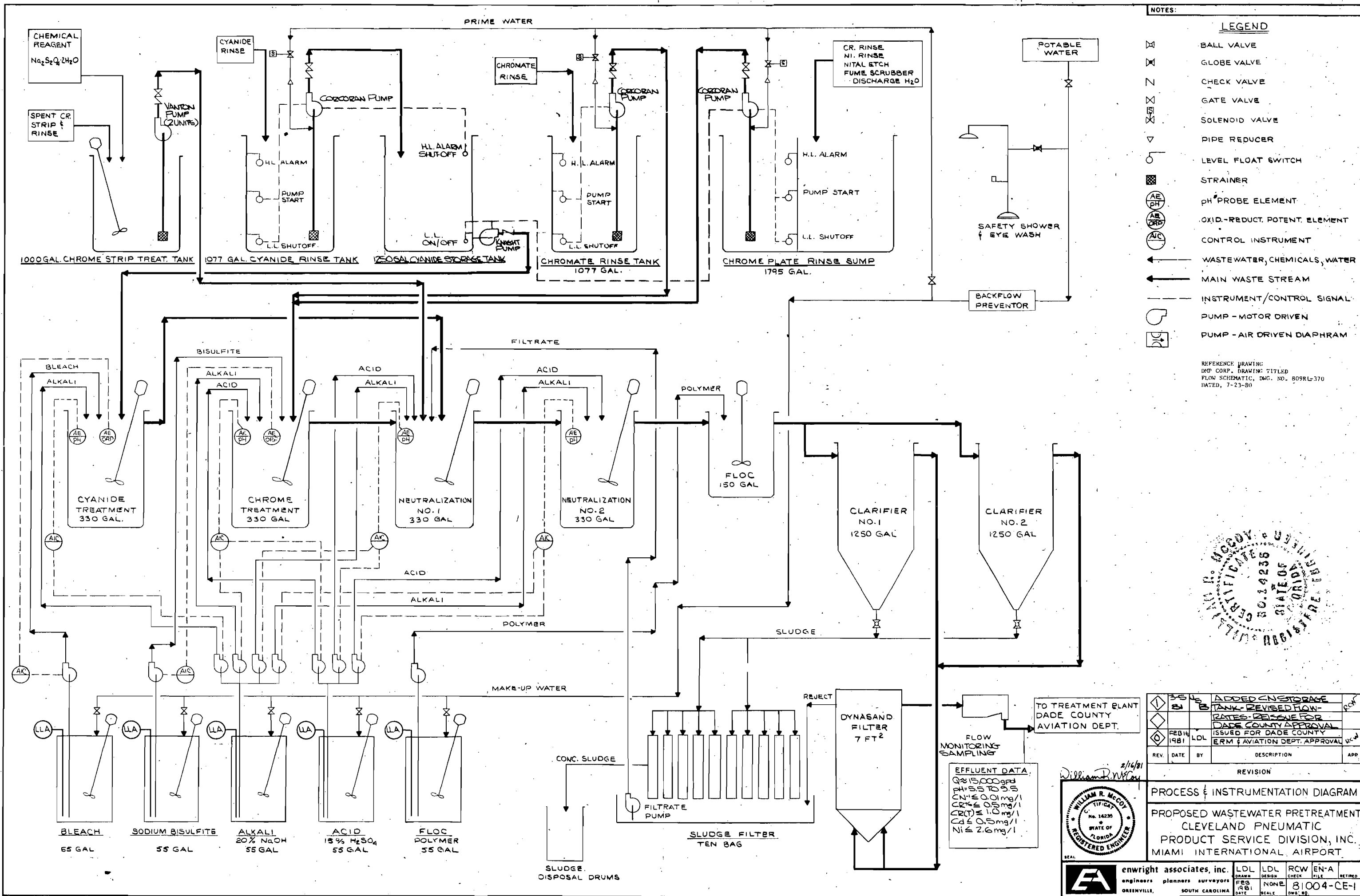
Rinsewaters from the cadmium plating line will be collected in a sump tank, pumped to a cyanide storage tank and held for metering to the cyanide treatment reactor.

2. Chromium

Rinsewaters from the chrome and nickel plating lines, the nital etch line, the chromate coating line and overflows from the fume scrubbers will be collected in a sump tank and held for pumping to a chrome treatment reactor.

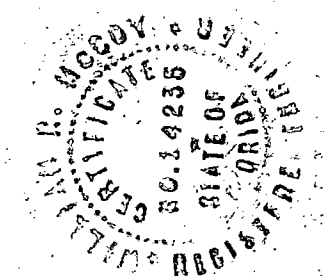
3. Chromium Strip

Rinsewaters and dumps from the chrome strip line will be collected in a holding tank, batch treated with sodium hydrosulfite to reduce the Cr^{+6} to Cr^{+3} , then pumped to the DMP treatment system, Tank N-1.



- NOTES:**
- LEGEND**
- ⊗ BALL VALVE
 - ⊕ GLOBE VALVE
 - ⌞ CHECK VALVE
 - ⌘ GATE VALVE
 - ⊗ SOLENOID VALVE
 - ▽ PIPE REDUCER
 - LEVEL FLOAT SWITCH
 - ⊠ STRAINER
 - ⊕ pH PROBE ELEMENT
 - ⊕ OXID.-REDUCT. POTENT. ELEMENT
 - ⊕ CONTROL INSTRUMENT
 - ← WASTEWATER, CHEMICALS, WATER
 - ← MAIN WASTE STREAM
 - INSTRUMENT/CONTROL SIGNAL
 - ⊕ PUMP - MOTOR DRIVEN
 - ⊕ PUMP - AIR DRIVEN DIAPHRAM

REFERENCE DRAWING
 DWP CORP. DRAWING TITLED
 FLOW SCHEMATIC, DWG. NO. 809RL-370
 DATED, 7-23-80



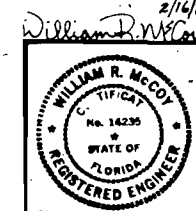
REV.	DATE	BY	DESCRIPTION	APP.
35	8/15	LDL	ADDED CN STORAGE TANK - REVISED FLOW RATES - PERSON FOR DADE COUNTY APPROVAL	LDL
34	8/15	LDL	ISSUED FOR DADE COUNTY ERM & AVIATION DEPT. APPROVAL	LDL
33	8/15	LDL		

REVISION

PROCESS & INSTRUMENTATION DIAGRAM

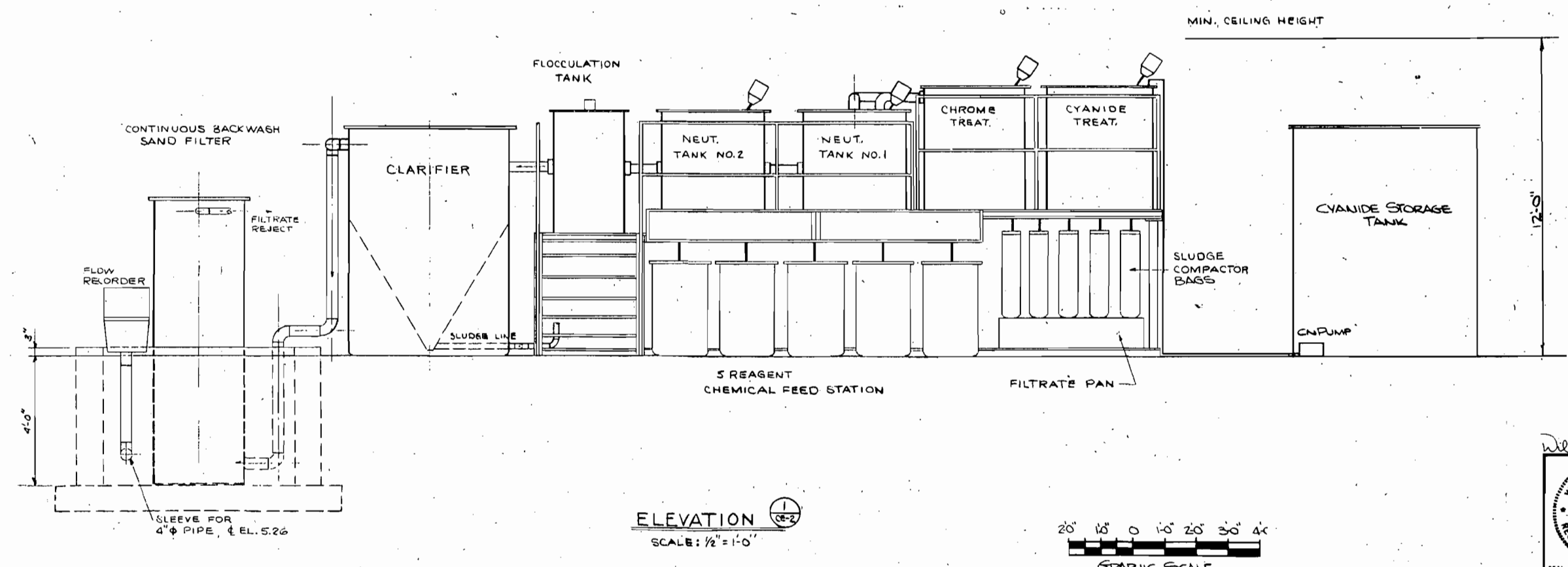
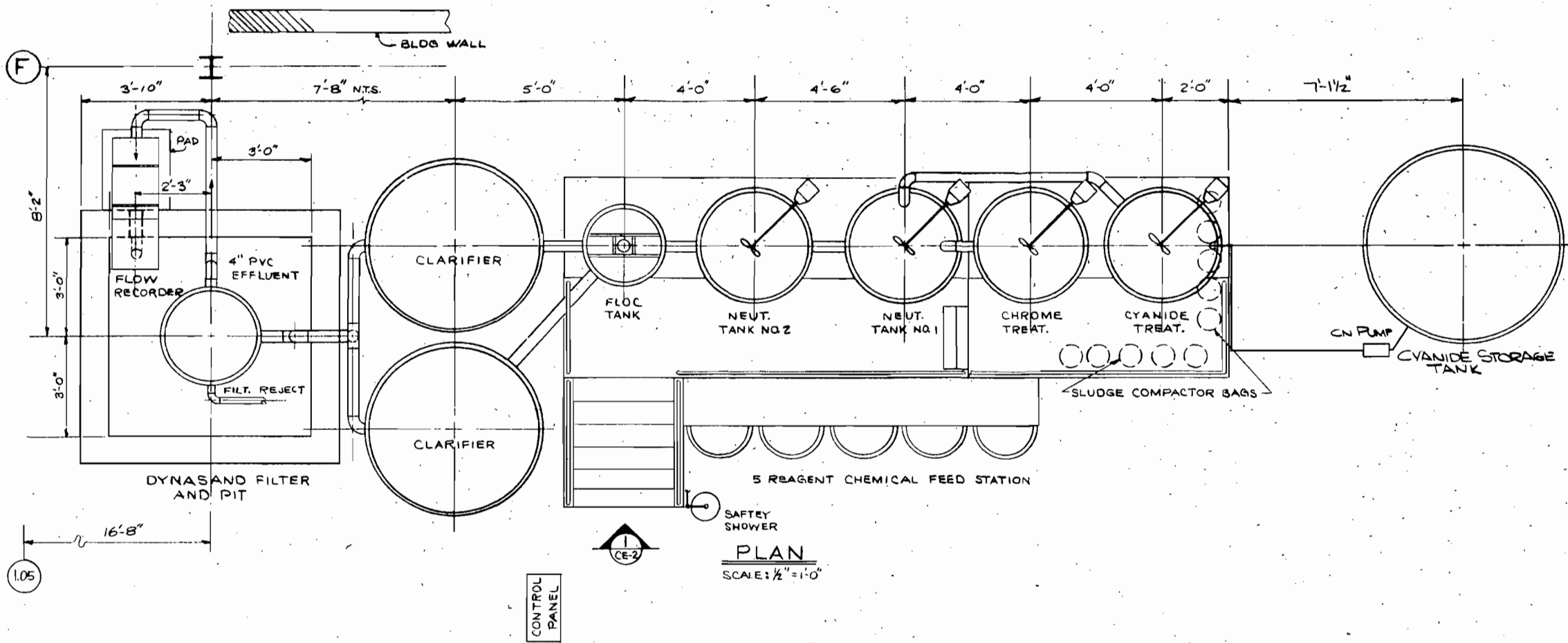
PROPOSED WASTEWATER PRETREATMENT
 CLEVELAND PNEUMATIC
 PRODUCT SERVICE DIVISION, INC.
 MIAMI INTERNATIONAL AIRPORT

EFFLUENT DATA:
 Q₂ 15,000 gpd
 pH 8.5 TO 9.5
 CN ≤ 0.01 mg/l
 CR ≤ 0.5 mg/l
 CRT ≤ 1.0 mg/l
 Cd ≤ 0.5 mg/l
 Ni ≤ 2.6 mg/l

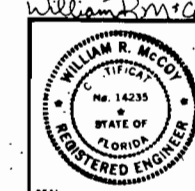


enwright associates, inc.		LDL	LDL	RCW	EN-A
engineers planners surveyors		DESIGN	CHECK	FILE	REVIEW
GREENVILLE, SOUTH CAROLINA	DATE	FEB 1981	NONE	81004-CE-1	SCALE

NOTES:
 REFERENCE DRAWINGS
 DMP CORP. DRAWING TITLED,
 EQUIPMENT LAYOUT, DWG. NO. PL-010
 DATED, 8-8-80
 KUNDE, DRIVER, SIMPSON & ASSOC., INC.
 DRAWING TITLED, "PIT PLAN & SECTIONS"
 DWG. NO., S-1, DATED 8-6-80
 KUNDE, DRIVER, SIMPSON & ASSOC., INC.
 DRAWING TITLED, "EQUIPMENT FOUNDATION
 AND PIT DETAILS, DWG. NO. S-4"



REV.	DATE	BY	DESCRIPTION	APP.
3-5	81	LDL	ADDED CN STORAGE TANK	RCW
			REVISED FLOWRATES	
			REISSUE FOR DADE COUNTY APPROVAL	
FEB 16	1981	LDL	ISSUED FOR DADE COUNTY ERM & AVIATION DEPT. APPROVAL	RCW



GENERAL ARRANGEMENT
 PROPOSED WASTEWATER PRETREATMENT
 CLEVELAND PNEUMATIC
 PRODUCT SERVICE DIVISION, INC.
 MIAMI INTERNATIONAL AIRPORT

enwright associates, inc.
 engineers planners surveyors
 GREENVILLE, SOUTH CAROLINA

LDL DRAWN 1981	LDL DESIGN 1/2" = 1'-0"	RCW CHECK SCALE	EN-A FILE 81004-CE-2	RETIRED
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Effluents from the cyanide rinse, chrome rinse and chromate rinse sump tanks will be pumped at a constant rate to their respective reactors (330 gallons each) by constant speed pumps. The pumps will be activated by float controls and primed by tap water.

The contents of the cyanide treatment reactor will be maintained at a pH of approximately 11.0 by automatic addition of NaOH. An Oxidation Reduction Potential (ORP) controller will maintain a slight excess of cyanide oxidation agent (NaOCl). Theoretical detention time in the tank will be 16 minutes at 20 GPM. The tank will be equipped with a mixer and pH probe. DMP's "incorrect treatment" alarm will function in this reactor. Should the pH and/or ORP values fall outside the setpoints, the alarm will activate after a specific time delay.

The pH in the chromium reduction reactor will be maintained at 2.0 - 2.5 by automatic addition of sulfuric acid (H_2SO_4). An Oxidation Reduction Potential (ORP) controller will maintain a slight excess of chrome reducing agent, either sodium bisulfite or sodium metabisulfite. Theoretical detention time in the tank will be 16 minutes at 20 GPM. The tank will be equipped with a mixer and pH probe. DMP's "incorrect treatment" alarm will function in this reactor.

The effluent from the chromium reduction reactor and the cyanide treatment reactor will flow by gravity to a two-stage neutralization-precipitation step for pH adjustment. Effluent from the chrome strip holding tank will be pumped to the first neutralization tank N-1 by a corrosion resistant pump, activated

and primed as described above. The pH in tank N-2 will be maintained at an optimum point for precipitation of chromium, cadmium, and nickel.

The theoretical detention time in each of the neutralization-precipitation reactors will be 16 minutes at 20 GPM. Each tank has a volume of 330 gallons and will be equipped with a pH probe and mixer. Flow will be baffled to prevent short circuiting of untreated material. The "incorrect treatment" alarm will function in the reactor.

The neutralized wastewater will flow to a 150 gallon flocculation tank. Theoretical detention time in the tank will be approximately seven (7) minutes. A flocculant aid will be added to enhance settling in the clarifiers.

From the flocculator, the wastewater will flow to two 1,250 gallon clarifiers. Total theoretical detention time will be approximately two (2) hours. Theoretical overflow rate (at the maximum 20 gpm flowrate) for each clarifier will be approximately 1,500 gpd/ft². Clarified effluent will flow to a DYNASAND filter.

The DYNASAND filter is an upflow sand filter with continuous backwash that will remove very fine or light non-settling solids from the clarified effluent. The backwash water will be returned to the head of the treatment facility for additional treatment.

Wastewater flowrate from the DYNASAND filter will be measured using a V-notch weir and strip chart recorder. A proportional sampler will collect a composite effluent sample

for laboratory analysis prior to discharge to the Dade County Aviation Department Sewer System.

Sludge will be dewatered in a compactor consisting of polyethylene "bag filters". The compactor has two (2) independent racks with five (5) filters per rack. Maximum sludge handling capacity will be 35 gallons (15% solids) per twenty-four (24) hour day. Filtrate will be pumped to the first neutralization tank for pretreatment. Dewatered sludge will be stored and disposed of in accordance with current regulations.

C. Equipment Failure and Shutdown

The DMP treatment system is equipped with "incorrect treatment" alarms as previously described. In event of failure of pumps, instruments or controls, wastewater storage capacity is available in the three (3) sump tanks:

Cd/CN Sump: 1077 gallons

Chromate Sump: 1077 gallons

Chrome Rinse Sump: 1795 gallons

These sumps should provide a minimum of three (3) hours of emergency holding capacity at a wastewater flowrate of 10 gpm. In the event of a prolonged shutdown of the waste treatment facilities, the three (3) waste sump tanks can overflow into the concrete containment pits. The following approximate emergency wastewater storage volumes (net) would then be available:

Cd/CN - 1500 gallons

Chromate - 7800 gallons

Chrome Plating - 40,370 gallons

V. AIR POLLUTION CONTROL FACILITIES

A. Plating Facilities

The new plant for Cleveland Pneumatic will contain several metal plating lines including chromium, nickel, and cadmium plating processes. These operations have been described previously in this report.

In order to remove toxic fumes from the plating tanks, two fume scrubber systems with associated duct work, fans, and sprayers will be installed as follows:

1. System I

This fume scrubber will serve the three (3) chromium plating tanks and two (2) strip tanks. The fan will pull an air curtain over the tops of the plating tanks and through a single pack water spray scrubber. The water spray will dissolve various forms of chrome fumes from the air into solution with the water.

The fume scrubber for System I will be a MAPCO Model No. MW-100 with a rated capacity of 25,000 cubic feet per minute (cfm). Total surface area of the chrome plating tanks and strip tanks is approximately 132 square feet; thus, the scrubber is nominally rated at 190 cfm/square foot. The scrubber will feature self-contained recirculation of the water with approximately 6.25 gpm (maximum) of overflow. The overflow will drain to the chrome rinse sump. This fume scrubber is rated for a removal efficiency of 97 to 99 percent.

2. System II

This fume scrubber will serve the sulfuric, and three nickel sulfamate tanks. The fan will pull an air curtain over the top of the plating tanks and through a double pack water spray scrubber. The water spray will dissolve various fumes from the air into solution with the water.

The fume scrubber for System II will be a MAPCO Model No. MW-100D with a rated capacity of 6,522 cfm and dual packing and dual sprayers. Total surface area of the these tanks is approximately 45 square feet; thus, the scrubber is nominally rated at 145 cfm/square feet. The scrubber will feature self-contained recirculation of the water with approximately 3.75 gpm (maximum) of overflow. The overflow will drain to the chrome rinse sump. This fume scrubber has a rated removal efficiency of approximately 99 percent.

B. Sandblasting

In the process of rebuilding the aircraft landing gear parts, many of the parts must be sandblasted to remove paints and certain light coatings prior to further processing.

The sandblasting equipment for the Cleveland Pneumatic facility is an existing unit to be installed in the hangar building in Miami, Florida. The sandblaster is a self-contained unit with an integral recirculating dust collector.

The sandblaster and the dust collector were manufactured

by the VACU-BLAST Corporation. The material used for blasting is "Banding Sand" consisting of approximately 99 percent silicon dioxide. The dust collector is a recirculating type with no external discharge.

C. Shot Peen

Another process to be used by Cleveland Pneumatic for removing various coatings from the landing gear parts is the shot peen process. This process involves high velocity impact of fine steel shot (0.011" to 0.019" diameter) against the surface of the gear parts. The shot peen process removes old coatings from the parts, reduces the parts to base metal, and pits the surface of the base metal to better prepare the parts for further processing. There will be two separate shot peen processes at the new plant. The I.D. process is used for the inside diameter of parts and the O.D. process is used for the outside diameter of the parts.

To remove the dust particles resulting from the shot peen process, Cleveland Pneumatic will install a dust collector system to serve the ventilating requirements of both the I. D. and O. D. systems. The dust collector will be a Model No. 168-CT-614 as manufactured by Pangborn Division of the Carborundum Company. The collector will have a capacity of 11,500 cfm.

The cloth tube type collector will contain 168 tubes fabricated from polyester twill fabric with a net cloth area of 3,074 square feet. The cloth tubes will be housed in a

casing designed for suction operation up to and including 10" S.P.W.G.

The casing will have one 60 degree slope pyramid hopper with manual dump valve and a motor operated, outside mounted shaker mechanism. The shaker motor will be 3 HP and the fan motor will be 30 HP.

D. Ovens

The heat treating ovens will follow the metal plating operations. The landing gear parts are heated to certain temperatures for certain time periods to assure specific metallurgical characteristics.

The ovens to be used at the new facility will be electric powered with no exhaust; consequently, no air pollution control devices will be required.

E. Vapor Degreaser

Another unit process step to be used by Cleveland Pneumatic will be the vapor degreaser. This unit will consist of a tank containing trichlorethylene or 1, 1, 1-trichloroethane. ^{exempt} Parts will be immersed in this tank to remove oil and grease prior to further processing.

The vapor degreaser tank will be 13'-11" long by 7'-7" wide by 6'-0" deep. An additional 5'-8" of tank height will be added, thus giving a freeboard ^(c.l.) ratio of 0.75. The tank will have a motorized cover that is easily opened and closed without disturbing the vapor ^(c.l.) zone. The parts will enter and exit the tank via a motorized hoist. The cover will be open a maximum of three (3) minutes during the degreasing operation.

$$13.9167' \times 7.5833' = 105.63 \text{ sq'}$$

17-2116(6)(8)2

= 17 and
3 c.l.

17-2116(6)(8)3
d.

17-2.16(6)(2) 3. b. i - ✓

Pj. 16-16

ii - 2

iii - ✓

Safety switches will be installed to shut off the sump heat when either the contents become too warm or the vapor level rises too high.

F. Paint Booth

One of the steps in the final preparation of parts prior to reassembly is painting. All painting will be done inside a new paint arrestor type spray booth.

The spray booth will be a De Vilbiss Model No. XDF-6215 complete with lights, fan, and motor. The working chamber of the booth will be 10' wide by 10' high by 12' deep. The booth will have 48 paint filters, each measuring 20" x 25", providing a total of 167 square feet of filter area.

The booth will have an exhaust fan rated at 12,500 cfm with a 2 HP motor and will provide a minimum of 100 feet per minute (fpm) air velocity at the work location. The fan static pressure will be 0.375 to 0.5 inches w.c. The discharge will be a 34-inch diameter stack which discharges through the roof, complete with a stack head raincap. The stack will extend a minimum of three (3) feet beyond the roof line.

fifteen (15%) percent solids in twenty-four (24) hours.

System consists of two (2) independent filter packs.

Each pack contains five (5) polyethylene "sock" filters.

14. One DYNASAND filter system. System is gravity upflow type with continuous backwash; 7 square feet surface area.
15. One (1) portable pH meter for cross reference.

MANUFACTURER'S CUT SHEETS

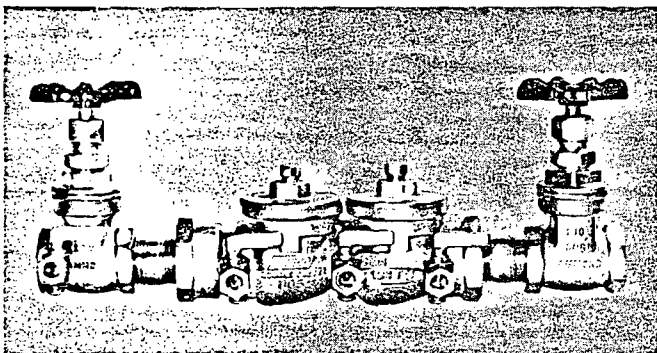
Johns-Manville



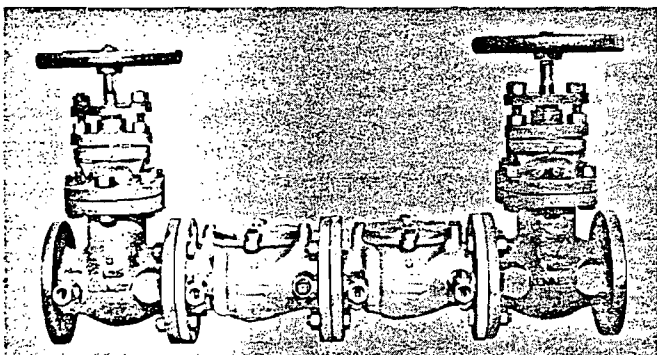
Febco

Double Check Valve Assembly

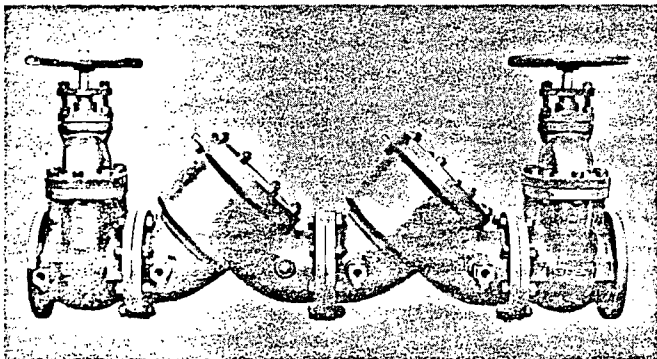
Model 805



¾" through 2"



3" and 4"



6" 8" and 10"

Description

The Model 805 Double Check Valve Assembly is designed for the prevention of backflow into a potable water system. This device may be installed under continuous pressure. The spring-loaded check valves utilize soft rubber discs for positive closure and a unique design which assures a very minimum of flow loss through the unit while still remaining compact in size. The check valves are spring-loaded to hold 1 psi in the direction of flow.

The 805 assembly in sizes ¾" thru 2" includes two spring-loaded, brass check valves, two brass gate valves and test cocks for field testing. These valves are screwed type and the unit is shipped completely assembled.

The 805 assembly in sizes 3" and 4" includes two spring-loaded, brass check valves, two cast iron gate valves and test cocks for field testing. All valves are flanged type and the unit is shipped completely assembled.

The 805 assembly in sizes 6" 8" and 10" includes two spring-loaded check valves with cast iron bodies and bronze internal parts, two cast iron gate valves and test cocks for field testing. All valves are flanged type and the unit is shipped completely assembled.

These units are designed to meet the performance specifications of AWWA, UL, ASSE, IAMPO, The USC Foundation for Cross Connection Control, Public Health Officials, Sanitary Engineers, and Military requirements. We reserve the right to use materials which are not necessarily the same as materials specified.

Typical Specifications

Double Check Valve Assemblies in sizes ¾" thru 4" shall consist of two brass, internally spring-loaded check valves, two gate valves and four test cocks.

Double Check Valve Assemblies in sizes 6" 8" and 10" shall consist of two internally spring-loaded check valves with cast iron bodies and bronze internal parts, two gate valves and four test cocks.

All check valve internal parts, shall be easily accessible from the top of the device without removing the check valve body from the line. The device shall be suitable for installation in any position. The assembly shall be rated to 150 psi working pressure and shall withstand water temperatures of 32°F to 140°F.

Typical Applications

Sprinkler systems.
Manufacturing plants (no toxic chemicals used).
Multi-story buildings.
Food processing installations.

Installation

The 805 Double Check Valve Assemblies may be installed under continuous pressure, and may be subjected to back pressure. The device will operate in any position and may be installed below ground level. However, the device must be accessible for periodic testing and maintenance. Drain or protect from freezing.

Sizes

¾" 1" 1½" 2" 3" 4" 6" 8" and 10"

Product Specifications

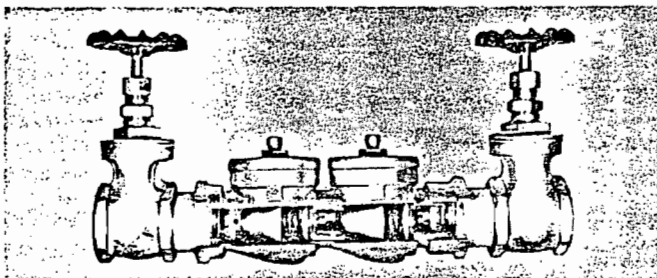
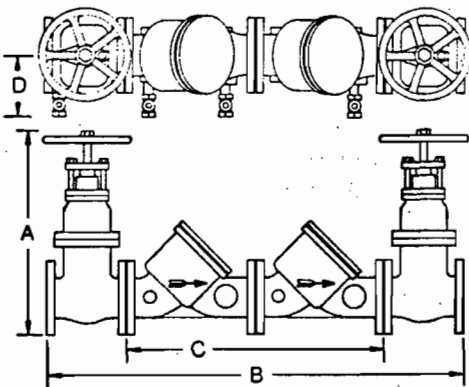
Characteristics

Maximum working pressure	150 PSI
Hydrostatic test pressure	300 PSI
Temperature range	32°F to 140°F
Fluid	Water
End detail	¾"-2": Threaded ANSI B2.1 3" and 4": Flanged ANSI B16.24 6"-10": Flanged ANSI B16.1
Main valve body	Bronze ASTM B-61 (¾"-4") Gray iron ASTM A-126 (6"-10") epoxy coated internal
Valve trim	Bronze ASTM B-61
Elastomers	Nitrile ASTM D-2000

Dimensions and Weights

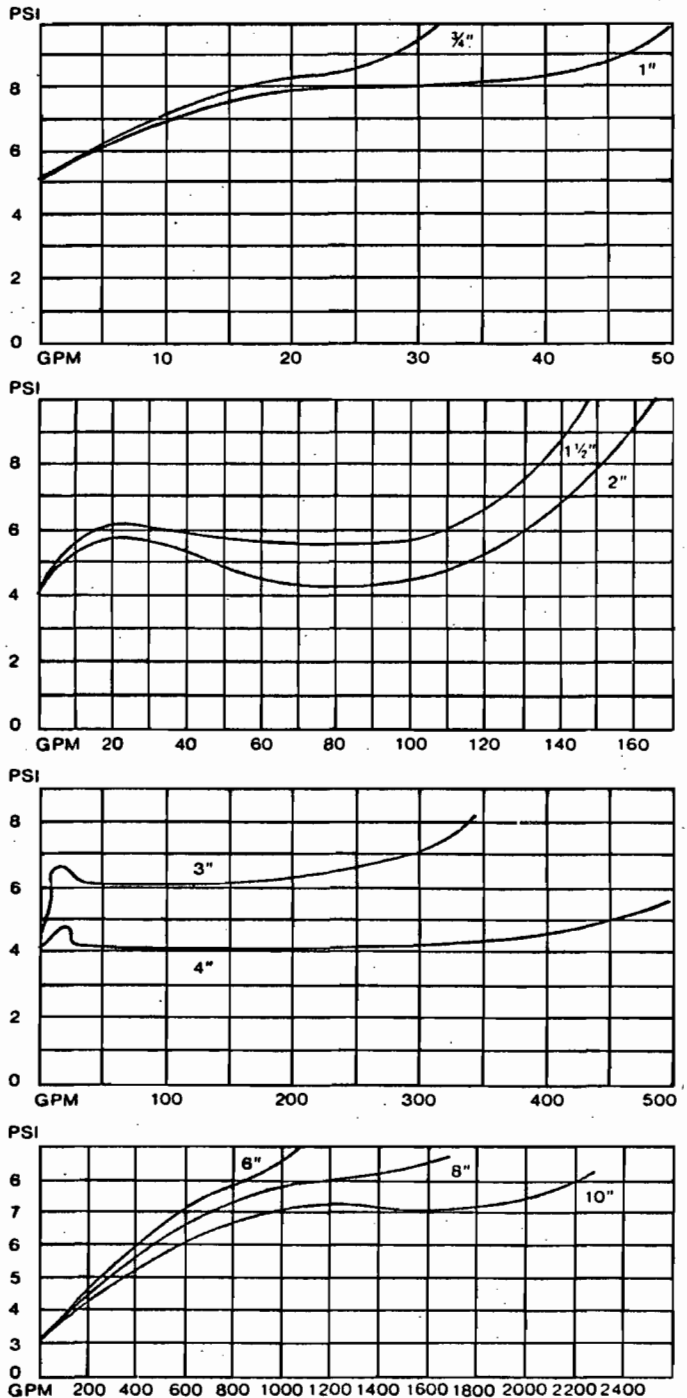
Size/in.	A/in.	B/in.	C/in.	D/in.	Net Wt./lbs.	Wt. L.G./lbs.
¾	4 7/8*	11 1/8	6 1/2	2 3/4	4.6	3.1
1	6 1/4*	11 3/4	6 1/2	2 5/8	5.8	3.4
1 1/2	8 3/8*	17	10 3/4	3 1/2	18.4	13.3
2	10 1/8*	18	10 3/4	4	19.9	12.4
3	16 7/8	34 1/4	18 1/8	5 7/8	215	103
4	19 3/4	37 3/4	19 1/2	6 3/8	300	132
6	28 3/4	59 3/4	38 5/8	8 1/4	680	424
8	34 1/2	69 1/4	46 1/8	9 1/2	930	558
10	41 1/4	84 1/4	58 1/8	10 1/2	1950	1350

*Gate valve fully open



2" Cutaway

Flow Loss Chart



For full terms and conditions and current information, check with the J-M Customer Service Center, P.O. Box 232, Fresno, California 93708, (209) 442-8511, or J-M Sales Representative.

For Information on other J-M Products and Systems call Product Information Center at (303) 979-1000.

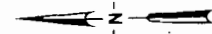
The physical or chemical properties of Johns-Manville FEBCO Products represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. This information is supplied as a technical service and is subject to change without notice.

JM
Johns-Manville
 Ken-Caryl Ranch
 Denver, Colorado 80217

NOTES:

MIDWEST AIR PRODUCTS CO., INC.
DRAWING TITLED, PROPOSED
VENTILATION SYSTEMS (PROPOSAL A)
NCA SYSTEMS, DATED, 8-11-80

KUNDE, DRIVER, SIMPSON & ASSOC., INC.
DRAWING TITLED, PIT PLAN & SECTIONS
IWC. NO. 5-1, DATED 8-6-80



VAPOR
DEGREASER
(NO EXHAUST)

I.O. SHOT PEEN
(EXHAUST TO
DUST COLLECTOR
OUTSIDE)

MAGNAFLUX

SHOT PEEN MACHINE
(EXHAUST TO
DUST COLLECTOR
OUTSIDE)

SAND BLAST
(DUST COLLECTOR
INSIDE)

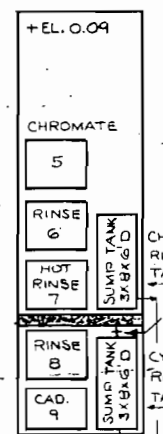
FIN. FLOOR EL. 8.36

PAINT AREA

PAINT
BOOTH

OVEN

OVEN

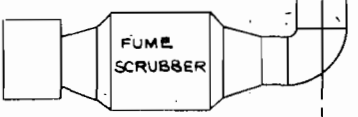
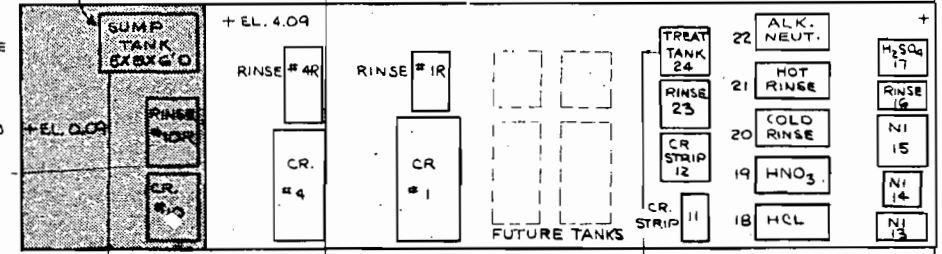


CHROME PLATING RINSE SUMP
RINSE FROM #1, 4, 10 PLUS NICKEL,
NITAL ETCH AND FUME SCRUBBERS

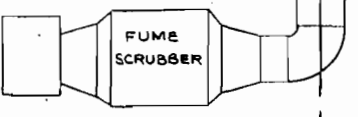
CHROME
STRIP
LINE

NITAL
ETCH
LINE

NICKEL
PLATE
LINE

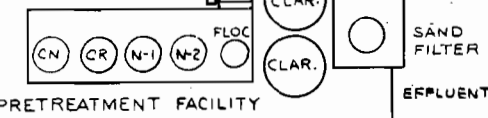


SYSTEM I
TANKS 1, 4, 10, 11 & 12



SYSTEM II
TANKS 13, 14, 15 & 17

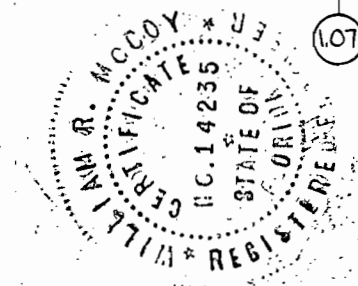
CN STORAGE
TANK



PRETREATMENT FACILITY

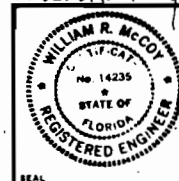
SAN. SEWER

2/16/81
William R. McCoy



REV.	DATE	BY	DESCRIPTION	APP.
3-5	81	LDL	ADDED CN STORAGE TANK	RMW
			REVISED FLOW RATES	
			REVISED FOR DADE COUNTY APPROVAL	
FEB 16	1981	LDL	ISSUED FOR DADE COUNTY ERM & AVIATION DEPT. APPROVAL	RMW

GENERAL ARRANGEMENT
PLATING & SURFACE PREP. AREAS
CLEVELAND PNEUMATIC
PRODUCT SERVICE DIVISION,
MIAMI INTERNATIONAL AIRPORT



enwright associates, inc.
engineers planners surveyors

LDL
CHECKED
FEB 1981
DATE

LDL
CHECKED
2/16/81
SCALE

RCW
CHECKED
FILE

En-A
RETURNED

GREENVILLE, SOUTH CAROLINA

81004-CE-3



D

E

F

1.01

1.02

1.03

1.04

1.06

1.07

Product Specifications

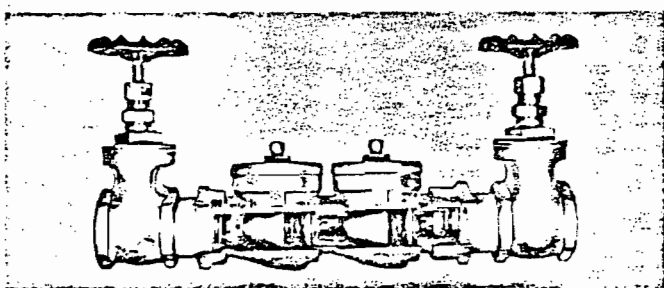
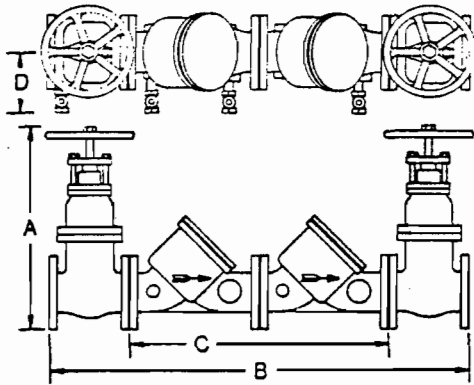
Characteristics

Maximum working pressure	150 PSI
Hydrostatic test pressure	300 PSI
Temperature range	32°F to 140°F
Fluid	Water
End detail	¾"-2": Threaded ANSI B2.1 3" and 4": Flanged ANSI B16.24 6"-10": Flanged ANSI B16.1
Main valve body	Bronze ASTM B-61 (¾"-4") Gray iron ASTM A-126 (6"-10") epoxy coated internal
Valve trim	Bronze ASTM B-61
Elastomers	Nitrile ASTM D-2000

Dimensions and Weights

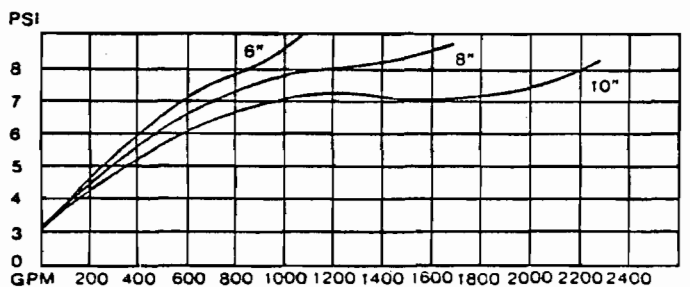
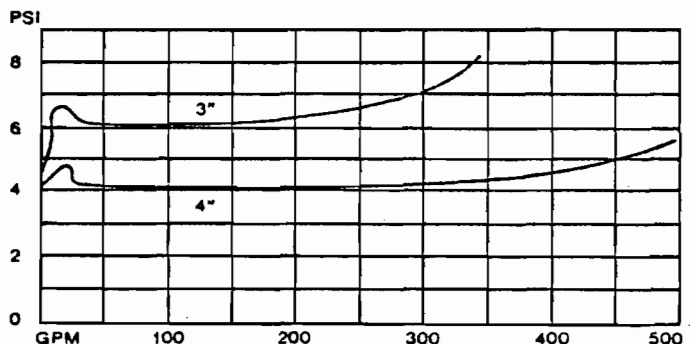
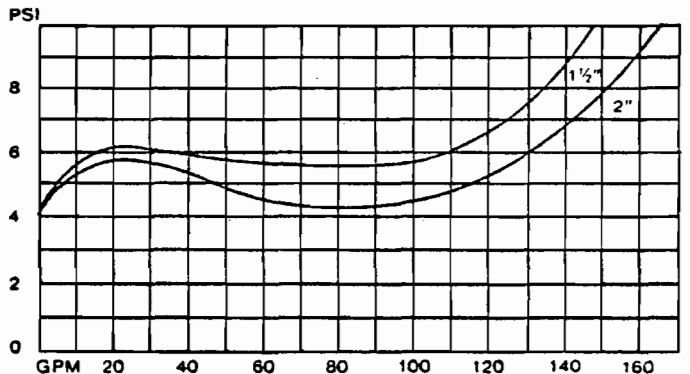
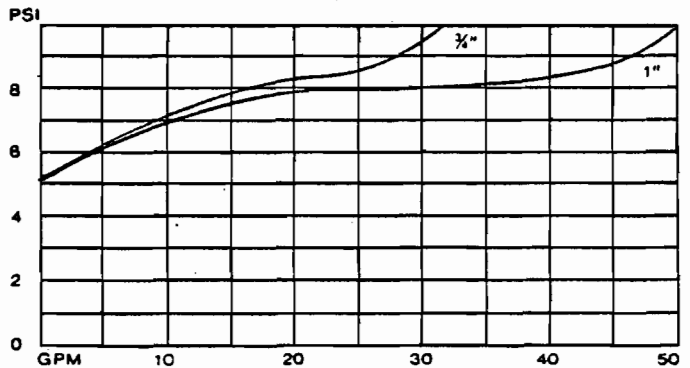
Size/in.	A/in.	B/in.	C/in.	D/in.	Net Wt./lbs.	Wt. L.G./lbs.
¾	4⅞*	11⅞	6½	2¾	4.6	3.1
1	6¼*	11¾	6½	2⅞	5.8	3.4
1½	8⅜*	17	10¾	3½	18.4	13.3
2	10⅞*	18	10¾	4	19.9	12.4
3	16⅞	34¼	18⅞	5⅞	215	103
4	19¾	37¾	19½	6⅞	300	132
6	28¾	59¾	38⅞	8¾	680	424
8	34½	69¼	46⅞	9½	930	558
10	41¼	84¼	58⅞	10½	1950	1350

*Gate valve fully open



2" Cutaway

Flow Loss Chart



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Johns-Manville

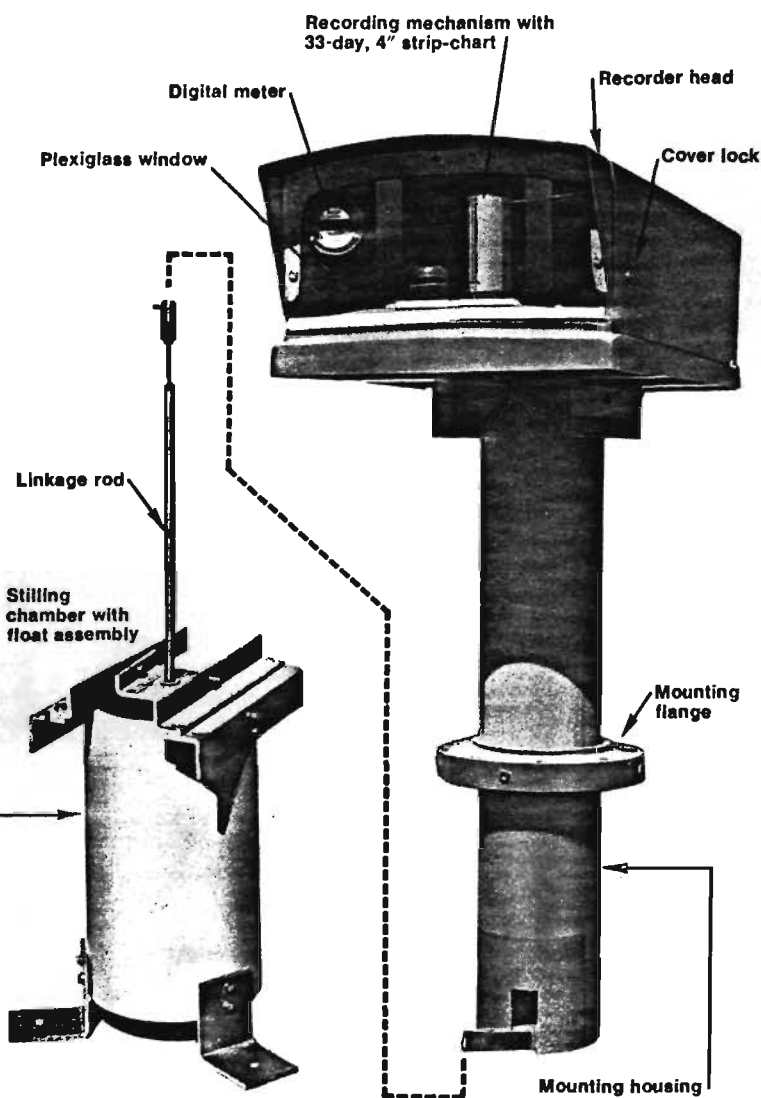
Ken-Caryl Ranch
Denver, Colorado 80217

BIF SaniTrol

A UNIT OF GENERAL SIGNAL

DEEP-WELL FLO-RECORDER

FOR FLUMES • MANHOLES • TREATMENT SYSTEMS



Deep-well Recorder (Model 21-402) for accurate recording in manholes, deep wells and channels.

APPLICATIONS

For easy, automatic recording of volume flow, adaptable for new or existing wastewater treatment installations in such areas as: food and beverage processing, agricultural enterprises, industrial plants, municipal utilities, mobile home parks, motels, regional schools, shopping centers, national parks, campsites, etc.

ADVANTAGES

The BIF SaniTrol Flo-Recorder is a simple, practical, and reliable mechanism for furnishing accurate records of wastewater discharge volume. Each component is designed for simplicity and trouble-free operation. Can be calibrated to fit any type of recognized weir configuration. Can be adapted to different weir styles or capacities. The recorder is the heart of the monitoring system and can be used to operate a sampler or chemical feeder.

Maintenance problems and costs are minimum because stainless steel or fiberglass housings and non-corrosive parts provide trouble-free, long-life operation. Mechanical linkage from recorder float to strip-chart eliminates need of adjustment and is unaffected by moisture and gases.

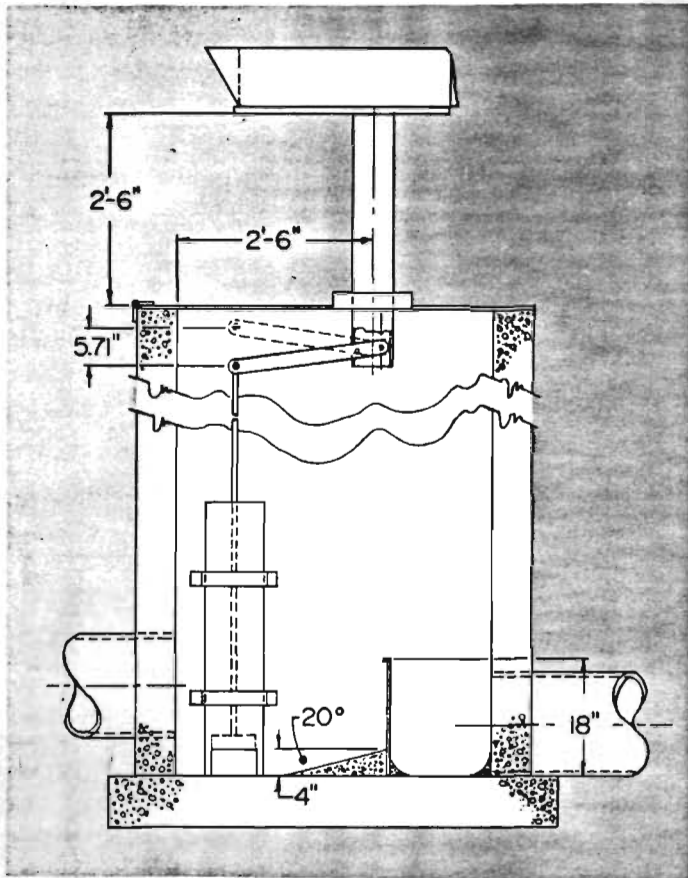
Proof of flow volume is recorded on both a 4" strip-chart and digital meter. Plexiglass window over recording mechanism permits reading without unlocking or raising the instrument cover. The digital meter is mounted on the window for easy reading. These records often prevent excessive surcharges or eliminate unnecessary process equipment modifications.

CHOOSING THE RIGHT RECORDER

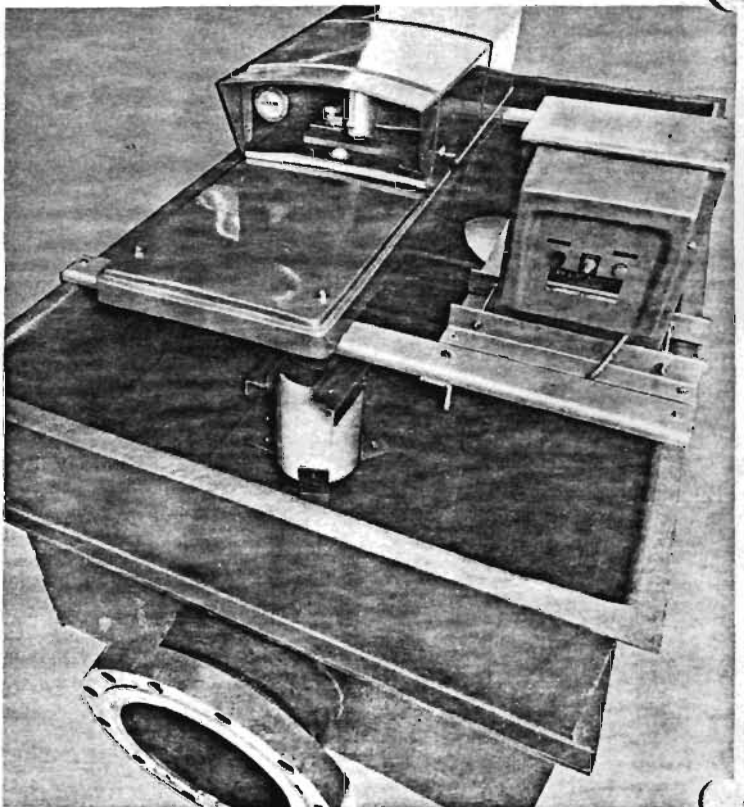
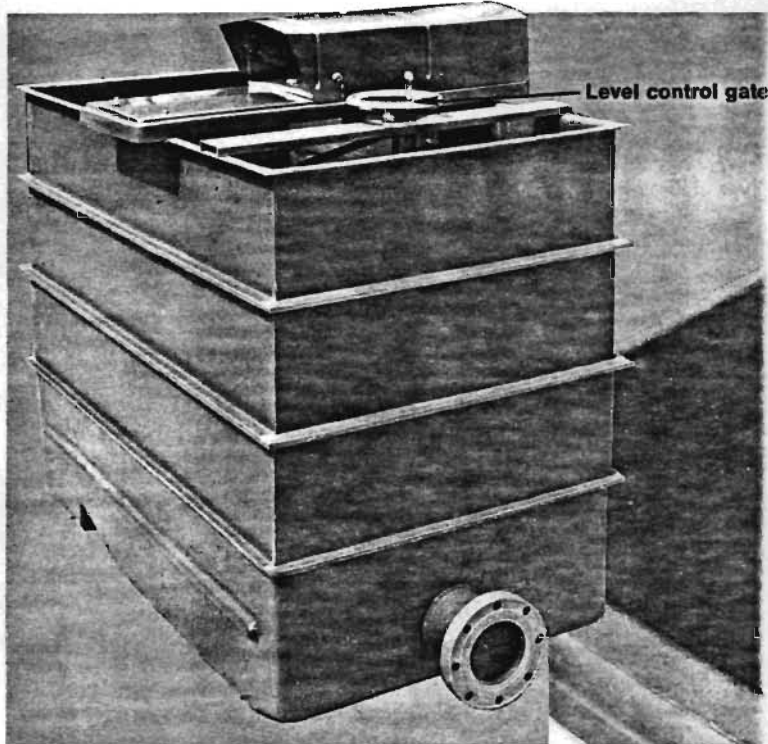
There are several types of BIF SaniTrol recorders available. Each is designed to offer accurate recording of wastewater volume flow for specific problems.

Deep-well recorder — Designed for deep areas such as manholes, wet wells and other below-grade channels where above-grade readings are desired. Available for any depth, with mounting brackets and anchored stilling chamber. The recorder can be mounted beside or on top of a manhole cover.

Typical Pedestal Recorder installation in manhole



Lagoon flume with recorder unit



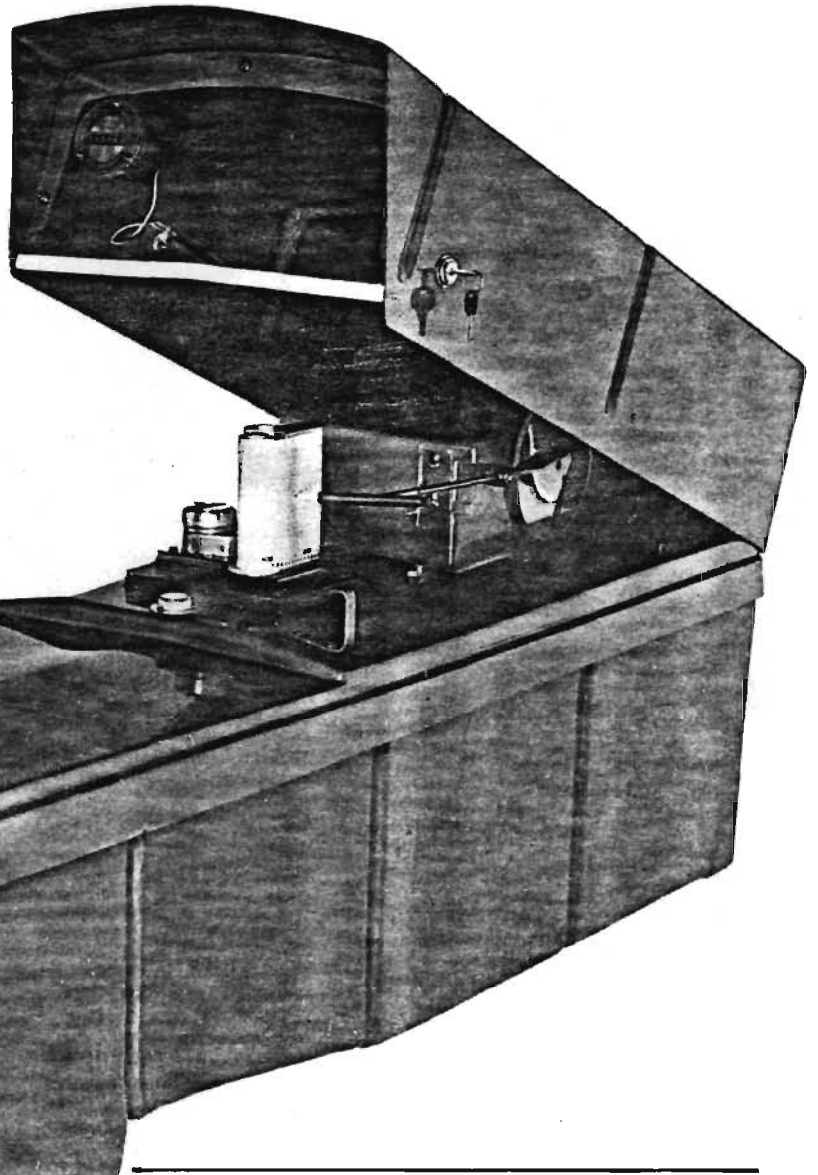
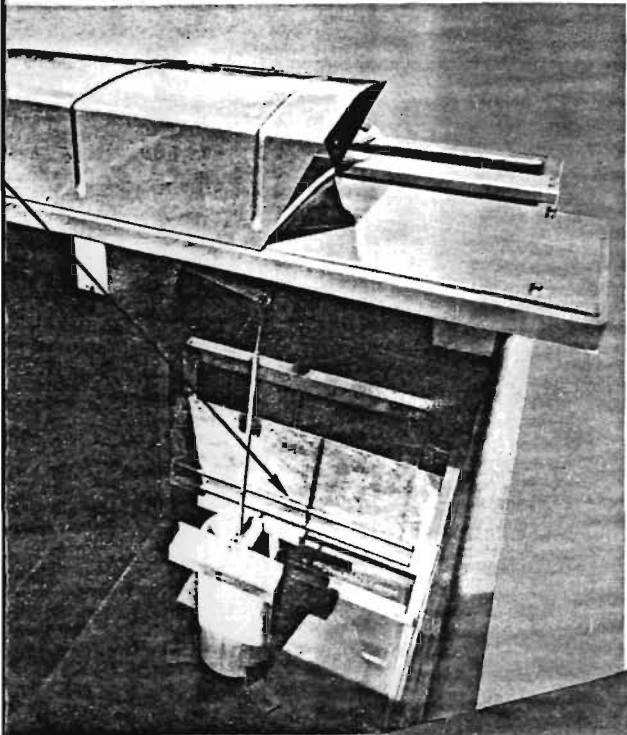
Large flume recorder — For 300 to 1500 gpm. Standard flume is 18" deep, 72" long, 42" wide. Special 30" deep flume also available. Supplied as a complete unit for quick installation.

Lagoon recorder — For installation at dike end of lagoon. Supplied with a manually controlled gate for lagoon level. Automatic flow actuated control gate for maintaining constant discharge from the lagoon.

Pneumatic recorder — With bubbler tube — for remote monitoring, for indoor or outdoor installation.

Large flume recorder incorporating a standard model BIF sampler. Samples are provided on a timed or proportionate-to-flow basis.

Recorder and stilling chamber installation in lagoon flume



Small flume recorder

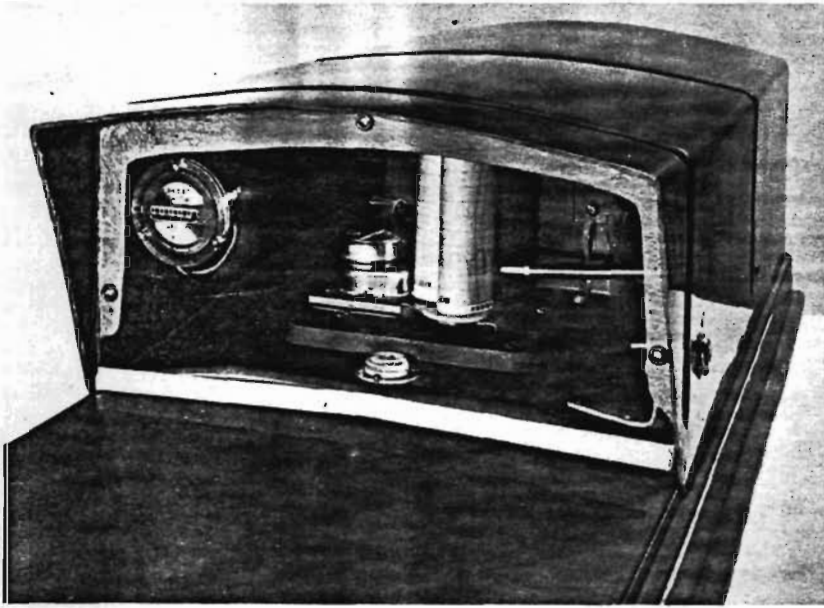
Small flume recorder — For 30 to 200 gpm. Only 12" deep, 48" long and 16" wide. Comes as a complete unit with flume, inlet, outlet, and weir.

ACCESSORIES

Weirs — Replaceable plate for use with our recorder.

Flumes — Packaged units with flume and recorder. Recorder can be used with any standard flume such as Parshall or Palmer-Bowlus.

Samplers — Two models: Standard with capacity of 70 oz. to 1000 oz. per 24 hrs. and Industrial 400 oz. to 6000 oz. per 24 hrs. Sampler-refrigerator combination available.



For mounting on flumes where no extension of the float assembly is required. Write for Bulletin No. 20-102 describing our standard gravity flow recorder.

GENERAL SPECIFICATIONS NO. 21-1006 DEEP-WELL RECORDER

There shall be furnished a flow recorder equal to the model _____ Flo-Recorder as manufactured by BIF SaniTrol, Inc.

Unit shall be fiberglass, PVC and stainless steel construction with a hinged, protective, locking enclosure for the instrumentation. A Plexiglass window shall permit reading the digital meter and strip-chart without unlocking the hood.

Unit shall be complete, including the flume and/or weir. Flume shall be of fiberglass fabrication, _____ inches wide by _____ inches long, by _____ inches deep. Inlet and outlet provision shall be as follows:

Deep-well recorder to extend _____ feet from grade level to the zero flow level.

Weir plate shall be of fiberglass, factory calibrated, and designed for flow ranges of _____ gpm to _____ gpm. Weir plate shall be replaceable to permit measurement of larger or greater future flow. There shall be furnished a complete strip-chart mechanism. Strip-chart shall be 4" equal to BIF SaniTrol Model No. 20-101. The chart shall move at the rate of one inch per hour and be driven by an electric gearmotor. Each continuous strip-chart shall be of sufficient length to operate for 33 days. A spring-loaded fiber-tip pen mounted directly on the float linkage arm shall permanently mark the strip-chart to provide a continuous record of flow. A six-month supply of charts and pens shall be furnished with the recorder.

Recorder shall include a digital meter which shows cumulative flow. Digital meter shall receive its signal from a totalizing cam designed to suit the characteristics of the flume and/or weir.

Electrical power requirement shall be 3 watts to the chart drive, digital meter, and cam wheel drive, for a total of 9 watts at 120v, 60-cycle a-c. Battery power chart drive available 1.5v d-c.

ORDERING INFORMATION

Please supply this information —

1. Maximum gpm flow.
 - a) Mounting arrangement — pedestal, deck level or across channel.
2. Is sensitizer control for chemical feed desired? (Furnish full information on control sequence required.)
3. Weir or flume data — capacity, flow, dimensions.
4. Electrical power if other than 120v, 60-cycle a-c.
5. Special conditions or features.

For more information and assistance, call your BIF SaniTrol REPRESENTATIVE

BIF SaniTrol

A UNIT OF GENERAL SIGNAL

P.O. BOX 14, 1803 12TH STREET, S.E.
LARGO, FLORIDA 33540 813-584-2157

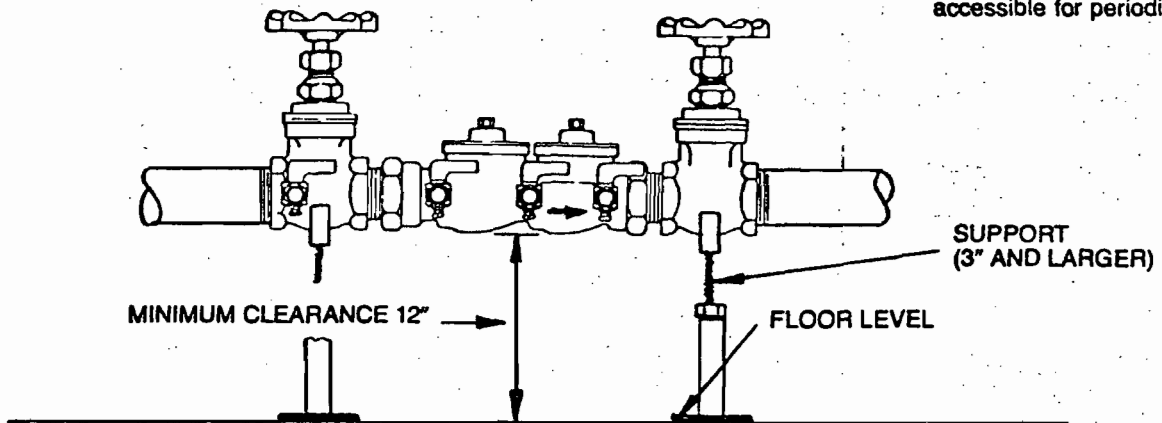
TELEX 52794



Indoor
Installation

FEBCO MODEL 805

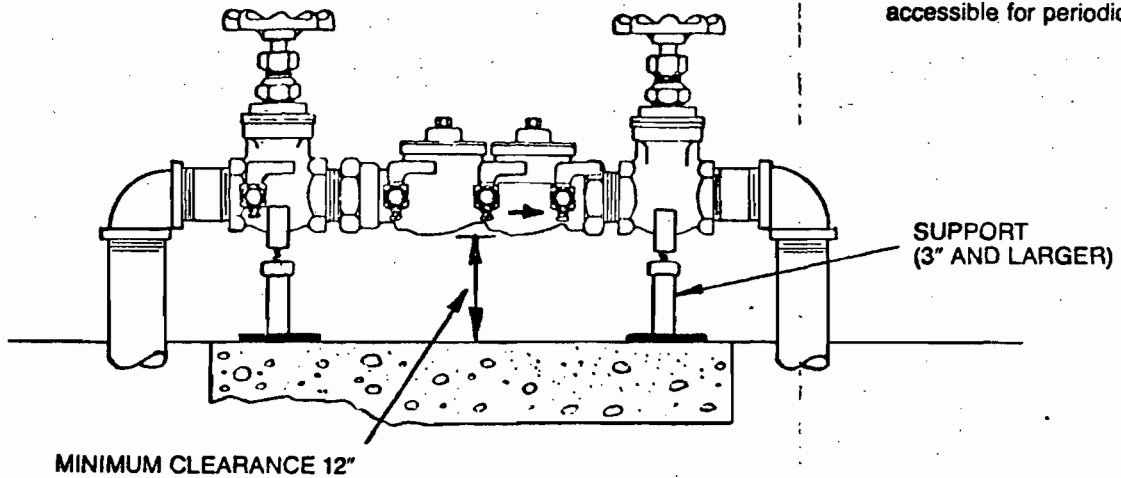
Note:
Should be installed where it will be
accessible for periodic testing



Outdoor
Installation

FEBCO MODEL 805

Note:
Should be installed where it will be
accessible for periodic testing



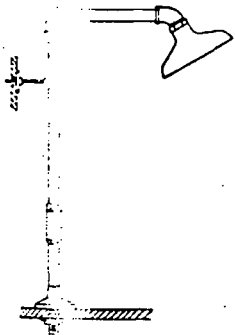
Body Showers

All Meet OSHA requirements

Maximum safeguard of personnel against laboratory hazards demands provision of reliable, instant-action showers and eye sprays. These specially designed fixtures provide immediate, effective dousing to limit injury from chemical spills and fires. Harmful liquids and solids are promptly diluted and

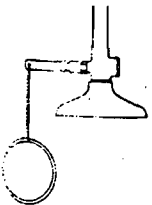
washed away. Fixtures have threaded inlets for connection to cold water line. Most have stay-open valves which continue full-volume delivery once they are actuated, until shut off. Hands are freed for tending to injury.

A moderately drenching shower (91-582) is offered for protection in low-hazard areas.



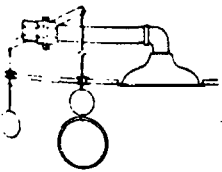
91-582 Safety Shower, Bench-Mount. A small shower, recommended for limited-hazard areas not likely to require deluge dousing. Includes mounting flange, threaded inlet shank 1/4" IPS and locknut for installing on service shelf or worktop up to 1 1/2" (3.8cm) thick.

91-582177.00



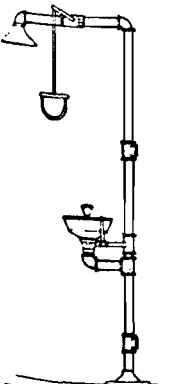
91-583 Deluge Shower, Ceiling-Mount. Bright orange head of chemical resistant plastic extends from ceiling. With female inlet 1" IPS.

91-583113.00



91-584 Deluge Shower, Concealed. Only underside of shower head is exposed. Pull large ring for instant full flow. Pull small ring to close valve. With female inlet for 1" IPS.

91-584181.00



91-589 Safety Station (Deluge Shower & Eye/Face Wash). Stanchion and piping of this floor-mounted combination unit are painted brilliant orange for high visibility. Eye/face wash operates independently of deluge shower, produces active, aerated outflow for thorough facial rinsing without harsh jets; drains into stainless-steel bowl 1 1/2" (29.2cm) O.D. with chrome-plated fittings and female outlet 1/4" IPS. With floor flange, inter-connecting piping, and female inlet 1/4" IPS.

91-589493.00

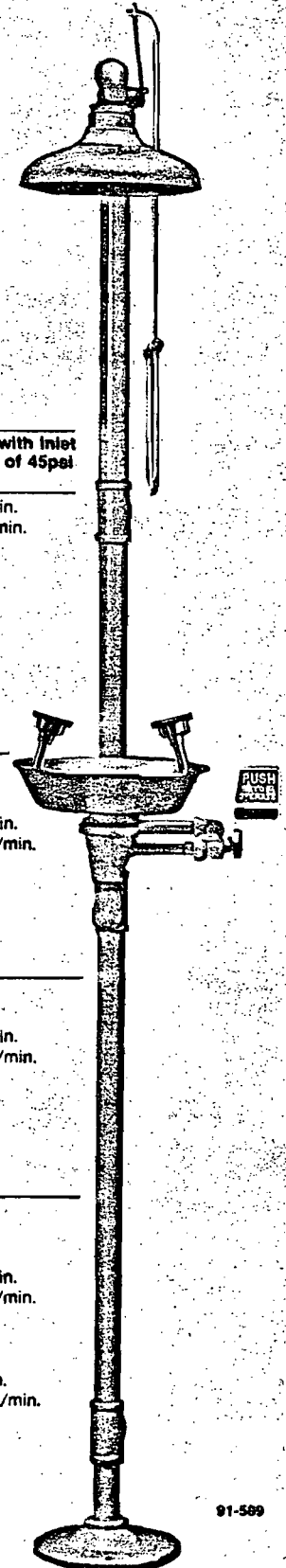
Shower Head	Valve/actuator	Delivery with Inlet Pressure of 45psi (310kPa)
6" diameter, 15.24cm nickel-plated	Stay-open ball valve with lever handle located on right side at convenient height above benchtop	20 gal./min. 76 liters/min.

10" diameter, 25.40cm ABS plastic	Slow self-closing valve with pull-ring chain	30 gal./min. 114 liters/min.
-----------------------------------	--	---------------------------------

10 1/4" diameter, 27.31cm chrome-plated with flange for recessed mounting	Stay-open valve with 2 pull-ring chains	30 gal./min. 114 liters/min.
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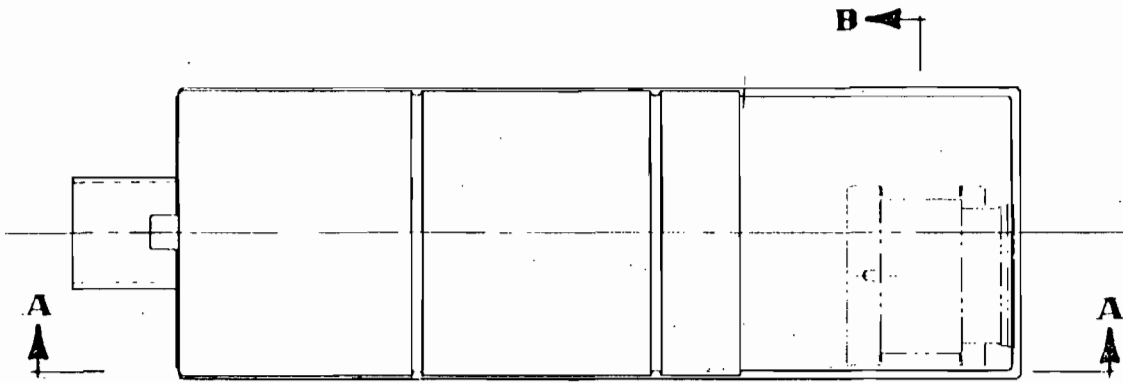
Deluge shower: 10" diameter, 25.40cm ABS plastic	Stay-open ball valve with pull-rod	27 gal./min. 102 liters/min.
--	------------------------------------	---------------------------------

Eye/face wash: 2 soft-stream Delrin® heads	Stay-open ball valve with push-lever	6 gal./min. 22.7 liters/min.
--	--------------------------------------	---------------------------------



91-589

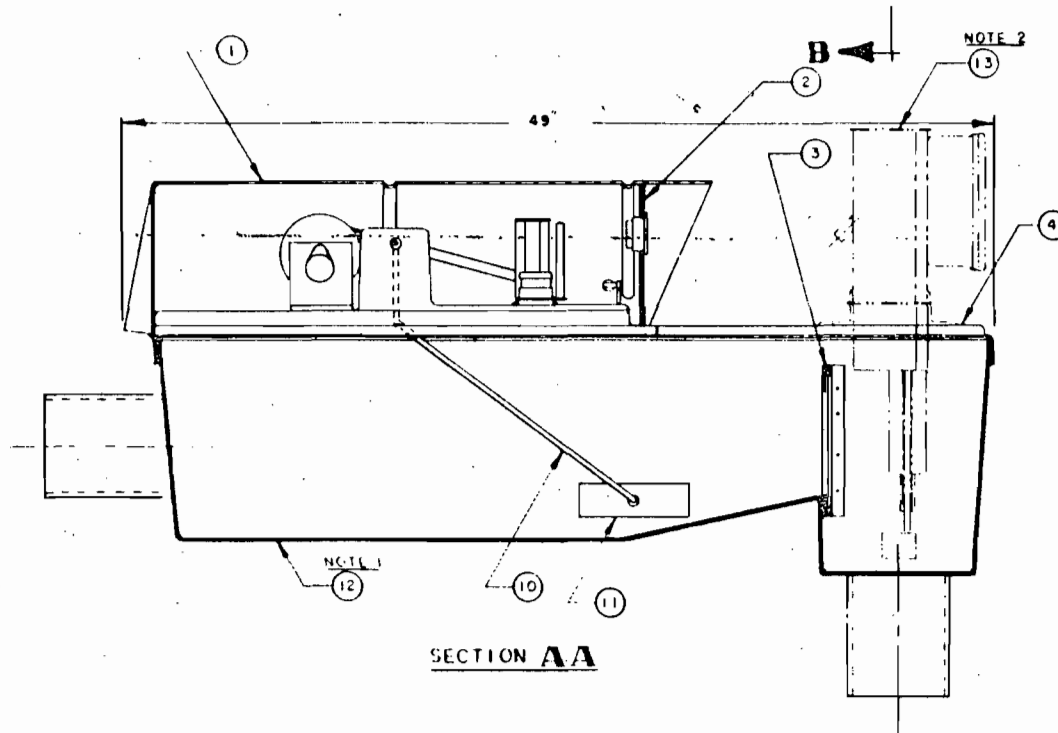
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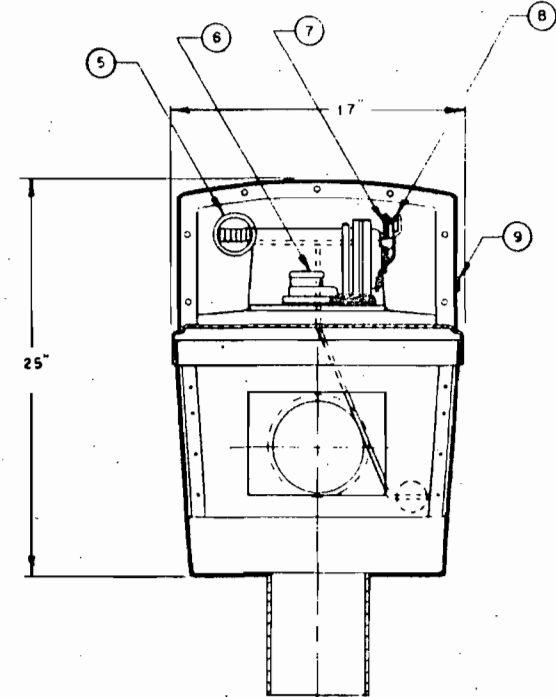
ITEM NO	DESCRIPTION
1	WEATHER HOOD FRP
2	WINDOW PLEXIGLASS
3	WEIR PLATE FRP
4	FLUME BOX COVER FRP
5	FLOW TOTALIZER
6	CHART DRIVE
7	TOTALIZER CAM
8	CAM SENSOR SWITCH
9	HOOD LOCK
10	FLOAT ARM SSTL
11	FLOAT PVC
12	FLUME BOX FRP
13	SAMPLER (OPTIONAL)

WEIR CONFIGURATIONS

MODIFIED SUTRO LINEAR MEASURE	RECTANGULAR	V-NOTCH
S1 - 100GPM	R 4.55 - 200 GPM	22-1/2" - 30 GPM
S2 - 200GPM		30" - 50 GPM
		60" - 100 GPM
		90" - 175 GPM



SECTION AA



SECTION BB

2 REF. DWG A41-1103 SAMPLER DATA SHEET.
 1 REF. DWG B-0-0141 FLUME BOX ULTATE 4 STUB OUT OPTIONS.
NOTES:

		BIF Sanifrol A PART OF GENERAL SIGNAL CORPORATION	
5		TWO GRAVITY FLOW RECORDER	
		MODELS: 30-50-100-175-200	
REDRAWN	SCALE N.T.S.	DESIGN BY POPE	MANUFACTURED BY
REVISIONS	DATE 2/28/67	CHK BY	C10-014



CORCORAN

CORROSION RESISTANT CENTRIFUGAL PUMPS

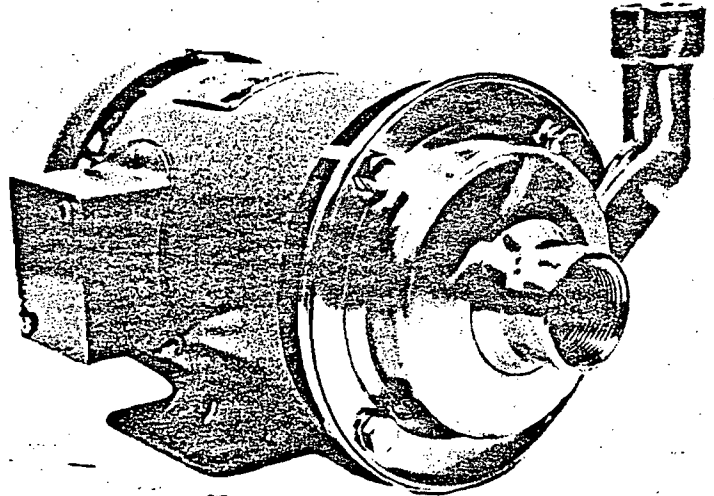
SERIES 2000

► MODELS

- 2000-E - Close Coupled
- 2000-F-DRN - Pedestal Mounted

MATERIALS OF CONSTRUCTION

304 Stainless Steel	Zirconium
316 Stainless Steel	Titanium
Carpenter 20CB-3	Tantalum
Monel	PVC
Nickel 200, 201	Polypropylene
Hastelloy B, C	



► PORT SELECTION

- IPS (Threaded)
- ASA Flanged
- Hose

► MECHANICAL SEAL AND GASKET

- Buna N
- Viton
- Teflon

► OTHER MODELS AVAILABLE

- 2000-H (Double Mechanical Seal)
- 2000-VE (Vertical Extended Shaft)
- 2000-RS (Rear Suction)
- 2000-SP (Self Priming)
- 2000-FMS (Stainless Steel Pedestal)
- 2000-VEC (Vertical Cantilever Shaft)
- 2000-FHP (High Temperature, High Pressure)

► CONSTRUCTION OF STANDARD STAINLESS STEEL PUMPS

Alloy - 304 Stainless Steel	316 Stainless Steel	Carpenter 20
Seal - #21 Buna N	#21 Viton	#9 Viton
Ceramic and Carbon Faces	Ceramic and Carbon Faces	Ceramic and Carbon Faces
304 Stainless Steel Metal Parts	316 Stainless Steel Metal Parts	Carpenter 20 Stainless Steel Metal Parts
Gasket - Buna N	Viton	Teflon

Note: Seal and gasket variations can be made.
 Standard Ports are IPS threaded 1 x 1-1/4, 1-1/4 x 1-1/2, 1-1/2 x 2.

MODEL 2000-E

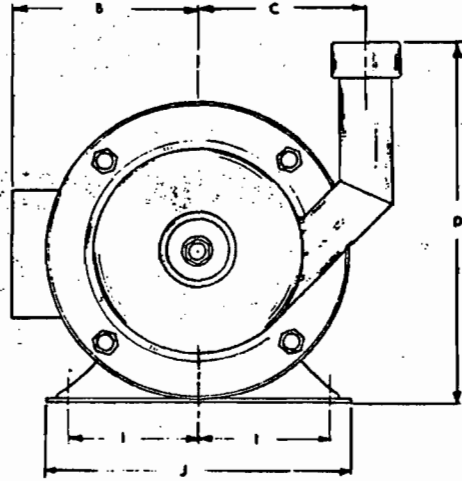
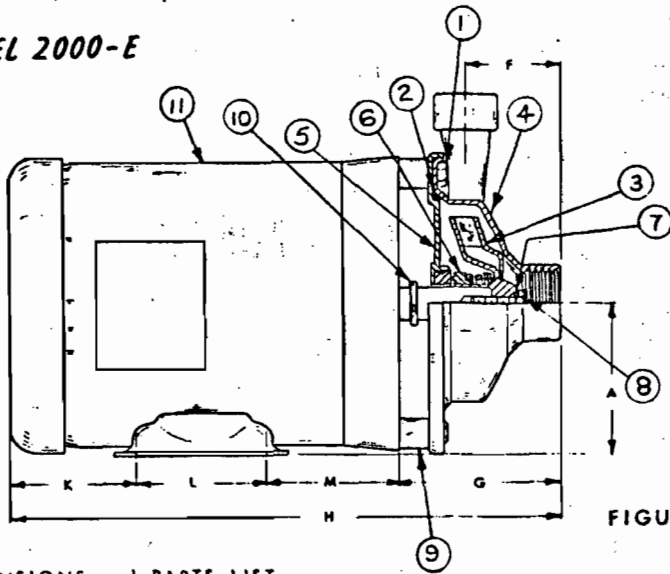


FIGURE E-2

DIMENSIONS and PARTS LIST

Port Sizes	A	B*	C	D	F ₁	F ₂₃	G ₁	G ₂₃	H ₂₃	I*	J*	K*	L*	M*
1/2 x 3/4	3-1/2	"	4	7-3/4	2-1/8	3-1/4	3-5/8	4-3/4						
3/4 x 1	"	"	"	"	2-1/8	"	3-5/8	"						
1 x 1-1/4	"	"	"	"	1-7/8	"	3-3/8	"						
1-1/4 x 1-1/2	"	"	"	"	1-7/8	"	3-3/8	"						
1-1/2 x 2	"	"	"	"	1-7/8	"	3-3/8	"						

No.	Part No.	Req.	Description
1	2001	4	3/8-16 x 1-1/4 HEX CAP SCREW
2	2002	1	HOUSING GASKET
3	2003	1	IMPELLER
4	2004	1	HOUSING
5	2005	1	ADAPTOR
6	2006	1	MECHANICAL SEAL ASS'Y
7	2007	1	IMPELLER STUD GASKET
8	2008	1	3/8-16 x 1-1/4 HEX CAP SCREW
9	2020	4	EXTENDER
10	2027	1	SLINGER
11	2010	1	MOTOR

*Consult your motor catalog
**G + motor length

1 = IPS Threaded ports
2 = ASA Flanged ports
3 = Hose ports

MODEL 2000-F-DRN

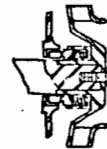
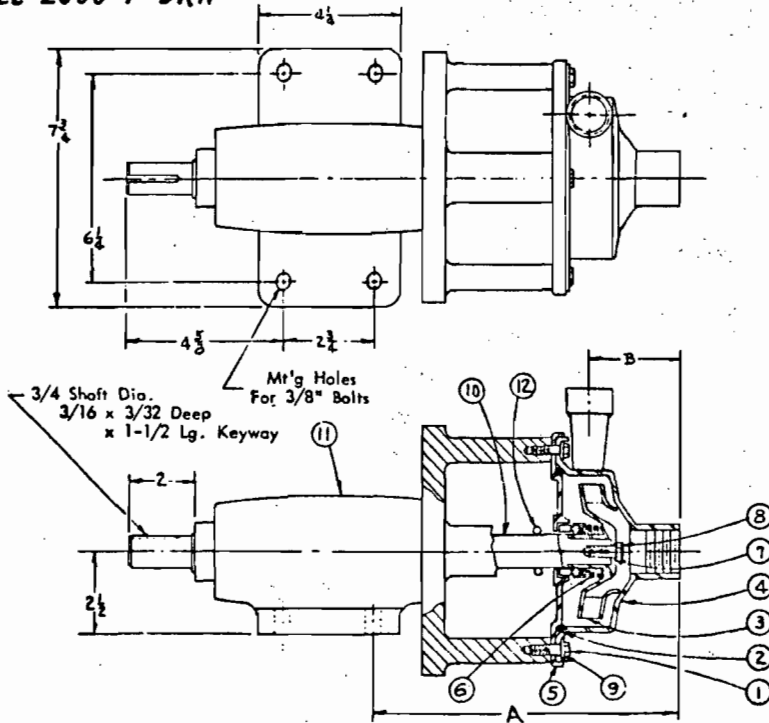


Fig. 9A
Single Type 9 Seal

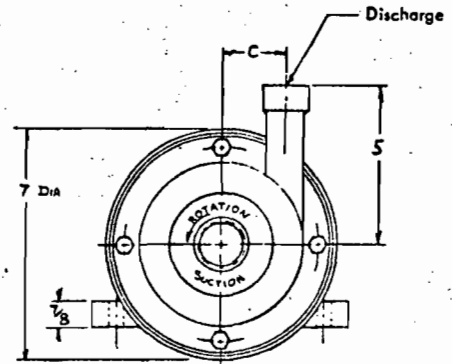


FIGURE 2FDRN

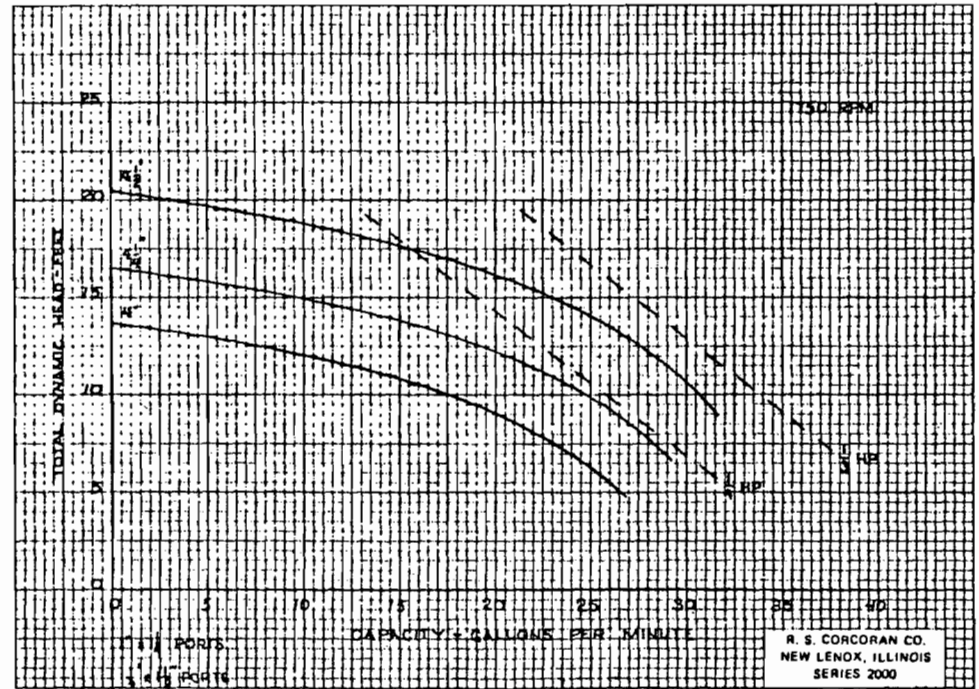
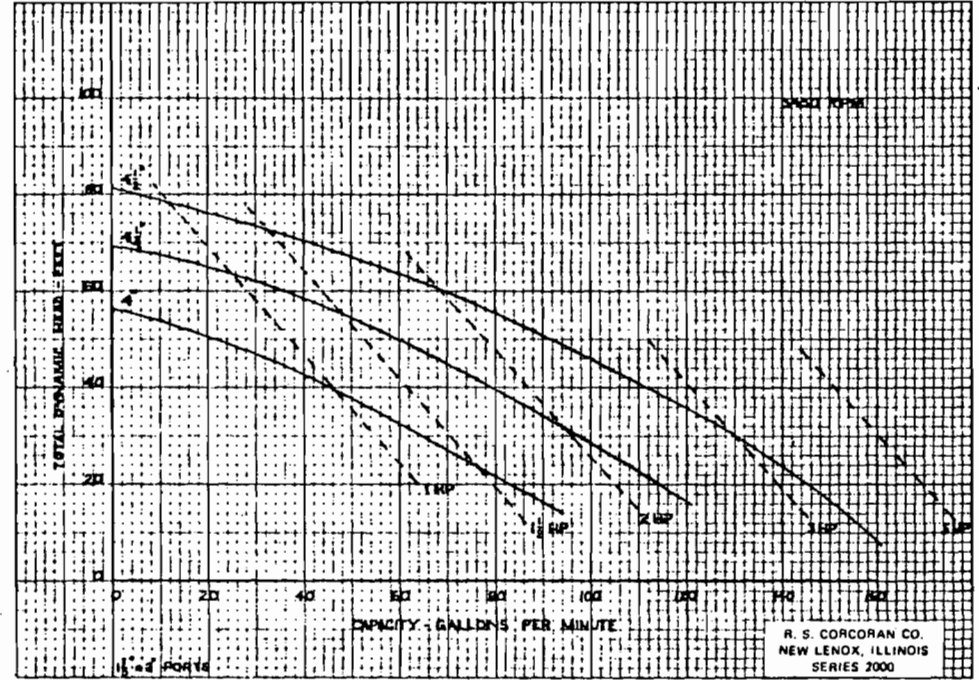
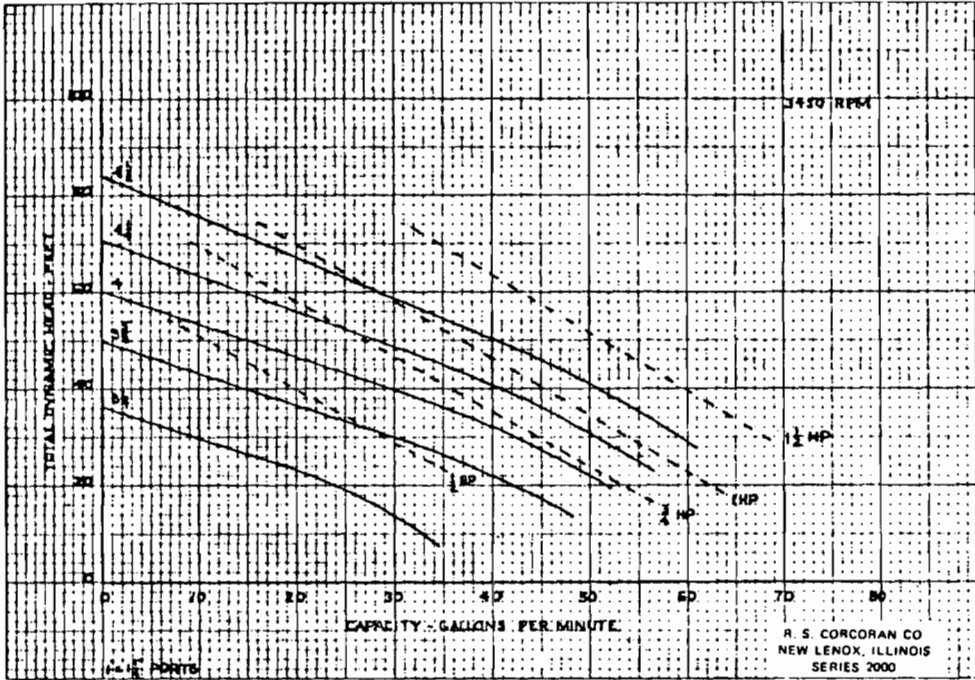
PARTS LIST

No.	Part No.	Req.	Description
1	2001	4	3/8-16 x 3/4 HEX HD CAP SCREW
2	2002	1	HOUSING GASKET
3	2003	1	IMPELLER
4	2004	1	HOUSING
5	2005	1	ADAPTOR
6	2006-21	1	MECHANICAL SEAL TYPE 21

No.	Part No.	Req.	Description
7	2007	1	IMPELLER GASKET
8	2008	1	IMPELLER BOLT
9	2009-B	4	LOCKWASHER
10	2023	1	SHAFT
11	2026	1	PEDESTAL
12	2027	1	SLINGER

Parts	A	B	C
1/2 x 3/4	8- 3/16	2-1/8	1-15/16
3/4 x 1	8- 3/16	2-1/8	1- 5/8
*1 x 1-1/4	8- 1/16	2	1- 1/2
*1-1/4 x 1-1/2	8- 1/16	2	1- 3/8
*1-1/2 x 2	7-13/16	1-3/4	1- 5/16

* Standard Part Sizes



VANTON

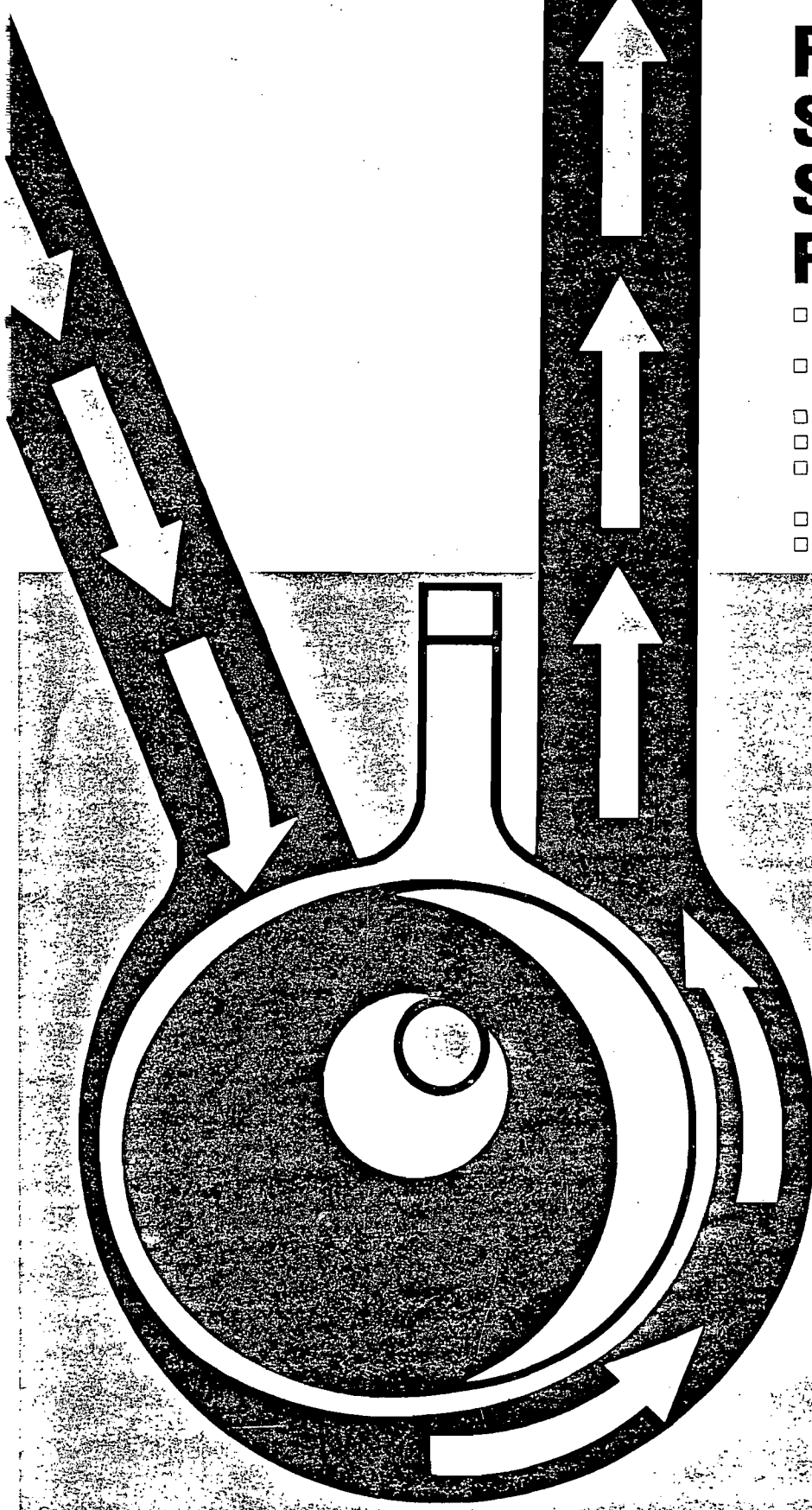
FLEX-I-LINER[®]

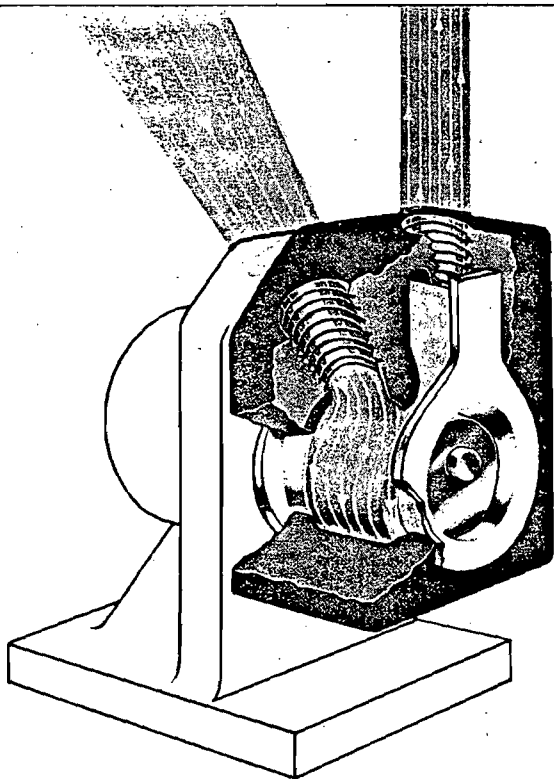
SEALLESS

SELF-PRIMING

PLASTIC PUMPS

- Polypropylene • Polyethylene
• Teflon/Rulon
- No stuffing boxes, glands, shaft seals,
check valves, gaskets.
- Capacities to 40 gpm.
- Electric, gasoline and air motor drives.
- Corrosive, hazardous chemicals,
liquids, gases, slurries.
- Vacuum service.
- Reversible operation.





ENGINEERED FOR Acids, Caustics, Salts Abrasive Slurries Solvents, Chlorides Viscous Fluids

Vanton self priming Flex-i-liner pumps are precision engineered with relatively few parts to provide efficient handling of corrosives, volatile fluids, abrasives and other products safely and dependably. Capacity to 40 gpm; discharge pressure as high as 45 psig; temperatures to 250F. Suitable for vacuum service and for gases, liquids and viscous fluids up to 6,000 SSU. The Vanton Flex-i-liner can operate in either direction with equal effectiveness. It is recommended for slurries with as much as 20% soft solids and for gas service handling a maximum of 1 cfm, as well as the handling of clear, volatile fluids.

FLEX-I-LINER® FEATURES:

No Stuffing Boxes, Glands, Shaft Seals or Gaskets

The design of the Vanton Pump has eliminated the need for stuffing boxes, packing glands or mechanical shaft seals, completely removing the possibility of hazardous and wasteful external leakage. This design also avoids oil or grease contamination of pumped fluids. Stuffing boxes, shaft seals and gaskets are not necessary since the flanges on the flexible liner straddle the body block and are pressed to its sides by concentric machined grooves in the bearing sleeve and cover plate. This confines the fluid to a channel formed by the outer surface of the flexible liner and the inner surface of the body block while all mechanical action and moving parts are on the inside of the flexible liner.

No Check Valves:

Internal valves are not necessary. The absence of valves adds to the simplicity of construction and eliminates maintenance due to valve stickiness and wear. Sensitive fluids which might otherwise be damaged by opening and closing of check valves are readily handled by the Flex-i-liner pump.

Self-Priming/Wet or Dry Operation:

Vanton Flex-i-liner pumps will prime in any operating position without priming devices. Air bubbles will not cause locking or seizing of the pump nor impair efficiency...and running dry for extended periods is not detrimental.

Non-Agitating:

At selected RPM, depending on the fluid, the gentle pumping action prevents churning or foaming. This prevents excessive settling out of suspensions and avoids breakdown of various latex emulsions and other similar sensitive liquids.

External Bearings:

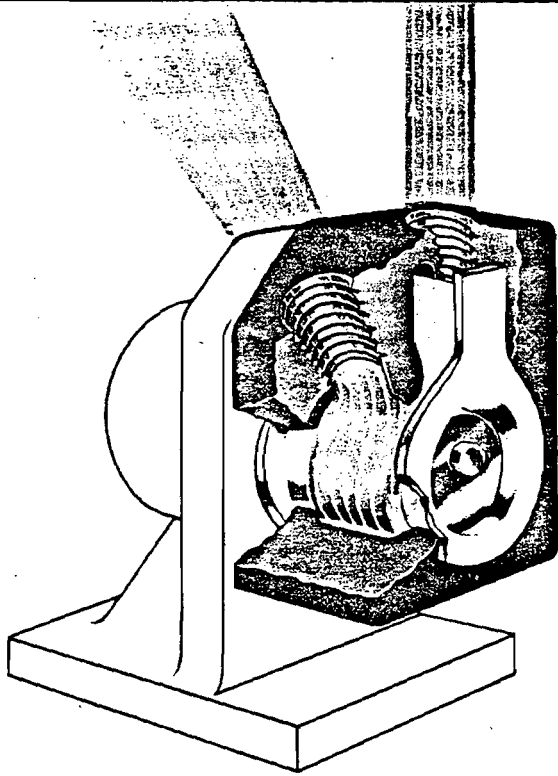
Both shaft bearings are housed in a cast iron pedestal which is external to the fluid cavity itself. The rotor bearing is completely protected within the phenolic rotor and sealed off with a plug on one side and a spring loaded phenolic bearing guard on the other which rides on the lapped surface of the bearing sleeve. Bearings are sealed-in, permanently lubricated ball bearings and operate in a clean, isolated non-corrosive atmosphere.

Low Maintenance:

Flex-i-liner pumps, by eliminating stuffing boxes, shaft seals, gaskets and check valves remove the major causes of pump maintenance. The only wearing part is the low cost flexible liner which can be replaced readily.

Easy Servicing

There is no need to remove the pump to a workbench for expensive or intricate servicing...or to remove it from the base plate which could affect the precise alignment of shaft to motor. With the external bearing design, only the inexpensive flexible liner may require replacement after long periods of service. This can be accomplished in a matter of minutes, even by an inexperienced operator, and with no special tools.



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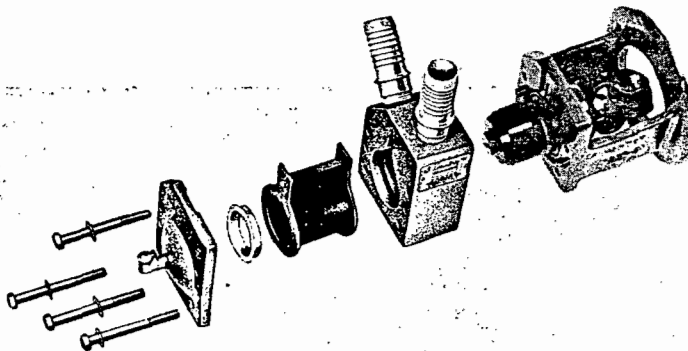
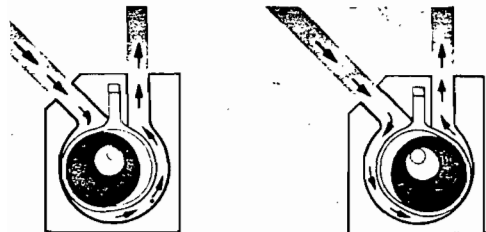
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PRECISION MADE WITH FEW PARTS FOR EASY TROUBLE-FREE OPERATION



The rotor mounted on an eccentric shaft, oscillates within the liner creating a progressive squeegee action on the fluid trapped between the liner and the body block. The only contacts with the fluids are the outer surface of the low cost precision molded flexible liner and the inner surface of the body block. Flanges on the flexible liner are pressed to the sides of the body block by concentric grooves on the pedestal assembly and the cover plate to isolate the fluid to the outside surface of the flexible liner.

Because of the unique efficient pump design, the fluid going through the pump comes in contact with only two basic parts: the molded flexible liner and the body block. These two parts are available in a wide range of plastics, natural and synthetic rubbers, stainless steels and other materials making the pump suitable for an endless list of corrosive and hazardous applications.

CONSTRUCTION AND MATERIALS

BODY BLOCK	MATERIAL	OPERATING TEMPERATURE RANGE	GENERAL CHEMICAL SERVICE
		Polyethylene (Linear, High Temp.)	up to 185°F	Excellent for weak and strong acids; weak and strong alkalis; attacked by strong oxidizing acids and aromatic solvents.
	Polypropylene	up to 185°F	Excellent for weak and strong acids and alkalis. Excellent for many solvents.
	Teflon*/Rulon**	limited only by flex-i-liner	Excellent for weak and strong acids, weak and strong alkalis, and organic solvents; generally inert to chemical attack.
	Stainless Steel	limited only by flex-i-liner	Good resistance to acids, alkalis and chemical salts; not satisfactory for chloride bearing compounds. Excellent for solvents and food product service. Excellent for Slurries.
FLEX-I-LINER	Natural Rubber	up to 165°F	Good resistance to weak and strong acids and alkalis; attacked by oxidizing agents; good resistance to oxygenated solvents as alcohols; sweets in vegetable, mineral and animal oil. Excellent abrasion resistance.
	Buna N	up to 185°F intermittent to 200°F	Good resistance to weak and strong acids and alkalis; excellent resistance to aliphatic hydrocarbons; excellent resistance to petroleum oil, gasoline, mineral and vegetable oils. Excellent water swell resistance.
	Neoprene	up to 185°F	Excellent resistance to dilute acids; weak and strong alkalis; good resistance to concentrated acids; good resistance to oil and gasoline.
	Hypalon* (Chlorosulfonated Polyethylene)	up to 210°F	Excellent resistance to dilute and concentrated acids, weak and strong alkalis. Exceptional resistance to strong oxidizing acids. Good resistance to concentrated mineral acids.
	Butyl	up to 225°F	Good resistance to corrosive chemicals. Outstanding resistance to dilute mineral acids. Excellent resistance to vegetable and mineral oils and solvents. Excellent heat resistance and low gas permeation.
	Viton*	up to 250°F	Excellent resistance to oils, solvents and missile fuels and most chemicals at elevated temperatures.
	Nordel*	up to 225°F	Resistant to weak acids most alkalis & ketones.

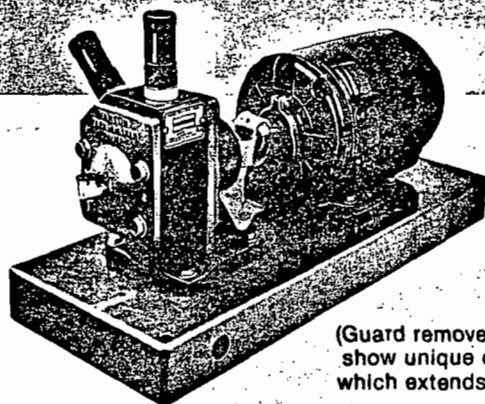
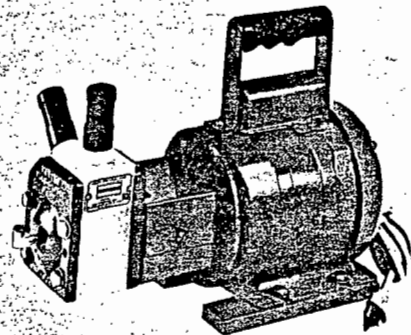
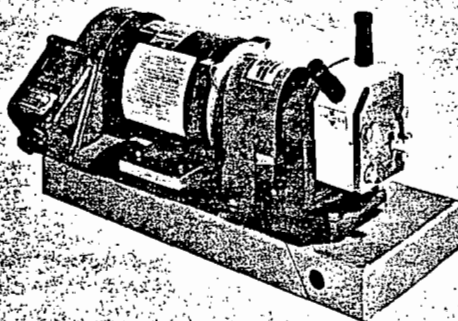
*Trademark Dupont Company

**Trademark Dixon Corporation

VANTON SEALLESS PLASTIC PUMPS

FOR CORROSIVE, HAZARDOUS SERVICE

Vanton Flex-i-liner pumps are available in close-coupled models with a totally enclosed electric motor, as well as pedestal mounted with electric motor drive or gasoline engine to meet diverse, heavy duty industrial needs. Capacities range from 0.33 gpm to 40 gpm. Metering accuracies of $\pm 5\%$ can be obtained by using variable speed motors or pulley drives. Discharge pressures to 45 psig.



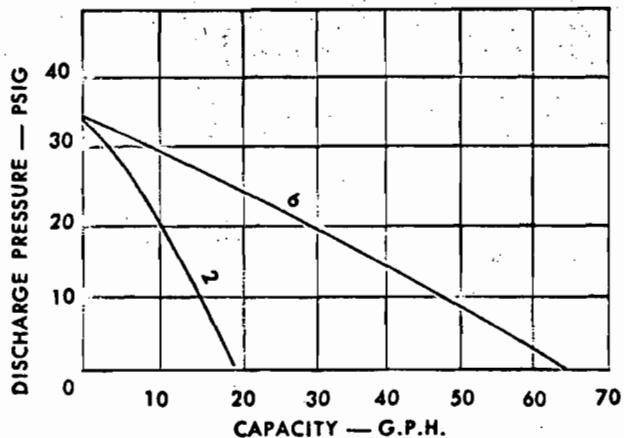
(Guard removed to show unique coupling which extends bearing life.)

PERFORMANCE DATA

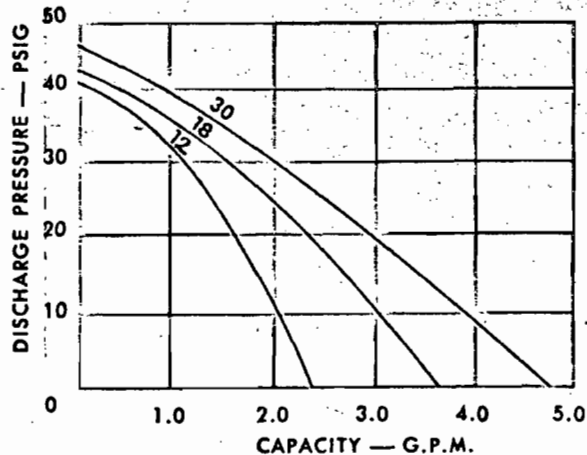
Pump Characteristic Curves show average performance data for water at room temperature. Slight differences may be encountered due to variation in Durometer hardness of the flexible liner, particularly when exotic materials such as Viton* and Hypalon* are used. Performance will also vary with materials of different viscosity and specific gravity. Detailed curves on request.

SIZE	CAPACITY G.P.M. H ₂ O AT 70°F AT 0—P.S.I.	OPERATING PRESSURE RANGE P.S.I.G.		H.P.	R.P.M.	HOSE CONNECTIONS* O.D.
		INTER- MITTENT	CON- TINUOUS			
2	0.33	0-25	0-25	1/4	1750	3/4"
6	1.0	0-25	0-25	1/4	1750	3/4"
12	2.0	0-35	0-30	1/4	1750	3/4"
18	3.0	0-40	0-30	1/4	1750	3/4"
30	5.0	0-45	0-30	1/4	1750	1"
60 B	10.0	0-50	0-30	1/2	1750	1"
90	15.0	0-15	0-10	1	1200	1 1/2"
120	20.0	0-15	0-10	1	1200	1 1/2"
180	30.0	0-30	0-30	1-1 1/2	1750	2"
240	40.0	0-30	0-30	1-1 1/2	1750	2"

*Hose connections generally recommended.—Other types available.
 † 1 1/2" suction, 1" discharge



SIZES 2 - 6

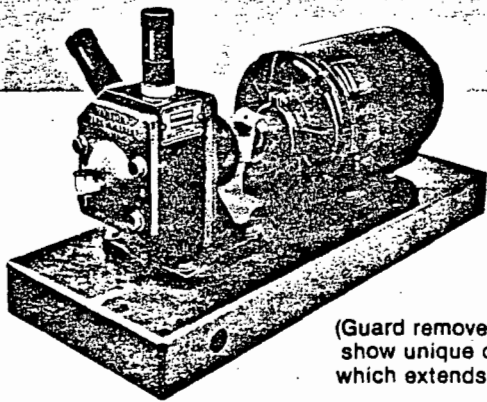
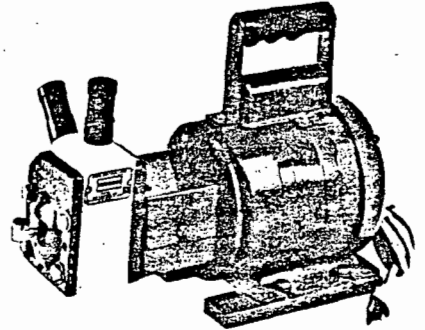
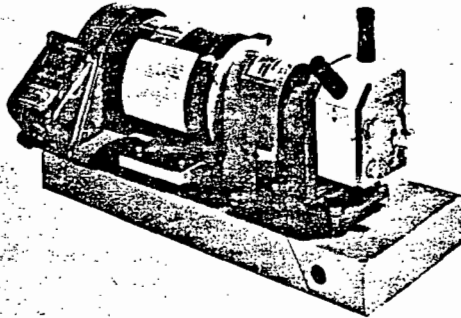


SIZES 12 - 18 - 30

VANTON SEALLESS PLASTIC PUMPS

FOR CORROSIVE, HAZARDOUS SERVICE

Vanton Flex-i-liner pumps are available in close-coupled models with a totally enclosed electric motor, as well as pedestal mounted with electric motor drive or gasoline engine to meet diverse, heavy duty industrial needs. Capacities range from 0.33 gpm to 40 gpm. Metering accuracies of $\pm 5\%$ can be obtained by using variable speed motors or pulley drives. Discharge pressures to 45 psig.



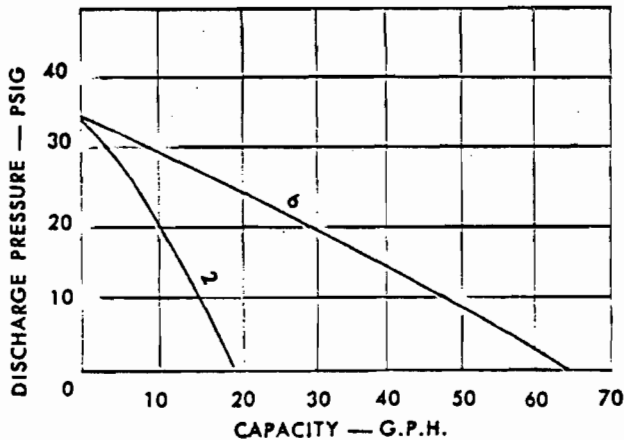
(Guard removed to show unique coupling which extends bearing life.)

PERFORMANCE DATA

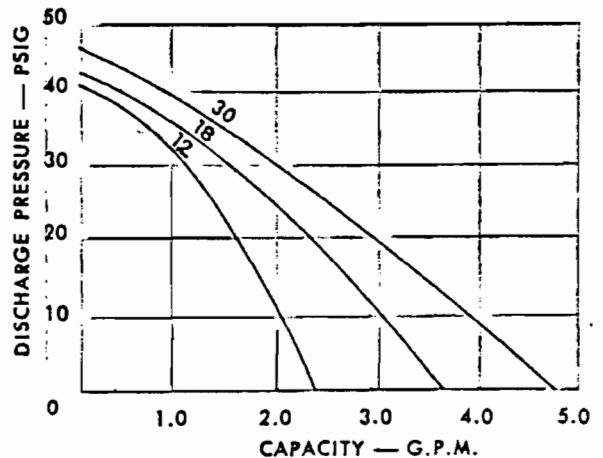
Pump Characteristic Curves show average performance data for water at room temperature. Slight differences may be encountered due to variation in Durometer hardness of the flexible liner, particularly when exotic materials such as Viton* and Hypalon* are used. Performance will also vary with materials of different viscosity and specific gravity. Detailed curves on request.

SIZE	CAPACITY G.P.M. H ₂ O AT 70°F AT 0—P.S.I.*	OPERATING PRESSURE RANGE P.S.I.G.		H.P.	R.P.M.	HOSE CONNEC- TIONS* O.D.
		INTER- MITTENT	CON- TINUOUS			
2	0.33	0-25	0-25	1/4	1750	3/8"
6	1.0	0-25	0-25	1/4	1750	3/8"
12	2.0	0-35	0-30	1/4	1750	3/8"
18	3.0	0-40	0-30	1/4	1750	3/8"
30	5.0	0-45	0-30	1/4	1750	1"
60B	10.0	0-50	0-30	1/2	1750	1"
90	15.0	0-15	0-10	1	1200	1 1/2"
120	20.0	0-15	0-10	1	1200	1 1/2"
180	30.0	0-30	0-30	1-1 1/2	1750	2"
240	40.0	0-30	0-30	1-1 1/2	1750	2"

*Hose connections generally recommended.—Other types available.
‡ 1 1/2" suction, 1" discharge



SIZES 2-6



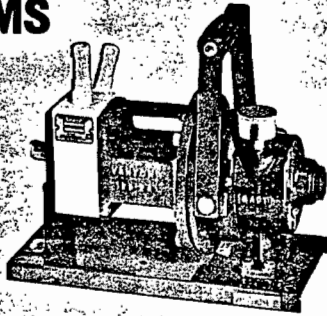
SIZES 12-18-30

VANTON SEALLESS PLASTIC PUMPS

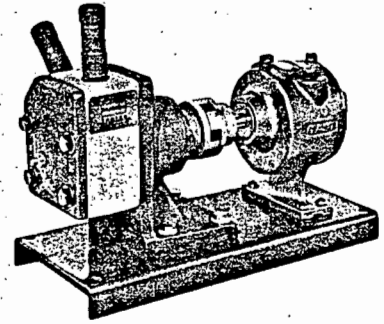
FOR VOLATILE FLUID SYSTEMS

AIR POWERED

Engineered primarily for chemical pumping service and for those applications which prohibit the use of electric power, these Vanton plastic sealless pumps are available in the same broad range of materials as the standard line. The rotary vane air motor generates 2,000 rpm on 90 psi and can be furnished in clockwise, or reversible models allowing for change of flow direction.

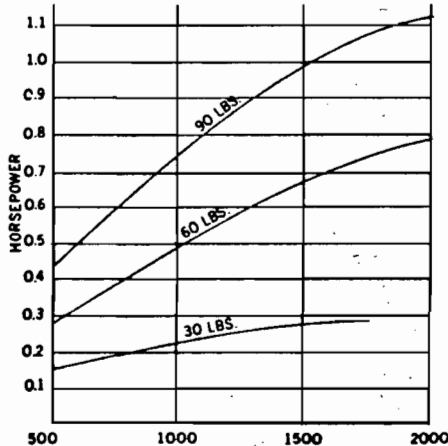


Control of the air motor drive offers a convenient means of obtaining varying rates of flow (within $\pm 5\%$) as needed. The Vanton air driven Flex-i-liner is available in capacities from 0.33 to 40 gpm.

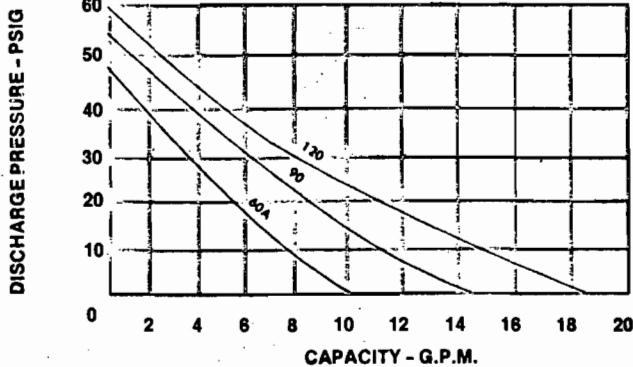
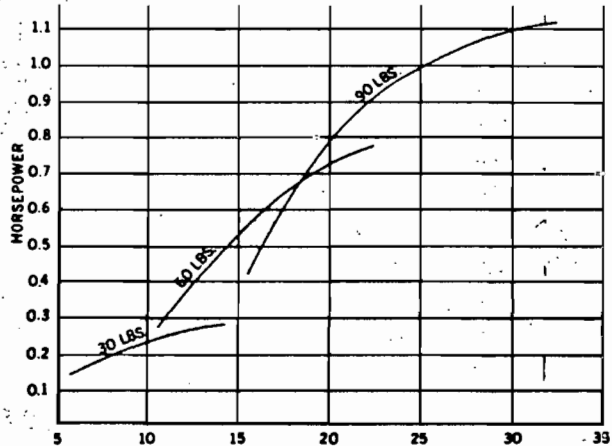


(Guard removed to show unique coupling which extends bearing life).

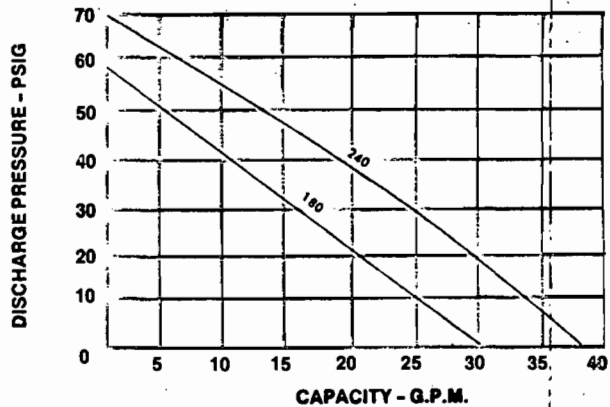
SPEED IN R.P.M.



FREE AIR CONSUMPTION IN C.F.M.

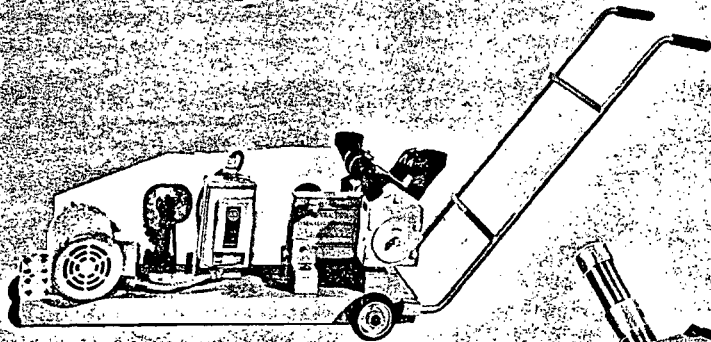


SIZES 60B - 90 - 120



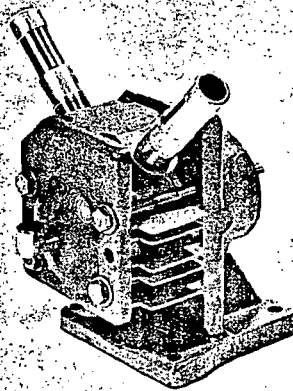
SIZES 180 - 240

OTHER FLEX-I-LINER® PUMP MODELS FOR A BROAD RANGE OF APPLICATIONS



**"DUPLIX"
FLEX-I-LINER**

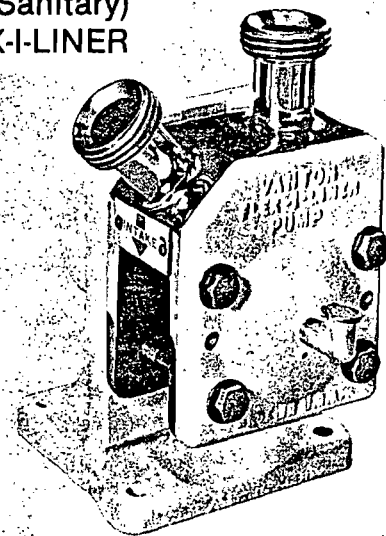
A double stage heavy duty pump with two fluid cavities, each activated by an eccentric 180° in opposition producing a steady pulseless flow. Fluid end intakes and discharges are manifolded to produce common suction and exit. Capacities 40 GPM. Available with same materials of construction as single stage units.



VANTON "HV" FLEX-I-LINER

Investment cast body with integral fins to keep pump cool. Vacuum and gas sampling service. 15' lift from a dry start. Recommended for gas sampling, particularly in pollution control, waste treatment and chemical processing. Flows to 1 cfm.

**"SANIFLEX"
(100% Sanitary)
FLEX-I-LINER**



A heavy duty sanitary pump unit meeting the requirements of Health Department authorities. Pump is furnished with polished stainless steel body block. There are no internal threads within the body. Sanitary fittings are provided. Known as the "SAN" Series, it is available in capacities from .33 to 20 gpm.

THE FLEX-I-LINER AT WORK

APPLICATIONS UNLIMITED

Foam sensitive coating solutions.
Andrews Paper and Chemical Company

Abrasive glass particles in hydrochloric acid solution.
Winthrop Laboratories

Concentrated ferric chloride for printed circuit etching.
Westinghouse Electric Corp.

Chemical cleaning compounds at missile center.
Dow Chemical

Abrasive chemicals over a broad pH range from 2 to 11.
Reheis Company

HCl, HF and H₂SO₄ for chemical etch milling process.
North American Aviation

Vacuum service handling radioactive primary water and gases.
USS Nautilus

30% HCl for synthesizing vitamin B₂.
Hoffman-LaRoche, Inc.

Highly abrasive and acidic Zr₂O₂ slurries.
Zirconium Corporation of America

Abrasive diatomaceous earth slurry.
HS Mensing Company

Abrasive frit, silica, feldspar, clay and color oxide blends.
Architectural Tiling Company

Chromic acid plating solutions
Westinghouse Electric Company

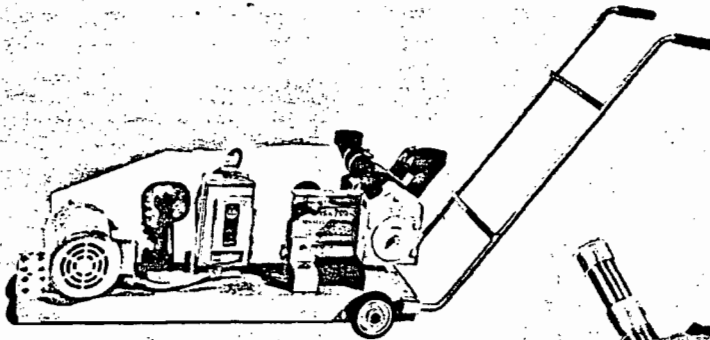
Active etchants, HCL and grit laden wastes.
Bendix Corporation

Liquid concentrate and dialysate for multi-patient hemodialysis system
Bio/Systems, Inc.

Acids, caustic solutions and salts often with solid particles.
Jaffrys Laboratories, Inc.

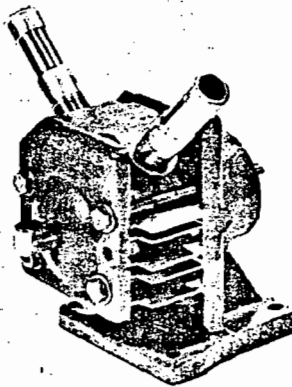
High viscosity polymer used in production of floor wax.
Boyle-Midway Division, American Home Products

OTHER FLEX-I-LINER® PUMP MODELS FOR A BROAD RANGE OF APPLICATIONS



**"DUPLEX"
FLEX-I-LINER**

A double stage heavy duty pump with two fluid cavities, each activated by an eccentric 180° in opposition producing a steady pulseless flow. Fluid end intakes and discharges are manifolded to produce common suction and exit. Capacities 40 GPM. Available with same materials of construction as single stage units.

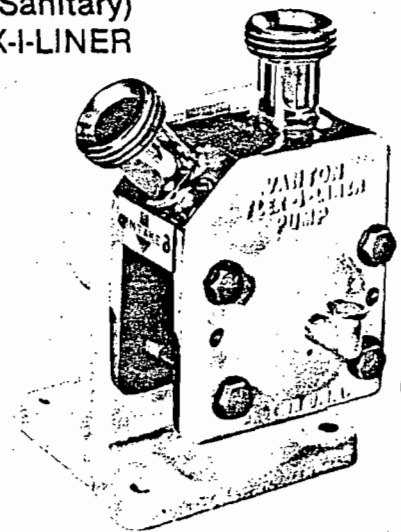


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(100% Sanitary)
FLEX-I-LINER**



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APPLICATIONS UNLIMITED

Foam sensitive coating solutions.
Andrews Paper and Chemical Company

Abrasive glass particles in hydrochloric acid solution.
Winthrop Laboratories

Concentrated ferric chloride for printed circuit etching.
Westinghouse Electric Corp.

Chemical cleaning compounds at missile center.
Dow Chemical

Abrasive chemicals over a broad pH range from 2 to 11.
Reheis Company

HCl, HF and H₂SO₄ for chemical etch milling process.
North American Aviation

Vacuum service handling radioactive primary water and gases.
USS Nautilus

30% HCl for synthesizing vitamin B₁₂.
Hoffman-LaRoche, Inc.

Highly abrasive and acidic Zr₂O₃ slurries.
Zirconium Corporation of America

Abrasive diatomaceous earth slurry.
HS Mensing Company

Abrasive frit, silica, feldspar, clay and color oxide blends.
Architectural Tiling Company

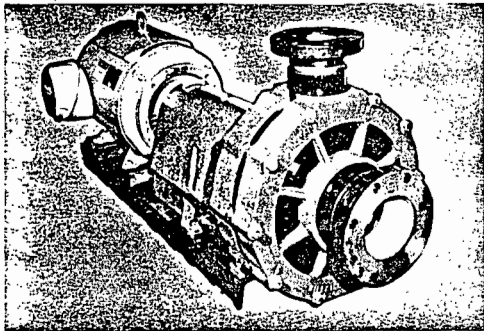
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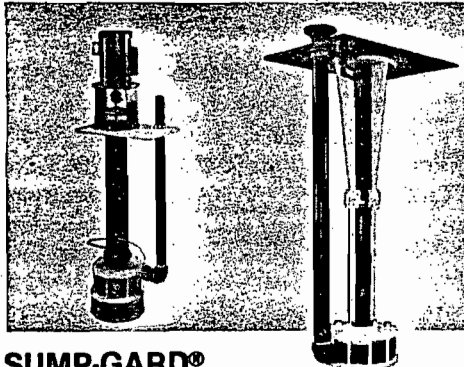
Acids, caustic solutions and salts often with solid particles.
Jaffrys Laboratories, Inc.

High viscosity polymer used in production of floor wax.
Boyle-Midway Division, American Home Products



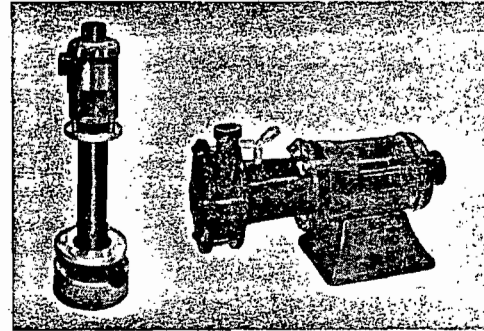
CHEM-GARD®

Centrifugal Pumps—Heavy duty plastic pumps, heads, rated from 5 to 1000 GPM. Available in polypropylene, PVC, or Kynar*. Discharge heads to 200 feet. Temperatures to 300 °F. (Catalog 11.0)



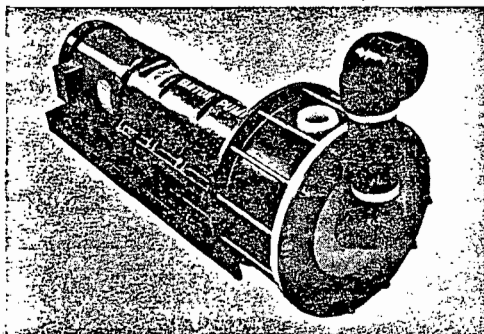
SUMP-GARD®

Sealless, self-priming submersible pumps. Seven models in same materials as Vanton Chem-Gard. Capacities to 1000 GPM with operating depths to 16 feet. Temperatures to 300 °F. (Catalog 12.0)



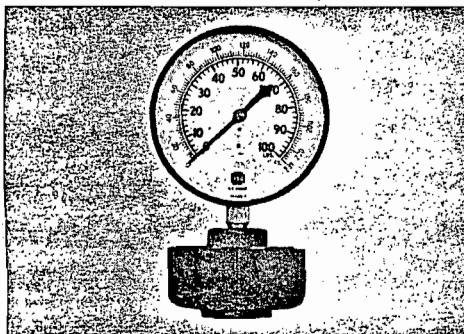
SGH/CCGH

These low cost corrosion resistant plastic pumps with integral, removable pump motor shafts eliminate need for bearings. Design prevents liquid or vapor from attacking the motor, assuring long pump life. Capacities to 300 GPM. Temperatures to 300 °F. (Catalog 19.0)



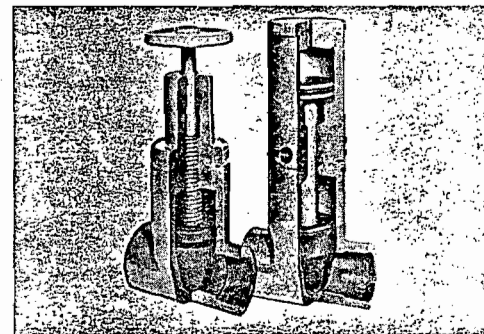
PRIME-GARD™

Self-priming centrifugal pumps in Kynar, PVC, Polypropylene. Rapid priming to 20 feet. 5 to 300 GPM. (Catalog 11.3)



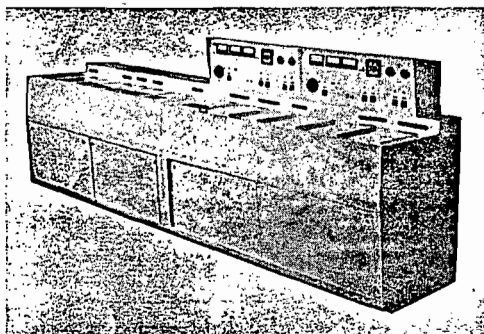
GAGE-GARD™

Diaphragm seal instrument protectors in PVC or Polypropylene with molded flexible diaphragm of Neoprene, Hypalon, or Viton. Accurate readings from 0-150 PSI and from 0-30 inch vacuum. (Catalog 30.0)



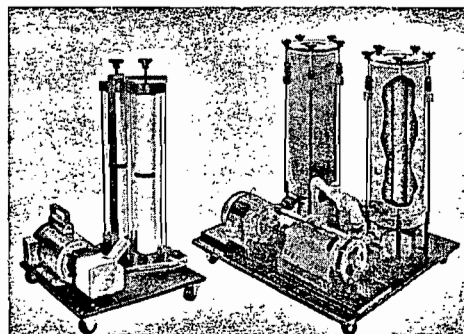
FLEX-PLUG™

Manual and air activated plastic valves in PVC and Polypropylene. 1/2 to 2 inch. Socket weld, flanged or screwed ends. (Catalog 44/43)



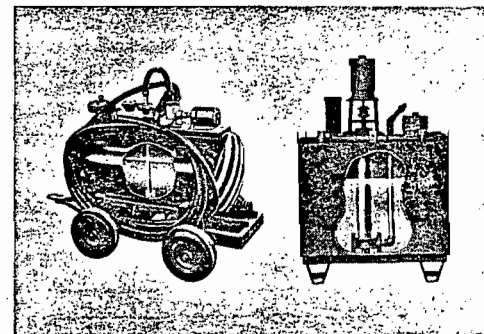
ELECTROPLATING SYSTEMS

From single tank to multiple tank plating consoles. Quality fabrication of plastic systems for every purpose. (Catalog 28.2)



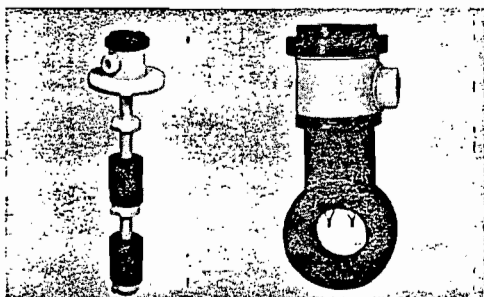
PUMP/FILTER SYSTEMS

In PVC, CPVC, Polypropylene, or Lucite. Capacities from 50 to 18,000 GPH. Compact, portable, rugged. Particle removal to 5 microns. (Catalog 28.8)



PORTABLE PUMPING SYSTEMS

4-wheeled acid buggy, forklift tank and pump unit and other systems for storage and transfer of corrosive liquids. No metal in contact with solution. (Catalog 28.6)



LEVL™ & FLO™ CONTROLS

In PVC, CPVC, Polypropylene, and Kynar. Reed, Probe, and Flap type liquid level controls; Probe and Flap type liquid flow sensors. (Catalog 30.0)

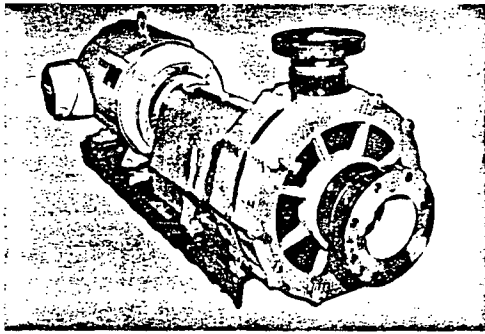


VANTON PUMP & EQUIPMENT CORP.

Hillside, New Jersey 07205 • 201-688-4216 • TELEX: 138-478

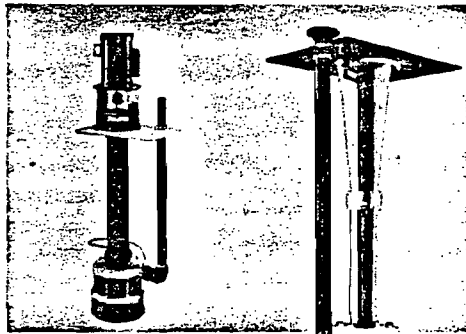
VANTON-PUMPEN AG, 25, RUE DE L'INDUSTRIE, 1700 FRIBOURG, SWITZERLAND
 VANTON PUMPS LTD., 68A HIGH STREET, CONGLETON, CHESHIRE CW12 1BA, U.K.
 VANTON PUMPS (INDIA) PRIVATE, LTD., 84 G.S.T. ROAD, CHROME PET, MADRAS-44, INDIA
 VANTON PUMP AND EQUIPMENT SOUTH AFRICA (PTY) LTD., ELANDSFONTEIN 1406

ENGINEERED NON-METALLIC PUMPS AND SYSTEMS FOR FLUID HANDLING



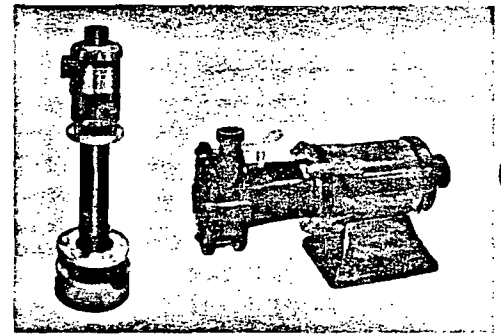
CHEM-GARD®

Centrifugal Pumps—Heavy duty plastic pumps, heads, rated from 5 to 1000 GPM. Available in polypropylene, PVC, or Kynar*. Discharge heads to 200 feet. Temperatures to 300°F. (Catalog 11.0)



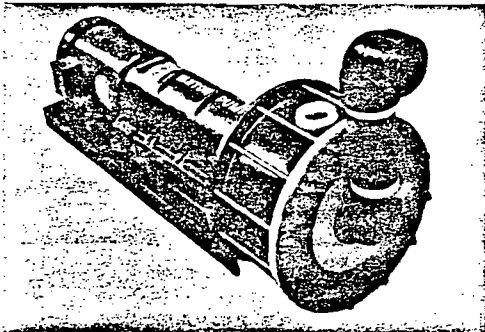
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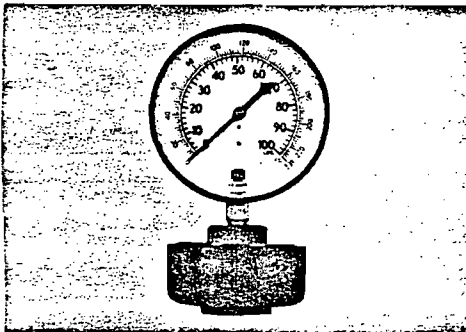
SGH/CCGH

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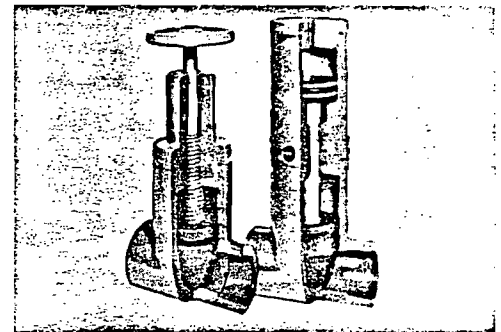
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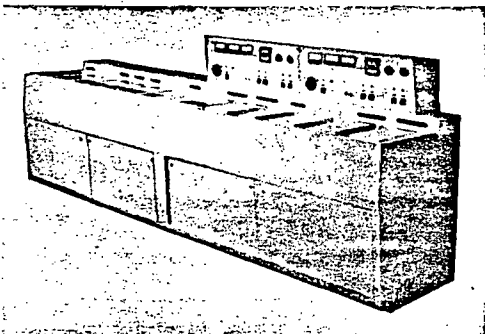
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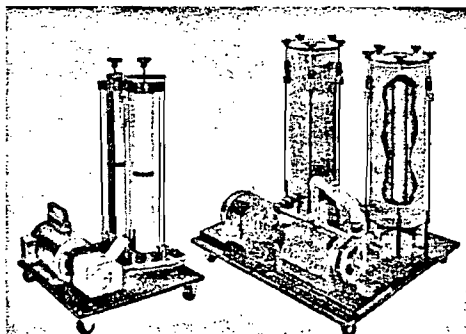
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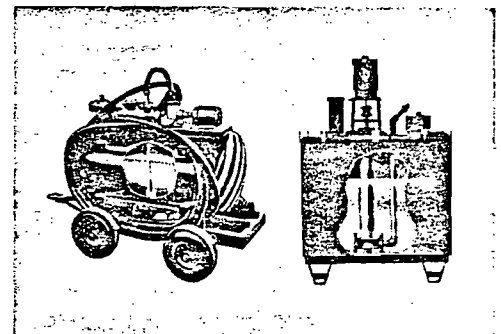
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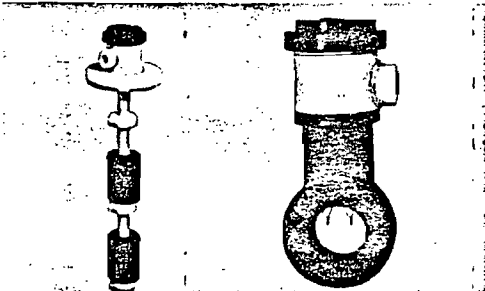
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4-wheeled acid buggy, forklift tank and pump unit and other systems for storage and transfer of corrosive liquids. No metal in contact with solution. (Catalog 28.6)



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In PVC, CPVC, Polypropylene, and Kynar. Reed, Probe, and Flap type liquid level controls; Probe and Flap type liquid flow sensors. (Catalog 30.0)



VANTON PUMP & EQUIPMENT CORP.

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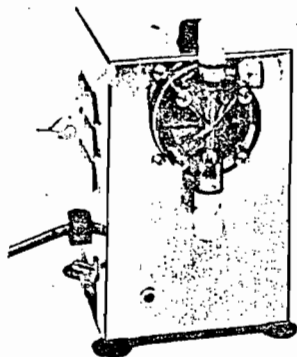
VANTON-PUMPEN AG, 25, RUE DE L'INDUSTRIE, 1700 FRIBOURG, SWITZERLAND
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 VANTON PUMP AND EQUIPMENT SOUTH AFRICA (PTY) LTD., ELANDSFONTEIN 1405

ENGINEERED NON-METALLIC PUMPS AND SYSTEMS FOR FLUID HANDLING

DIAPHRAGM CHEMICAL METERING PUMPS

KP-1000 SERIES – DIAL ADJUSTABLE METERING PUMP

This versatile fan-cooled series of pumps incorporates the most demanded features available in a metering pump today. A corrosion resistant stainless steel case, dial adjustable feed rate control, "power on" indicator light, rugged gearmotor, and positive seating check valves make these pumps well suited for many industrial conditions. An optional cartridge valve consisting of a ceramic ball and spring provide a double seal for optimum priming. Standard features include a large polypropylene foot valve strainer and injection fitting which also serves as an antisiphon valve. Optional features such as a low level alarm or control for sensing low chemical supply condition are listed on page 6. KP-1000 pumps provide fast priming ability with accurate, dependable feed rate control. DIMENSIONS: 8"H x 5"W x 6"D. Shipping weight: 10 lbs. Standard 120 Volt AC, 50/60 Hz. 240 Volt optional.



MODEL KP-1015

SPECIFICATIONS:

MODEL NO.	DESCRIPTION	MAX PSI	ML/MN	GPH	GPD	PKG
KP-1015	15 RPM Pump	125	55	.87	20.88	4
KP-1030	30 RPM Pump	100	125	2.00	48.00	4
KP-1060	60 RPM Pump	100	255	4.01	96.24	4
KP-1100	100 RPM Pump	30	408	6.50	156.00	4

→ KP-1250 250 RPM PUMP

OPTIONS: KP-1000/KP-1000H/KP-2000

PART NO.	DESCRIPTION
7904630	Teflon diaphragm, large, KP-900/1000
- R	Built-in relay for control activation
- X	Without stainless steel case, KP-900/1000
- T	10 minute percentage time, 115V
- I	Interruptor switch (3-60 Seconds)
- LT	Limiting timer (0-60 Seconds, 0-60 Minutes)
- 24	24 Volt 50/60 Hz motor.
- 240	240 Volt 50/60 Hz motor
- BV	Ball valve Cartridge Kit - 1/4" tube
	Ball valve Cartridge Kit - 3/8" tube

PUMP ACCESSORIES

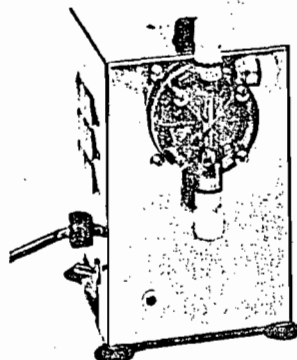
PART NO.	DESCRIPTION
7903320	Head assembly complete 1/4" valves, KP-1000H
7903340	Head assembly complete, 3/8" valves, KP-900/1000
7901220	Anti-siphon injection fitting, 1/4" valves, KP-1000H
7901240	Anti-siphon injection fitting, 3/8" valves, KP-900/1000
7402220	Foot valve strainer, 1/4" valves, KP-1000H
7902240	Foot valve strainer, 3/8" valves, KP-900/1000

Pump heads are available in PVC or Nylon.
Contact Sales Office.

cd/cn FEED Pump

KP-1000H SERIES – HIGH PRESSURE DIAL ADJUSTABLE METERING PUMP

This series of pumps have all the features listed above for the KP-1000 Series pumps with fast positive priming, accurate feed rate control, but delivering lower outputs with higher pressure range capabilities. Ideally suited for potable water treatment, cooling tower and boiler water treatment, these pumps deliver small amounts of chemical constantly and economically. Options are listed above and on page 6. DIMENSIONS: 8"H x 5"W x 6"D. Shipping weight: 10 lbs. Standard 120 Volt AC, 50/60 Hz. 240 Volt optional.



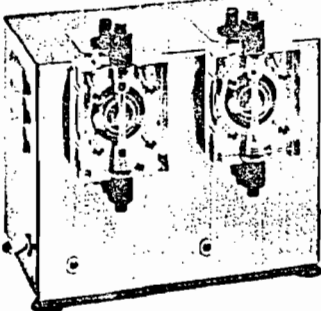
MODEL KP-1015H

SPECIFICATIONS:

MODEL NO.	DESCRIPTION	MAX PSI	ML/MN	GPH	GPD	PKG
JO-1015H	15 RPM Pump	150	5	.08	1.92	4
KP-1030H	30 RPM Pump	150	14	.22	5.28	4
KP-1060H	60 RPM Pump	125	26	.42	10.08	4

KP-2000 SERIES – DUPLEX DIAL ADJUSTABLE METERING PUMP

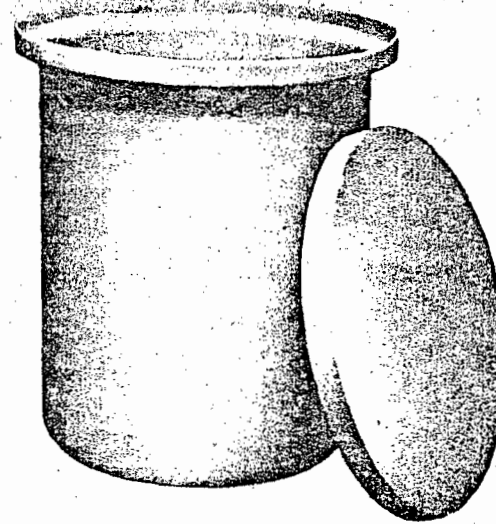
Many metering applications call for two products to be metered simultaneously and in direct proportion. Knight has designed the KP-2000 Series duplex by mounting two pumps in a single stainless steel case. Each pump has an individual operating switch with "power on" light, separate feed rate adjustment for each head, and a choice of different size gearmotors. A single power cord with plug is standard for 120 Volt unit. Output is selected from any combination of the KP-1000 and KP-1000H Series of pumps listed above as well as all optional features. DIMENSIONS: 8"H x 9"W x 6"D. Shipping weight: 20 lbs. Standard 120 Volt AC, 50/60 Hz. 240 Volt optional.



MODEL KP-2015

CYLINDRICAL TANKS

These are cylindrical tanks with heavy walls made to withstand rugged service. They are available in capacities from 5 to 2000 gallons, and are ready for immediate delivery. A wide assortment of fittings are available see page 15.

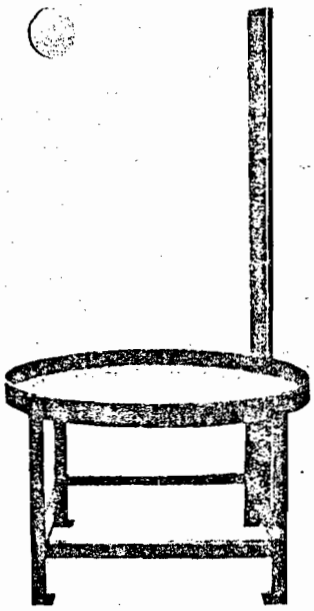


C1000H — High density polyethylene. Withstands continuous operating temperatures of up to 180° F.

C1000L — Conventional polyethylene. Recommended maximum operating temperature, 140° F.

C1000P — Polypropylene. Withstands continuous operating temperatures of up to 230° F.

CAPACITY (gal.)	DIAMETER BY HEIGHT (in.)	APPROX. WALL (in.)	PRICE C1000H & C1000L	PRICE C1000P	PRICE COVER	PRICE HINGED COVER	PRICED STAND	PRICE STAND W/AGITATOR MOUNT
5	11x13	3/16	\$ 12.00	\$ 17.00	\$ 3.00	\$ 12.00		
7	10x21	3/16	15.00	19.00	3.00	12.00		
8	13x16	3/16	17.00	21.00	4.00	16.00		
10	13x21	3/16	19.00	24.00	4.00	16.00		
12	15x16	3/16	24.00	32.00	5.00	17.00		
15	15x19	3/16	27.00	35.00	5.00	17.00	\$ 115.00	\$ 135.00
16	14x27	3/16	28.00	36.00	4.00	16.00	115.00	135.00
16	15x22	3/16	28.00	36.00	5.00	17.00	115.00	135.00
17	18x15	3/16	30.00	38.00	6.00	20.00	125.00	150.00
25	14x40	3/16	39.00	49.00	4.00	16.00	115.00	135.00
28	22x18	3/16	44.00	55.00	9.00	24.00	135.00	155.00
30	18x29	3/16	46.00	59.00	6.00	20.00	125.00	150.00
36	15x48	1/4	64.00	82.00	5.00	17.00	115.00	135.00
40	18x40	1/4	66.00	85.00	6.00	20.00	125.00	150.00
55	22x36	1/4	69.00	89.00	9.00	24.00	135.00	165.00
65	22x40	1/4	90.00	120.00	9.00	24.00	135.00	165.00
70	24x36	5/16	96.00	135.00	12.00	30.00	165.00	195.00
73	30x24	5/16	112.00	150.00	17.00	40.00	205.00	240.00
85	28x32	5/16	135.00	185.00	14.00	35.00	185.00	215.00
90	30x30	5/16	143.00	190.00	17.00	40.00	205.00	235.00
90	24x48	5/16	143.00	190.00	12.00	30.00	165.00	200.00
100	28x42	5/16	150.00	215.00	14.00	35.00	185.00	225.00
102	27x45	5/16	155.00	220.00	14.00	35.00	185.00	225.00
105	36x24	5/16	160.00	225.00	19.00	55.00	225.00	260.00
110	30x36	5/16	170.00	235.00	17.00	40.00	205.00	235.00
125	36x30	5/16	180.00	265.00	19.00	55.00	225.00	255.00
150	31x48	5/16	205.00	285.00	17.00	40.00	210.00	245.00
155	36x36	5/16	208.00	290.00	19.00	55.00	225.00	255.00
165	31x56	5/16	210.00	310.00	17.00	40.00	210.00	260.00
180	30x60	5/16	215.00	325.00	17.00	40.00	205.00	265.00
200	36x48	5/16	230.00	340.00	19.00	55.00	225.00	260.00
260	36x60	5/16	280.00	410.00	19.00	55.00	225.00	285.00
260	39x53	5/16	280.00	410.00	30.00	68.00	270.00	320.00
275	42x48	5/16	290.00	420.00	34.00	85.00	280.00	320.00
315	48x42	5/16	325.00	500.00	55.00	115.00	320.00	355.00
325	36x74	5/16	345.00	515.00	19.00	55.00	225.00	300.00
360	48x48	5/16	400.00	600.00	55.00	115.00	320.00	360.00
440	52x48	3/8	460.00	700.00	60.00	170.00	370.00	405.00
500	52x60	3/8	490.00	750.00	60.00	170.00	370.00	430.00
550	48x72	3/8	540.00	825.00	55.00	115.00	320.00	395.00
575	60x46	3/8	600.00	..	..	..	600.00	675.00
650	48x84	3/8	670.00	..	55.00	115.00	320.00	400.00
675	66x46	3/8	700.00	..	150.00	260.00	800.00	875.00
700	55x70	3/8	750.00	..	75.00	185.00	445.00	520.00
800	72x46	3/8	850.00	..	..	..	900.00	975.00
950	78x46	3/8	950.00	..	..	..	1050.00	1125.00
1000	66x72	3/8	995.00	..	150.00	260.00	800.00	875.00
1000	84x46	3/8	995.00	..	400.00	575.00	1400.00	1475.00
1250	69x84	7/16	1100.00	..	175.00	285.00	850.00	930.00
1500	73x84	7/16	1500.00	..	300.00	450.00	900.00	980.00
2000	84x84	7/16	2100.00	..	400.00	600.00	1400.00	1500.00



— 315 GAL. 45x48"

GIRDLES — Steel banded wooden girdles are available for our large capacity tanks. The girdles provide extra protection and support especially under heavy loads. 1000 gal., \$275; 1250 gal., \$325; 1500 gal., \$400; 2000 gal., \$500.

STANDS — Heavy duty steel braced stands with a corrosion resistant coating. Standard height provides a 24" clearance from the floor to the bottom of the tank. They are available with or without agitator mounting bracket.

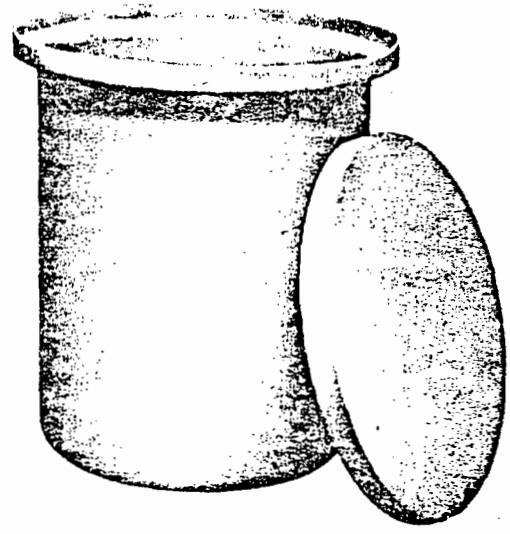
HINGED COVERS — All tank covers are available hinged. Flexible polypropylene hinge is installed with stainless steel rivets. For pricing, see chart above.

*All covers are conventional polyethylene. This size is available only when ordered with an FRP casing. See page 2.



CYLINDRICAL TANKS

These are cylindrical tanks with heavy walls made to withstand rugged service. They are available in capacities from 5 to 2000 gallons, and are ready for immediate delivery. A wide assortment of fittings are available see page 15.

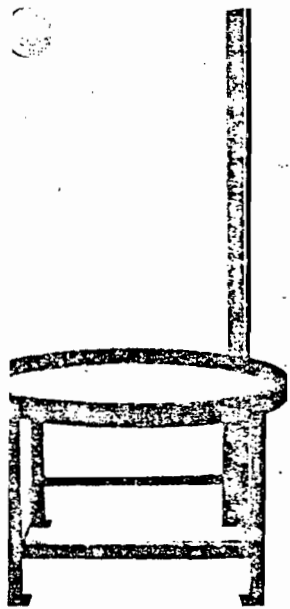


C1000H — High density polyethylene. Withstands continuous operating temperatures of up to 180° F.

C1000L — Conventional polyethylene. Recommended maximum operating temperature, 140° F.

C1000P — Polypropylene. Withstands continuous operating temperatures of up to 230° F.

CAPACITY (gal.)	DIAMETER BY HEIGHT (in.)	APPROX. WALL (in.)	PRICE C1000H & C1000L	PRICE C1000P	PRICE COVER	PRICE HINGED COVER	PRICED STAND	PRICE STAND W/AGITATOR MOUNT
5	11x13	3/16	\$ 12.00	\$ 17.00	\$ 3.00	\$ 12.00		
7	10x21	3/16	15.00	19.00	3.00	12.00		
8	13x16	3/16	17.00	21.00	4.00	16.00		
10	13x21	3/16	19.00	24.00	4.00	16.00		
12	15x16	3/16	24.00	32.00	5.00	17.00		
15	15x19	3/16	27.00	35.00	5.00	17.00	\$ 115.00	\$ 135.00
16	14x27	3/16	28.00	36.00	4.00	16.00	115.00	135.00
16	15x22	3/16	28.00	36.00	5.00	17.00	115.00	135.00
17	18x15	3/16	30.00	38.00	6.00	20.00	125.00	150.00
25	14x40	3/16	39.00	49.00	4.00	16.00	115.00	135.00
28	22x18	3/16	44.00	55.00	9.00	24.00	135.00	155.00
30	18x29	3/16	46.00	59.00	6.00	20.00	125.00	150.00
36	15x48	1/4	64.00	82.00	5.00	17.00	115.00	135.00
40	18x40	1/4	66.00	85.00	6.00	20.00	125.00	150.00
55	22x36	1/4	69.00	89.00	9.00	24.00	135.00	165.00
65	22x40	1/4	90.00	120.00	9.00	24.00	135.00	165.00
70	24x36	5/16	96.00	135.00	12.00	30.00	165.00	195.00
73	30x24	5/16	112.00	150.00	17.00	40.00	205.00	240.00
85	28x32	5/16	135.00	185.00	14.00	35.00	185.00	215.00
90	30x30	5/16	143.00	190.00	17.00	40.00	205.00	235.00
90	24x48	5/16	143.00	190.00	12.00	30.00	165.00	200.00
100	28x42	5/16	150.00	215.00	14.00	35.00	185.00	225.00
102	27x45	5/16	155.00	220.00	14.00	35.00	185.00	225.00
105	36x24	5/16	160.00	225.00	19.00	55.00	225.00	260.00
110	30x36	5/16	170.00	235.00	17.00	40.00	205.00	235.00
125	36x30	5/16	180.00	265.00	19.00	55.00	225.00	255.00
150	31x48	5/16	205.00	285.00	17.00	40.00	210.00	245.00
155	36x36	5/16	208.00	290.00	19.00	55.00	225.00	255.00
165	31x56	5/16	210.00	310.00	17.00	40.00	210.00	260.00
180	30x60	5/16	215.00	325.00	17.00	40.00	205.00	265.00
200	36x48	5/16	230.00	340.00	19.00	55.00	225.00	260.00
260	36x60	5/16	280.00	410.00	19.00	55.00	225.00	285.00
260	39x53	5/16	280.00	410.00	30.00	68.00	270.00	320.00
275	42x48	5/16	290.00	420.00	34.00	85.00	280.00	320.00
315	48x42	5/16	325.00	500.00	55.00	115.00	320.00	355.00
325	36x74	5/16	345.00	515.00	19.00	55.00	225.00	300.00
360	48x48	5/16	400.00	600.00	55.00	115.00	320.00	360.00
440	52x48	3/8	460.00	700.00	60.00	170.00	370.00	405.00
500	52x60	3/8	490.00	750.00	60.00	170.00	370.00	430.00
550	48x72	3/8	540.00	825.00	55.00	115.00	320.00	395.00
575	60x46	3/8	600.00	..	..	600.00	675.00	..
650	48x84	3/8	670.00	..	55.00	115.00	320.00	400.00
675	66x46	3/8	700.00	..	150.00	260.00	800.00	875.00
700	55x70	3/8	750.00	..	75.00	185.00	445.00	520.00
800	72x46	3/8	850.00	..	..	900.00	975.00	..
950	78x46	3/8	950.00	..	..	1050.00	1125.00	..
1000	66x72	3/8	995.00	..	150.00	260.00	800.00	875.00
1000	84x46	3/8	995.00	..	400.00	575.00	1400.00	1475.00
1250	69x84	7/16	1100.00	..	175.00	285.00	850.00	930.00
1500	73x84	7/16	1500.00	..	300.00	450.00	900.00	980.00
2000	84x84	7/16	2100.00	..	400.00	600.00	1400.00	1500.00



— 315 GAL 45x48"

GIRDLES — Steel banded wooden girdles are available for our large capacity tanks. The girdles provide extra protection and support especially under heavy loads. 1000 gal., \$275; 1250 gal., \$325; 1500 gal., \$400; 2000 gal., \$500.

STANDS — Heavy duty steel braced stands with a corrosion resistant coating. Standard height provides a 24" clearance from the floor to the bottom of the tank. They are available with or without agitator mounting bracket.

HINGED COVERS — All tank covers are available hinged. Flexible polypropylene hinge is installed with stainless steel rivets. For pricing, see chart above.

*All covers are conventional polyethylene.
This size is available only when ordered with an FRP casing. See page 2.





JWI INC., P.O. BOX 9A, HOLLAND, MICHIGAN 49423 U.S.A. (616) 399-9130

DIRECT DRIVE PORTABLE MIXER
OPERATING AND MAINTENANCE INSTRUCTIONS

Initial Inspection:

Remove mixer and clamping device from packing container. Propellers (23) and shaft (13) are usually packed separately. Check for shipping damage and report any damage to the carrier and to JWI, Inc.

Clamp Assembly:

Install the clamp or alternate flat mounting plate to the mixer housing using the bolt assembly furnished. (See parts sheet.)

Shaft and Propeller Assembly:

Insert the mixer shaft (13) spotted end into the drive shaft (12) until mixer shaft bottoms out. Align spots on mixer shaft with set screws in drive shaft. Tighten set screws with allen wrench furnished.

The propeller (23) furnished is a marine type propeller. Care should be taken when mounting the propeller on the shaft (13) that the driving face of the propeller is down. This means that the propeller pumps toward the bottom of the tank. The driving face of a marine type propeller is flat while the upper face or non-driving side has the appearance of an air foil. The best method to determine the driving face is to lay a straight edge chordwise on the blade about $\frac{2}{3}$ of the radius from the center of the bore. The driving face will be flat along the straight edge.

The single propeller is mounted at the end of the shaft being held in place by the two set screws. For dual propeller installation space upper, two propeller diameters minimum, four propeller diameters maximum from lower propeller.

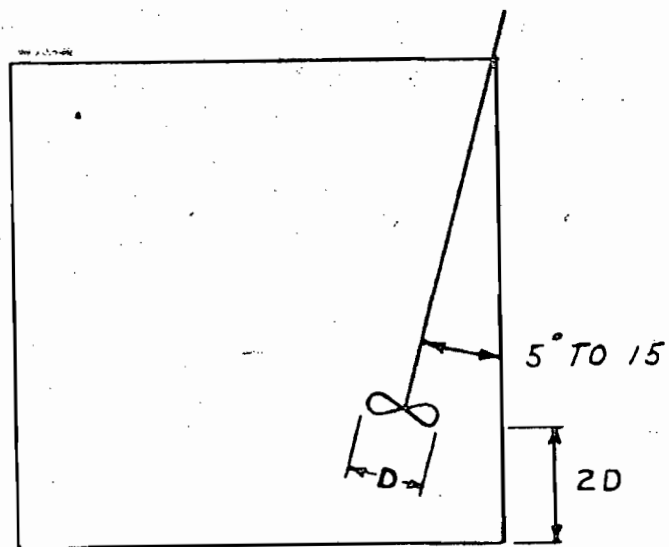
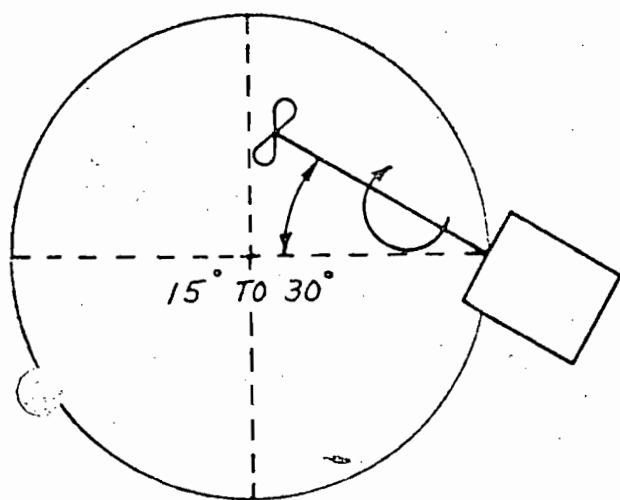
NOTE: Upper propeller should be two propeller diameters minimum below surface of liquid.

Mounting:

Install the portable mixer on the tank edge or other suitable support by means of the clamp (2) or flat plate (4).

Position the portable mixer as shown in Figure A for best top to bottom flow. In operation some adjustments of position may be desirable for best results.

Figure A.



Power Supply:

Wire motor as indicated on motor indication plate. Test mixer for smoothness of operation. Motor should rotate so as to force liquid downward. If not, check wiring or propeller position.

Lubrication:

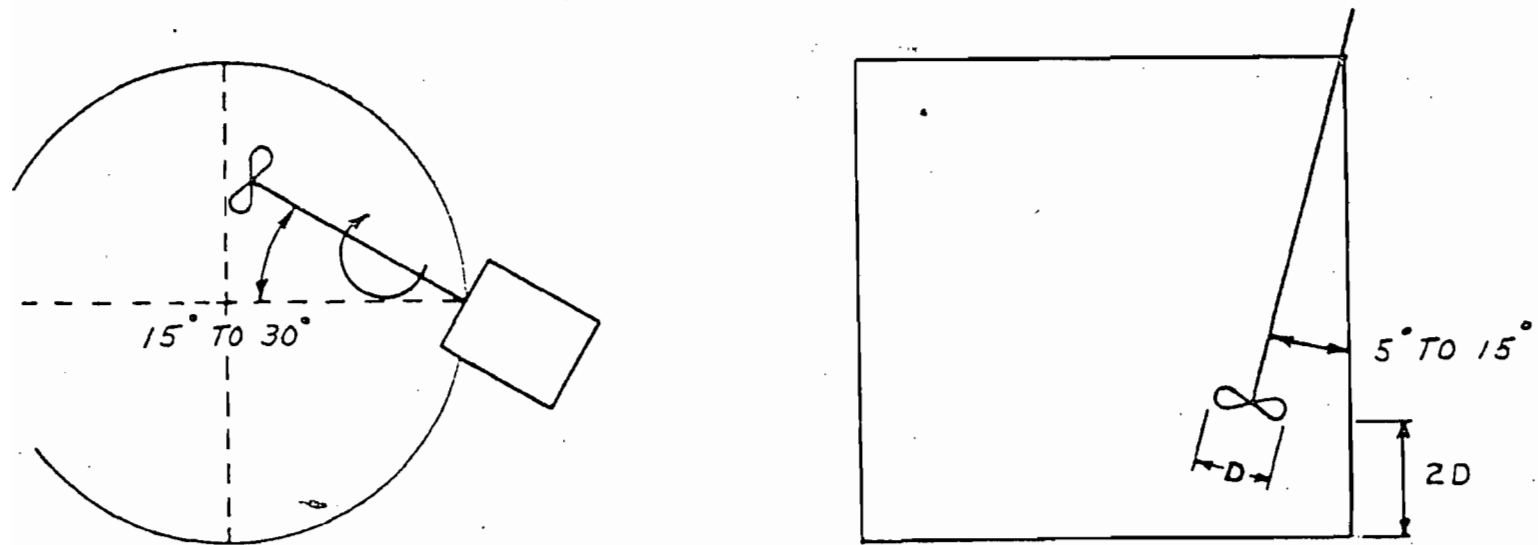
Mixer bearings are of the sealed type and normally do not require additional lubrication.

Mounting:

Install the portable mixer on the tank edge or other suitable support by means of the clamp (2) or flat plate (4).

Position the portable mixer as shown in Figure A for best top to bottom flow. In operation some adjustments of position may be desirable for best results.

Figure A.



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Wire motor as indicated on motor indication plate. Test mixer for smoothness of operation. Motor should rotate so as to force liquid downward. If not, check wiring or propeller position.

Lubrication:

Mixer bearings are of the sealed type and normally do not require additional lubrication.

DISASSEMBLY DIRECT DRIVE PORTABLE MIXER

1. Disconnect all wiring and remove mixer from tank.
2. Remove shaft (13) from drive shaft by loosening the two set screws.
3. Remove plastic cap (15) from housing (1).
4. Rotate drive shaft so as to align set screw (5) with hole in housing (1). Insert allen wrench and loosen set screw (5).
5. Remove the four socket head cap screws (14) holding housing (1) to motor (3).
6. Remove housing from motor.
 - a. The upper end of the drive shaft (12) is closely fitted to the motor shaft. Use care in separating the housing from the motor by one of the following methods.
 - 1) Tap evenly around the upper edge of the housing with a mallet.
 - 2) If the two housings do not easily separate, insert the mixer shaft into the drive shaft and tighten set screws. Separate motor and housing by tapping the top of the propeller hub with a mallet. Then, remove the mixer shaft.
7. Remove retaining rings (8) and (9) from shaft and housing using a retaining ring pliers.
8. Mount housing large end upward in an arbor press and press drive shaft (12) through the lower opening of the housing.
9. Turn the housing large end down and press ball bearing (10) and oil seal (11) downward out of the housing.

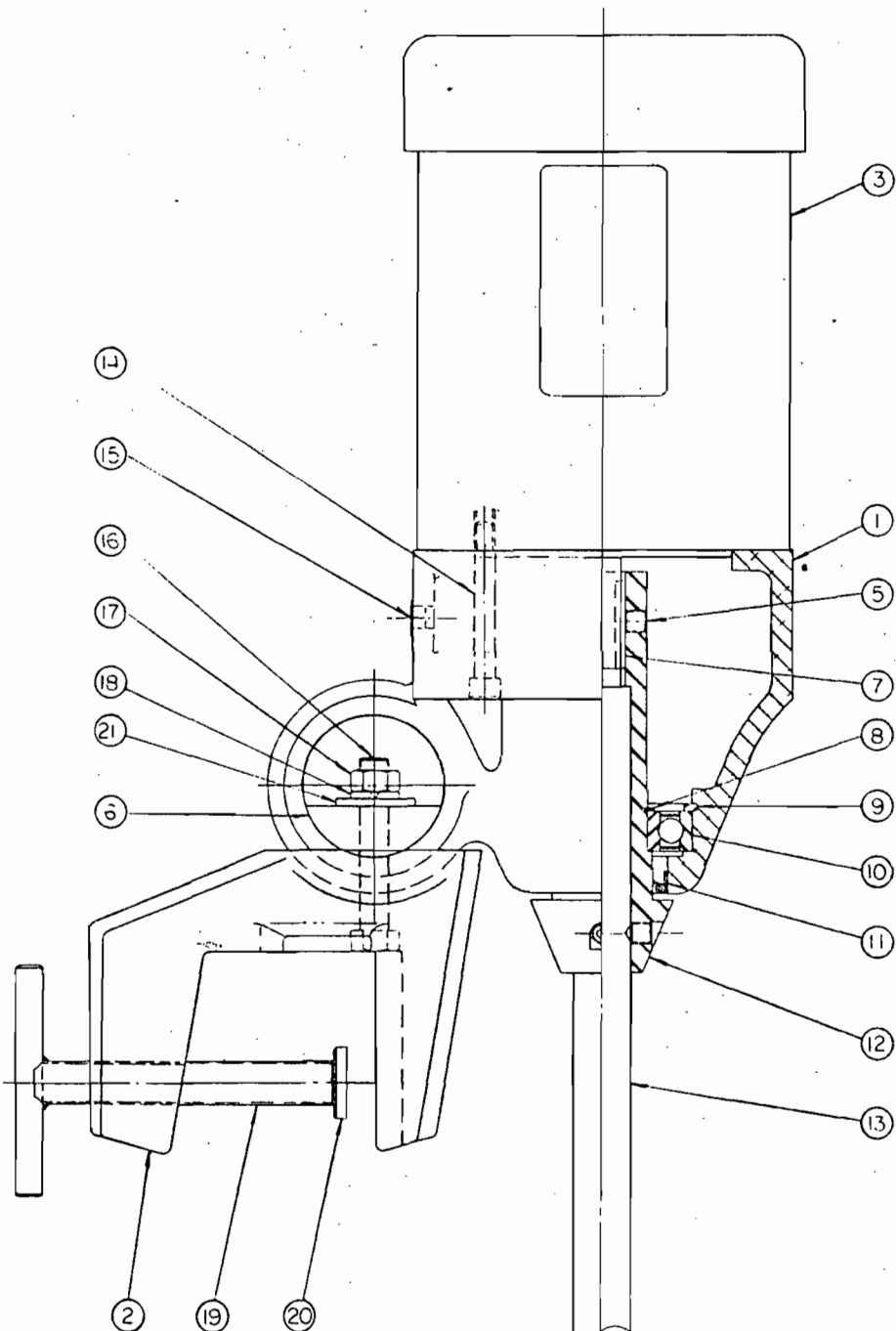
ASSEMBLY DIRECT DRIVE PORTABLE MIXER

1. Clean all parts thoroughly.
2. Replace defective parts such as bearing (10) or oil seal (11).
3. Mount the housing (1) in an arbor press, large end up.
4. Press the ball bearing (10) on its outer race to the shoulder of the housing.
5. Install retaining ring (9).
6. Turn the housing large end down and press the oil seal (11) sealing lip inward, flush with the nose of the housing.
7. Support the housing, large end down by resting the inner race of the ball bearing on a suitable sleeve.
8. Grease the lid of the oil seal and press the drive shaft (12) into the ball bearing until the shoulder of the shaft bottoms against the bearing.
9. Install retaining ring (8) on drive shaft.
10. Install key (7) onto motor shaft using Loctite sealant.
11. Apply a light film of oil to both shafts.
12. Align the mating keyways and insert one shaft into the other, without forcing, until the motor and housing are firmly seated..
13. Align motor and housing. (See parts list.)
14. Install the four housing cap screws using Loctite sealant.
15. Align drive shaft set screw (5) with hole in housing and tighten set screw (5).
16. Replace the plastic plug (15).
17. Replace mixer shaft.

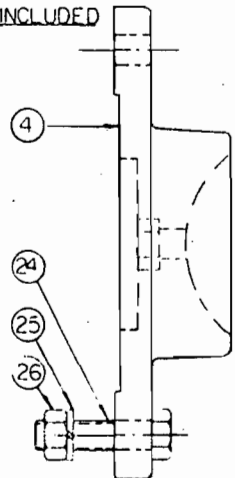
ASSEMBLY DIRECT DRIVE PORTABLE MIXER

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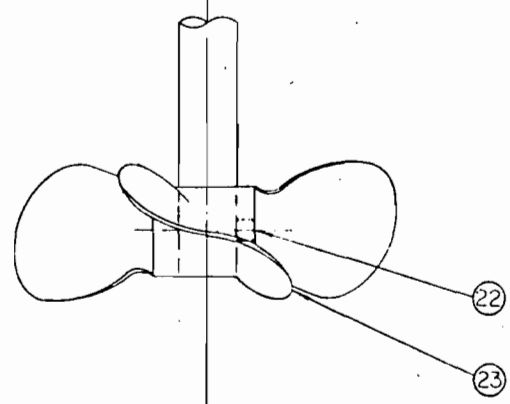
ITEM NO.	PART NAME	REQUIRED
1	HOUSING	1
2	CLAMP	1
3	MOTOR	1
4	RIGID MOUNT	1
5	SET SCREW	3
6	LOCKING SHOE	1
7	SHAFT KEY	1
8	RETAINING RING	1
9	RETAINING RING	1
10	BALL BEARING	1
11	OIL SEAL	1
12	DRIVE SHAFT	1
13	MIXER SHAFT	1
14	HEX HD CAP SCR	4
15	CAP PLUG	1
16	HEX HD BOLT	1
17	HEX NUT	1
18	LOCK WASHER	1
19	CLAMP SCREW	1
20	CLAMP WASHER	1
21	FLAT WASHER	1
22	SET SCREW	PER ORDER
23	PROPELLER	PER ORDER
24	HEX HD BOLT	4
25	LOCK WASHER	4
26	HEX NUT	4



WHEN ITEM 2 ORDERED ITEMS 4 24 25 & 26
NOT INCLUDED

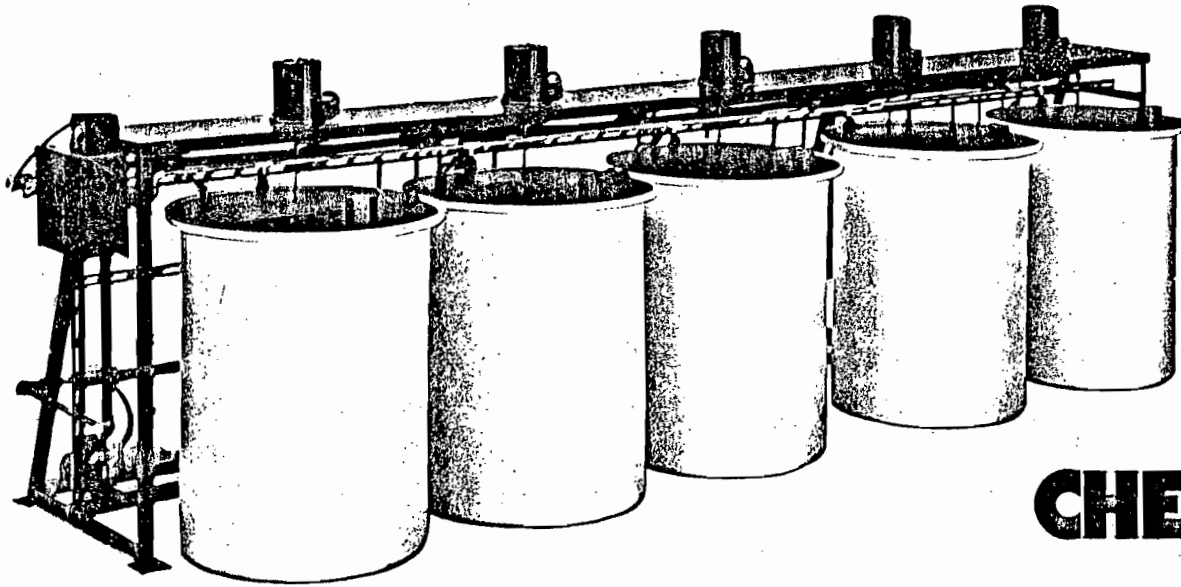


WHEN ITEM 4 ORDERED ITEMS 2 19 & 20
NOT INCLUDED

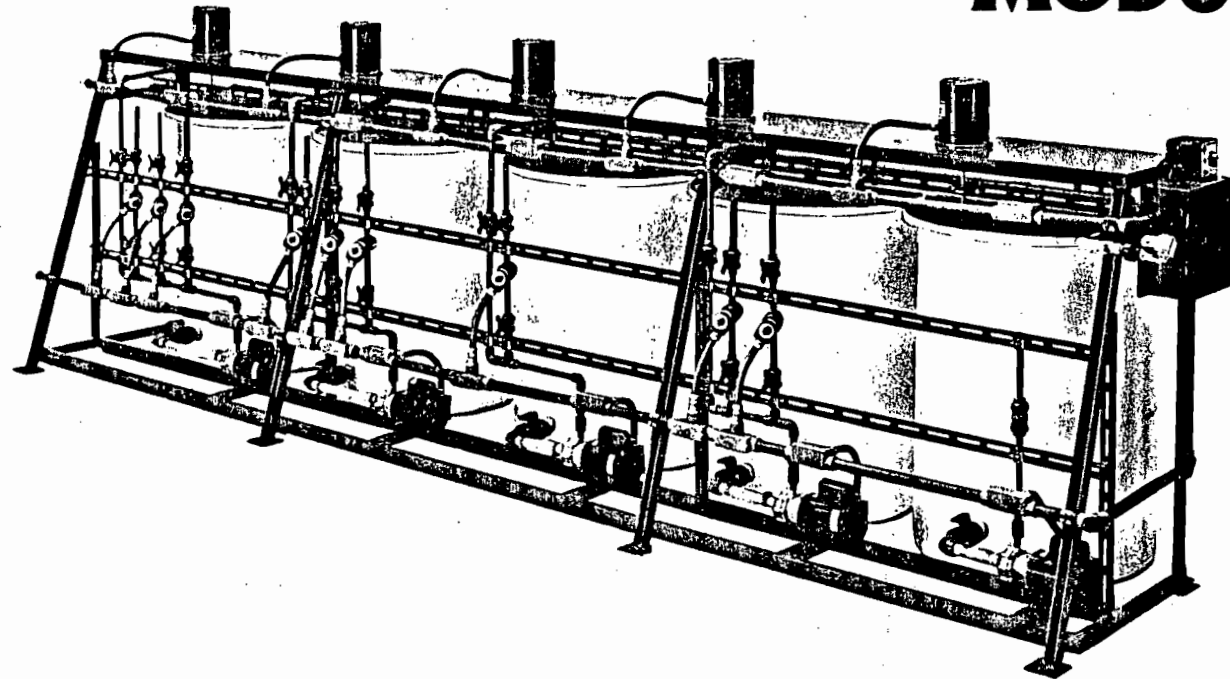


JWI INC. HOLLAND, MICH.

DIRECT DRIVE MIXER	
DATE	REVISED
DRAWN BY	DESIGNED BY
CHECKED BY	APPROVED BY
SCALE	BY
MATERIAL	DATE



CHEMICAL FEED MODULE




DMP
CORPORATION

4049 Point Clear Drive Fort Mill, S.C. 29715 803/548-0853 or call Toll Free 800/845-3681

GORMAN - RUPP INDUSTRIES DIVISION

SERVICE DATA

CHEMICAL FEED MODULE

BELLVILLE, OHIO 44813 U. S. A.

STANDARD SINGLE 1½" BELLOWS PUMP

DESCRIPTION

The bellows pump size (1½") is the actual outside diameter of the bellows. The pump operates on an adjustable stroke, positive displacement principle. Output is adjusted by changing the stroke. The pump is driven by a thermally protected gearmotor which is attached to an adjustable eccentric hub. The bellows, pump body, and valve seats are made of polypropylene. The tubing connectors used are made of polypropylene.

The stainless steel cover gives adequate protection from most atmospheric conditions. Exposure of the motor to extremely dusty or corrosive environment may reduce life.

FLOW ADJUSTMENT

Regulate bellows pump with adjustable screw on crank assembly. Rotate screw clockwise to increase flow and counter-clockwise to decrease flow. Do not turn or loosen lock nut on screw.

Do not reduce output flow by restricting suction or discharge as this will cause excessive pressure within the pump.

PRIMING

The pump is self-priming under most conditions; however, the priming ability lessens with greater suction lift, higher discharge head, or with reduced stroke.

After the pump has been primed and is full of liquid, subsequent repriming ability will be improved.

PRESSURE

The 1½" bellows pump has the ability to discharge into a pressurized system; however, system or discharge pressure over 20 psi may cause damage to the bellows or gearbox.

Note: The pump is designed for use up to approximately 120°F (49°C). Operation above this temperature will begin to decrease maximum allowable pressure and life. When liquid temperature exceeds 140°F (60°C), consult factory for recommendations.

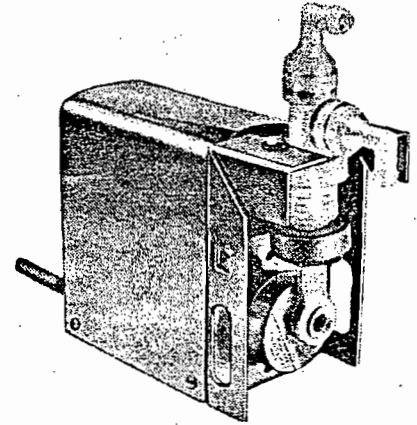
VISCOSITY

The pump has been designed to handle a wide range of liquid viscosities. It should be noted, however, that when pumping thicker liquids, it may be necessary to increase the size of connectors and tubing to relieve the pressure buildup within the pump assembly. It is good practice when pumping the heavier liquids to keep the liquid velocity (pump speed) as low as possible.

When pumping heavy suspensions which may tend to settle out, extremely corrosive solutions or any liquid which may tend to become more viscous with time, flush pump after use to increase pump life.

CHEMICAL SERVICE

The bellows pump will handle many different kinds of liquids. See chart in "Chemical Bellows Metering Pumps" catalog. For specific chemical service, write for our recommendations.



STANDARD SINGLE

Basic model. Most economical. Adjustment screw on crank allows discharge rate to be set at desired level. Fan-cooled motor. On-off switch. Polypropylene shield on crank mechanism.

WARRANTY

Gorman-Rupp Industries warrants that its pumps are free from defects in materials, workmanship and title. Warranty expires one year from date of shipment. **NO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR USE OR PURPOSE IS IMPLIED AND IS HEREBY EXPRESSLY EXCLUDED.**

TROUBLE SHOOTING GUIDE

The trouble shooting guide is a suggestion or aid in helping solve problems that might arise.

PUMP LEAKS

1. Bellows loose - Turn adjusting screw to full stroke, then rotate crank assembly to maximum bellows compression. Tighten plastic nut on crank assembly to 14 in. lbs. maximum.

CAUTION: Overtightening will distort bellows and cause leaks.

2. Connectors loose - Tighten to 5-½ to 6-½ in. lbs. torque (finger tight).
3. "O" ring defective or missing - See illustration.

MOTOR WILL NOT RUN

1. Cord, plug or switch defective.
2. Wires pulled loose.
3. Motor overtemperature thermostat open, motor overheating or poor ventilation.

UNIT WILL NOT PRIME

1. Pump leaks on suction side (see "Pump Leaks" section).
2. Bellows ruptured.
3. "O" ring defective or missing - See illustration.
4. Valves inverted or reversed.
5. Pump air-locked - Temporarily bleed off discharge pressure.
6. Stroke too short - Adjust screw to increase stroke.
7. Viscosity too high.

PUMP NOISY

1. Tolerance disc broken.
2. Fan hitting.
3. Gearmotor worn out.

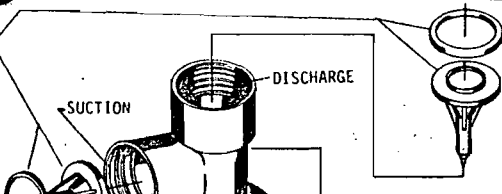
ERRATIC OR LOW FLOW

1. Tolerance disc broken.
2. Valves dirty - Dirt or foreign material in valves.
3. Adjusting screw broken.
4. Valves not seating.
5. Connectors loose.

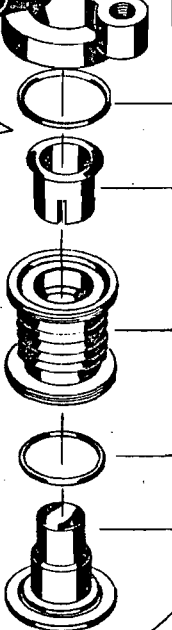
UNIT WILL NOT PUMP

1. Bellows ruptured.
2. Crank broken.
3. Adjusting screw broken.
4. Valves dirty - Dirt or foreign material in valves.
5. Valves may have deteriorated.

POPPET VALVE & O RING KIT
 H-253 HYPALON
 H-254 BUTYL
 H-255 EPT
 H-256 HYDRIN
 H-257 KEL-F
 H-268 VITON
 H-394 SILICONE
 H-395 NITRILE



BELLOWS MODULE REPLACEMENT KIT FOR 1 1/2" PUMP.
 H-263 HYPALON
 H-382 BUTYL
 H-279 EPT
 H-381 HYDRIN
 H-380 KELF
 H-379 VITON
 H-378 SILICONE
 H-377 NITRILE



TUBE CONNECTORS (2 PER KIT)
 H-352 STRAIGHT CONNECTOR 3/8" I.D. TUBING
 H-353 STRAIGHT CONNECTOR 1/2" I.D. TUBING
 H-258 STRAIGHT CONNECTOR 1/8" FEMALE PIPE THD.
 H-259 STRAIGHT CONNECTOR 1/8" I.D. TUBING
 H-260 STRAIGHT CONNECTOR 1/4" I.D. TUBING
 H-261 ELBOW CONNECTOR 3/8" I.D. TUBING
 H-354 ELBOW CONNECTOR 1/2" I.D. TUBING

08026-092
 5/8 O.D. X 1 1/64" I.D. X .045" THK.
 FLAT WASHER



05618-006
 HEX NUT



ADJUSTING SCREW-12933-000



INNER RACE-12932-006



ROD ASS'Y-12941-000



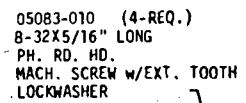
COUPLING NUT-12940-000



05463-016 (2-REQ.)
 1/4-14X1/2" LONG
 THD. FORMING TYPE B
 SL. RD. HD.



05083-010 (4-REQ.)
 8-32X5/16" LONG
 PH. RD. HD.
 MACH. SCREW W/EXT. TOOTH
 LOCKWASHER



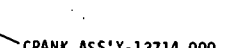
SPACER-11666-019



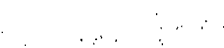
DRIVE BUSHING-12929-004



TOLERANCE DISC-12930-002



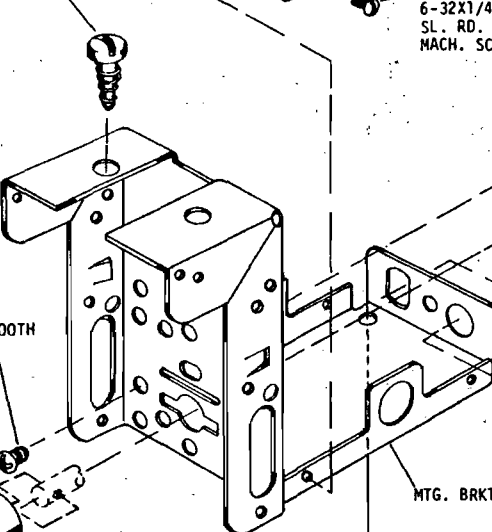
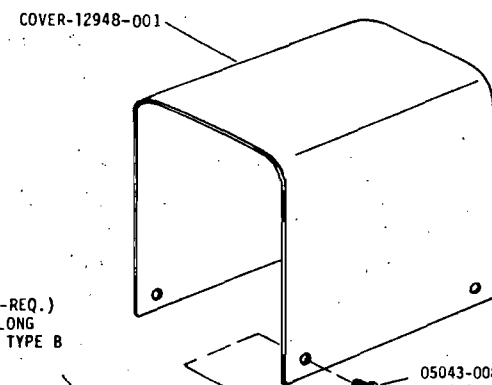
CRANK ASS'Y-13714-000



SPECIAL HEX NUT 14309-002



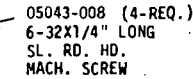
WIRE CONN.-08049-000



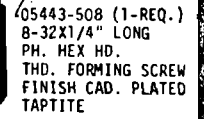
GEAR MOTORS WITH FANS
 115V 39 RPM USES G-003 OR G-036
 240V 39 RPM USES G-023 OR G-037
 115V 60 RPM USES G-002 OR G-038
 240V 60 RPM USES G-024 OR G-039
 115V 90 RPM USES G-011 OR G-040
 240V 90 RPM USES G-025 OR G-041

FANS FOR GEARMOTORS
 14171-003 USED ON G-023, G-024, G-025
 12721-012 USED ON G-003, G-002, G-011
 12721-011 USED ON G-036, G-038, G-040
 14171-001 USED ON G-037, G-039, G-041

05043-008 (4-REQ.)
 6-32X1/4" LONG
 SL. RD. HD.
 MACH. SCREW



05443-508 (1-REQ.)
 8-32X1/4" LONG
 PH. HEX HD.
 THD. FORMING SCREW
 FINISH CAD. PLATED
 TAPTITE



FELT PAD-09582-001



CORD & PLUG-09406-000



STRAIN RELIEF-08193-000



MTG. BRKT-12927-002



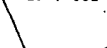
BUMPER-08492-000(4)



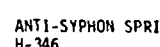
-SWITCH-13024-005-
 IF USED



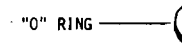
SHIELD 12947-002



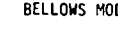
TUBE CONNECTOR



ANTI-SYPHON SPRING H-346



"O" RING



POPPET



BELLOWS MODULE



ANTI-SYPHON SPRING ASSY.

STD. SINGLE 1 1/2" BELLOWS PUMP ASSEMBLY.

POPPET VALVE & O RING KIT
 H-253 HYPALON
 H-254 BUTYL
 H-255 EPT
 H-256 HYDRIN
 H-257 KEL-F
 H-268 VITON
 H-394 SILICONE
 H-395 NITRILE

GEAR MOTORS WITH FANS
 115V 39 RPM USES G-003 OR G-036
 240V 39 RPM USES G-023 OR G-037
 115V 60 RPM USES G-002 OR G-038
 240V 60 RPM USES G-024 OR G-039
 115V 90 RPM USES G-011 OR G-040
 240V 90 RPM USES G-025 OR G-041

FANS FOR GEARMOTORS
 14171-003 USED ON G-023, G-024, G-025
 12721-012 USED ON G-003, G-002, G-011
 12721-011 USED ON G-036, G-038, G-040
 14171-001 USED ON G-037, G-039, G-041

COVER-12948-001

SUCTION DISCHARGE

BELLOWS MODULE REPLACEMENT KIT FOR 1 1/2" PUMP.
 H-263 HYPALON
 H-382 BUTYL
 H-279 EPT
 H-381 HYDRIN
 H-380 KELF
 H-379 VITON
 H-378 SILICONE
 H-377 NITRILE

05463-016 (2-REQ.)
 1/4-14X1/2" LONG
 THD. FORMING TYPE B
 SL. RD. HD.

05043-008 (4-REQ.)
 6-32X1/4" LONG
 SL. RD. HD. MACH. SCREW

05443-508 (1-REQ.)
 8-32X1/4" LONG
 PH. HEX HD. THD. FORMING SCREW
 FINISH CAD. PLATED TAPTITE

TUBE CONNECTORS (2 PER KIT)
 H-352 STRAIGHT CONNECTOR 3/8" I.D. TUBING
 H-353 STRAIGHT CONNECTOR 1/2" I.D. TUBING
 H-258 STRAIGHT CONNECTOR 1/8" FEMALE PIPE THD.
 H-259 STRAIGHT CONNECTOR 1/8" I.D. TUBING
 H-260 STRAIGHT CONNECTOR 1/4" I.D. TUBING
 H-261 ELBOW CONNECTOR 3/8" I.D. TUBING
 H-354 ELBOW CONNECTOR 1/2" I.D. TUBING

05083-010 (4-REQ.)
 8-32X5/16" LONG
 PH. RD. HD. MACH. SCREW w/EXT. TOOTH
 LOCKWASHER

FELT PAD-09582-001

CORD & PLUG-09406-000

STRAIN RELIEF-08193-000

08026-092
 5/8 O.D. X 1 1/64" I.D. X .045" THK.
 FLAT WASHER

ADJUSTING SCREW-12933-000

DRIVE BUSHING-12929-004

BUMPER-08492-000(4)

SWITCH-13024-005 IF USED

SHIELD 12947-002

TOLERANCE DISC-12930-002

CRANK ASS'Y-13714-000

SPECIAL HEX NUT 14309-002

INNER RACE-12932-006

ROD ASS'Y-12941-000

COUPLING NUT-12940-000

DUCK BILL EXTENSION FOR USE ON SUCTION SIDE

DUCKBILL VALVE KITS
 2-"O" RINGS -2-VALVES
 1-EXTENSION PER KIT.

H-319 VITON H-324 SILICONE
 H-320 NITRILE H-325 HYPALON
 H-321 HYDRIN H-327 BUTYL
 H-322 EPT H-355 KEL-F

TUBE CONNECTOR

ANTI-SYPHON SPRING H-346

"O" RING

POPPET

BELLOWS MODULE

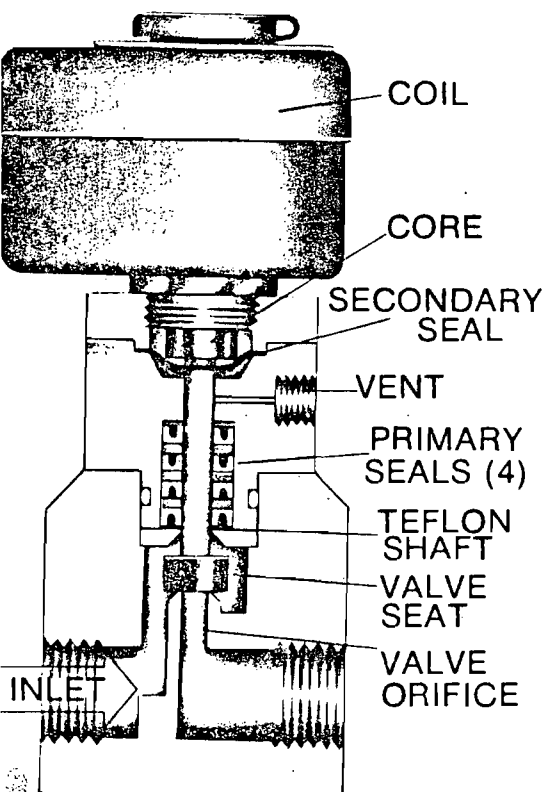
ANTI-SYPHON SPRING ASSY.

05618-006
 HEX NUT

WIRE CONN.-08049-000

STD. SINGLE 1 1/2" BELLOWS PUMP ASSEMBLY.

EASY VALVES



NORMALLY CLOSED IN-LINE PATTERN SOLENOID VALVES FEATURING THE FAIL-DRY® DESIGN AND BUBBLE-TIGHT SHUTOFF FOR HIGHLY CORROSIVE AND ULTRA-PURE LIQUIDS. POSITIVE VALVE CLOSURE IN THE EVENT OF ELECTRICAL FAILURE.

The Series "EASY" solenoid valves feature the FAIL-DRY® design with venting provided between a pair of seals (primary and secondary) which isolate the metal operating components from all process liquids even in the event of a primary seal failure. They are intended to operate under corrosive conditions which severely affect conventionally designed (packless) solenoid valves. Under normal conditions Series "EASY" valves should operate in excess of 1,000,000 cycles.

"EASY" solenoid valves are constructed of TYPE 1, GRADE 1, PVC (Polyvinyl Chloride), Polypropylene or Teflon. Standard seals are Buna-N or Viton. Other materials are available upon request. Screwed ends are standard. Series "EASY" valves are available with either general purpose or explosion-proof coil housings. See page 27 for coil and housing specifications.

The Series "EASY" valve illustrated at left is direct operating and normally closed by design. It will operate without assistance from line pressure or flow. Under the correct pressure conditions (see below chart) the coil, when energized creates an electro-magnetic field in the top section of the core tube. This force pulls the core and shaft upward, opening the valve orifice. When the coil is de-energized the valve spring pushes the core and shaft downward closing the valve orifice.

If the inlet pressure is in excess of the inlet pressure rating in the below chart the valve will not open when energized. CAUTION: If the valve remains energized under this condition the coil will burn out. It is also important that line back pressure, generally caused by flow restriction in the downstream piping, does not exceed the back pressure ratings in the below chart or the valve will not close. Series "EASY" valves can be used for pressure or vacuum service without any modifications.

Series "EASY" valves may be mounted in any position but preferably upright as illustrated. In the upright position particles will not settle against the U-cup seals. Do not install excessive fittings or restrictions downstream of the valves which cause back pressure in excess of that listed in the below chart. Throttling valves should be mounted upstream of the solenoid valve to eliminate back pressure problems. Other back pressure problems are caused by spray nozzles and gooseneck fittings.

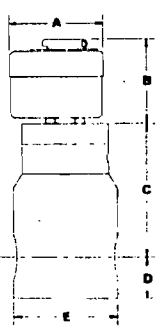
Series "EASY" valves are operated by 9 watt or 20 watt Class F high power continuous duty coils. These coils, manufactured in accordance with Underwriter's Laboratories insulation standards, can be energized continuously without danger of overheating or failure; however, they will reach very high temperatures. Available with either general purpose or explosion-proof housings with standard A.C. voltages of 24, 120, 240, or 480. Please consult page 27 of the catalog for detailed coil specifications.

Order by part number and specify materials of construction, exact chemicals, concentrations, temperatures, pressures and whether to be used on pressure or vacuum.

CHEMICAL FEED MODULE

SERIES "EASY" VALVES

PIPE SIZE (NPT)	ORIFICE DIAMETER INCHES	MAXIMUM PRESSURE RATINGS		MAXIMUM VACUUM RATINGS INCHES Hg	CV FACTOR	WATT RATING	SEAL MATERIAL	VALVE PART NUMBERS	
		INLET PRESSURE PSI	BACK PRESSURE PSI					GENERAL PURPOSE COIL ENCLOSURE	EXPLOSION-PROOF COIL ENCLOSURE
1/2"	3/32"	30	6	10"	1.10	9	BUNA-N	EASY1B8G9	EASY1B8E9
	3/32"	30	6	10"	1.10	9	VITON	EASY1VB8G9	EASY1VB8E9
	1/40"	30	30	30"	1.10	20	BUNA-N	EASY1B8G20	EASY1B8E20
	1/40"	30	30	30"	1.10	20	VITON	EASY1VB8G20	EASY1VB8E20
3/8"	3/32"	30	6	10"	1.10	9	BUNA-N	EASY2B8G9	EASY2B8E9
	3/32"	30	6	10"	1.10	9	VITON	EASY2VB8G9	EASY2VB8E9
	1/40"	30	30	30"	1.10	20	BUNA-N	EASY2B8G20	EASY2B8E20
	1/40"	30	30	30"	1.10	20	VITON	EASY2VB8G20	EASY2VB8E20
1/2"	3/32"	30	6	10"	1.10	9	BUNA-N	EASY3B8G9	EASY3B8E9
	3/32"	30	6	10"	1.10	9	VITON	EASY3VB8G9	EASY3VB8E9
	1/40"	30	30	30"	1.10	20	BUNA-N	EASY3B8G20	EASY3B8E20
	1/40"	30	30	30"	1.10	20	VITON	EASY3VB8G20	EASY3VB8E20
3/4"	3/32"	30	6	10"	1.10	9	BUNA-N	EASY4B8G9	EASY4B8E9
	3/32"	30	6	10"	1.10	9	VITON	EASY4VB8G9	EASY4VB8E9
	1/40"	30	30	30"	1.10	20	BUNA-N	EASY4B8G20	EASY4B8E20
	1/40"	30	30	30"	1.10	20	VITON	EASY4VB8G20	EASY4VB8E20



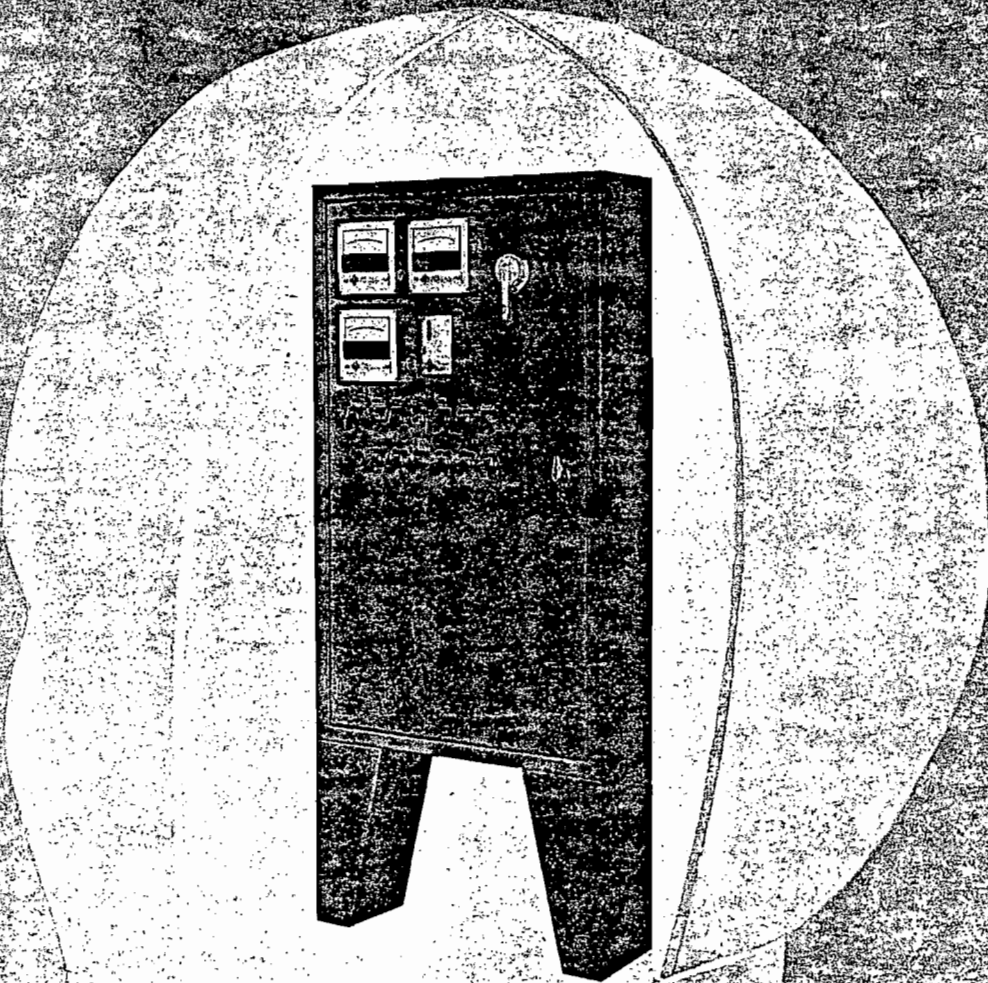
PIPE SIZE (NPT)	GENERAL PURPOSE	EXPLOSION-PROOF
"A"	9 WATT	20 WATT
"B"	9 WATT	20 WATT
"C"	9 WATT	20 WATT
"D"	9 WATT	20 WATT
"E"	9 WATT	20 WATT

PIPE SIZE (NPT)	1/2" NPT	3/4" NPT
"A"	2 1/8"	2 1/2"
"B"	2 1/4"	2 3/4"
"C"	2 1/4"	2 3/4"
"D"	2 1/4"	2 3/4"
"E"	2 1/4"	2 3/4"

PIPE SIZE (NPT)	1" NPT	1 1/2" NPT
"A"	2 1/2"	3"
"B"	2 1/2"	3"
"C"	2 1/2"	3"
"D"	2 1/2"	3"
"E"	2 1/2"	3"

PIPE SIZE (NPT)	2" NPT	3" NPT
"A"	3 1/2"	4 1/2"
"B"	3 1/2"	4 1/2"
"C"	3 1/2"	4 1/2"
"D"	3 1/2"	4 1/2"
"E"	3 1/2"	4 1/2"

PIPE SIZE (NPT)	4" NPT	6" NPT
"A"	5 1/2"	6 1/2"
"B"	5 1/2"	6 1/2"
"C"	5 1/2"	6 1/2"
"D"	5 1/2"	6 1/2"
"E"	5 1/2"	6 1/2"



E-CONTROLLER III economically functions as the heart and brain of a DMP Waste Treatment System.

E-CONTROLLER III is built to the specific needs of the customer. This totally centralized controller incorporates all motor starters, transformers, level controls, instruments, and recorders necessary to automatically operate a Waste Treatment System.

E-CONTROLLER III collects and integrates data on effluent condition, required reactions, and monitors output.

E-CONTROLLER III does not compromise quality for economy. The best in instrumentation and components are used. All are chosen for reliability and availability.

As with all DMP instrument and control centers E-CONTROLLER III is supplied with a complete wiring schematic to facilitate troubleshooting. All contacts and components are properly labeled and the wires visibly numbered.

**Ask your DMP
representative to
introduce you
to the Brains of
our family
of systems.**



**DMP
CORPORATION**

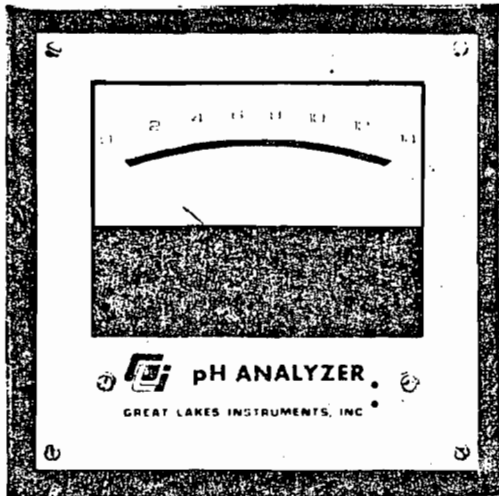
4049 Point Clear Drive
Fort Mill, S.C. 29715
Phone: 1-803-548-0853



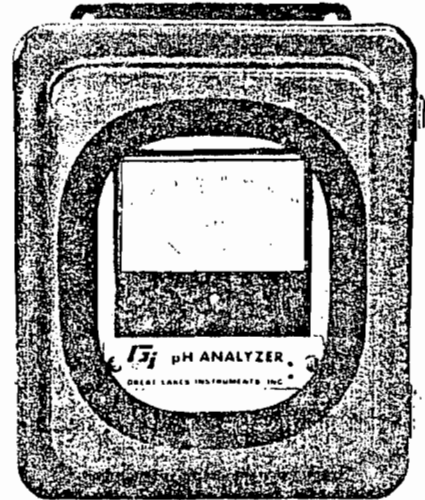
GREAT LAKES INSTRUMENTS, INC.

MODEL 70 pH and ORP ANALYZERS

A70 and A71



A72

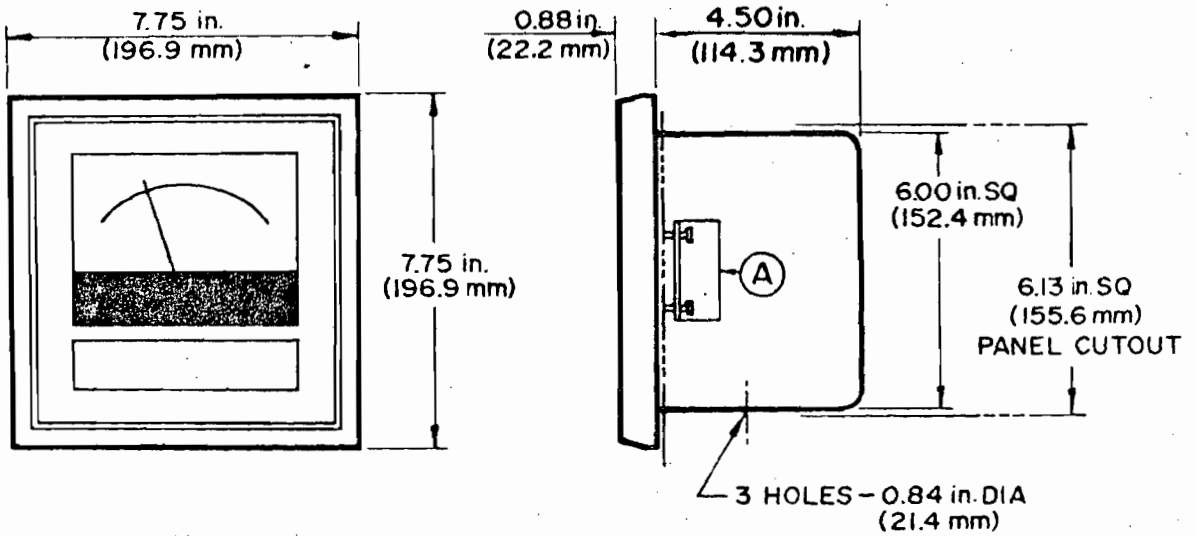


The GLI Model 70 series of pH and ORP indicating transmitters and relay controllers provide many functions found in more expensive analyzers:

1. Designed for operation with GLI's patented differential electrode probes.
2. Automatic temperature compensation.
3. Two-point buffer calibration.
4. 4-1/2 inch mirrored scale.
5. 100 percent solid state circuitry.
6. Panel mount case or optional fiberglass surface mount.
7. Controls mounted behind a coverplate are screwdriver adjustable to discourage tampering.
8. Variety of 5-ampere relay configurations available for ON/OFF control or alarm. LED's indicate when relays are energized.
9. Standard 0-5 VDC/0-1 ma non-isolated analog output. When connected to a voltage recorder the output is 0-5 VDC. When connected to a current recorder the output is 0-1 ma.
10. Optional, non-isolated or isolated analog current outputs (1-5 ma, 4-20 ma, 10-50 ma and 0-20 ma). True current output, no load resistor required.
11. Analog current option includes range expansion so that a subinterval of full scale may be expanded to the full current output. For example, on a 2-12 pH scale, the subinterval 5-10 pH may be expanded so that the analog current output is 4-20 ma over the range of 5-10.

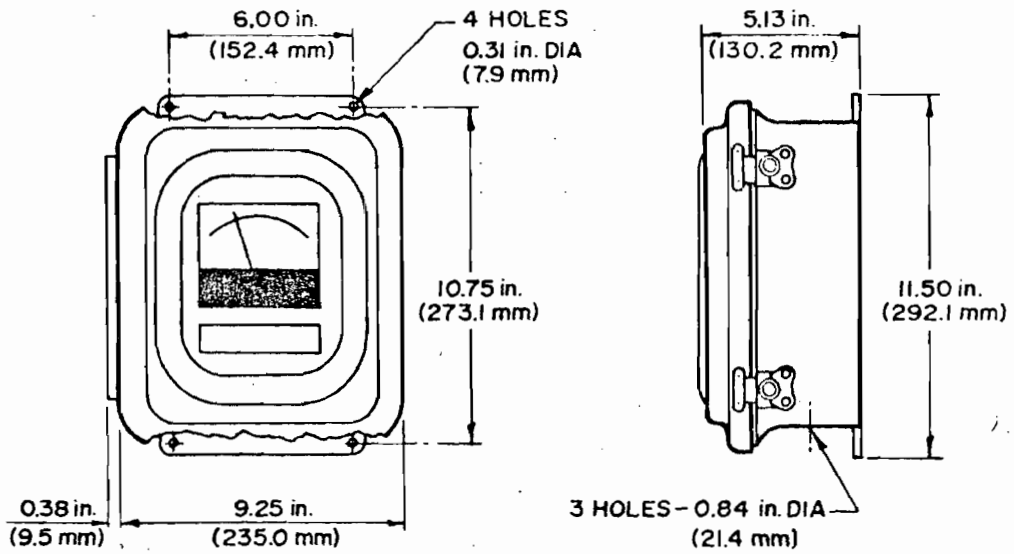
DIMENSIONS AND MOUNTING

A70 and A71 - Panel Mount NEMA 2 and NEMA 12

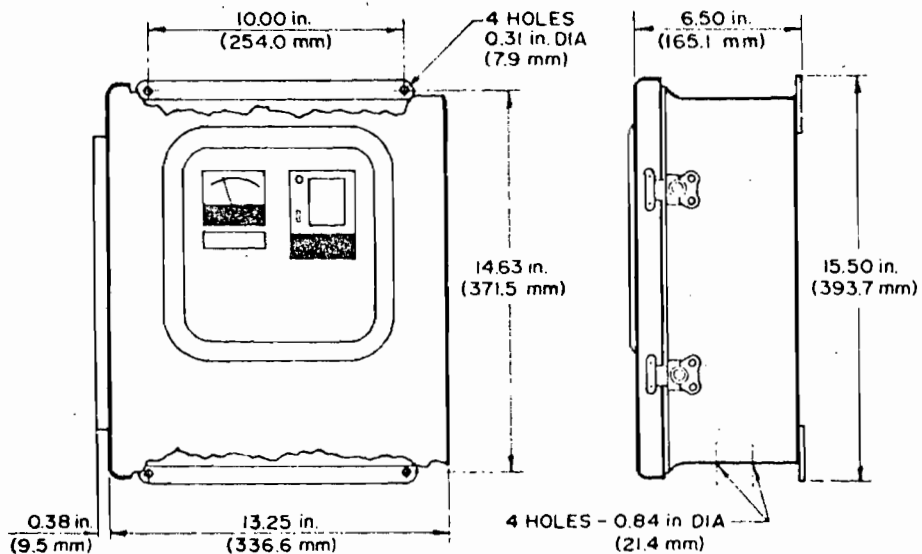


Compression brackets (A) included

A72 - Surface Mount NEMA 4 (No recorder)



A73 - Surface Mount NEMA 4 (Recorder included)



A70 SPECIFICATIONSMETER

4-1/2" mirrored scale (eliminates parallax)

RESPONSE TIME

1 second for 99% response

ANALOG OUTPUTS

One voltage/current signal (standard)

0-1 ma, 100 ohms maximum

0-5 VDC, 50,000 ohms minimum

Not isolated

Optional current signals available,
specify isolated or non-isolated

1-5 ma, 2500 ohms maximum

4-20 ma, 625 ohms maximum

10-50 ma, 250 ohms maximum

0-20 ma, 625 ohms maximum

True current source - no load resistor
needed

Output expansion

The current signal may be expanded up
to 50% of full scale, anywhere in the
full scale range

TEMPERATURE COMPENSATION

Automatic 0°C to 65°C (epoxy cells)

Automatic 0°C to 95°C (Derakane cells)

AMBIENT CONDITIONS

-30°C (-22°F) to +50°C (122°F)

0-100% relative humidity

CELL TO ANALYZER DISTANCE

Up to 3000 feet

CONTROL CONTACTS

28 VDC, 5 amps resistive

115 VAC, 5 amps resistive

Continuously adjustable setpoint

controls, 0 to 100% of full scale

Continuously adjustable deadband

controls, 0 to 15% of full scale

Light emitting diodes indicate that
relays are energized

ELECTRICAL POWER

80 to 130 VAC, 50/60 Hz, less than
10 VA

Connections made to terminal strips

CLASSIFICATIONS

Electrical - General Purpose

Enclosure - NEMA 2, NEMA 12 and
NEMA 4 optional

CASE MATERIALS

Anodized aluminum and cast epoxy
(NEMA 2 and 12)

Fiberglass and stainless steel
(NEMA 4)

CASE MOUNTING

See Page 4

WEIGHT

A70 and A71:

3.8 pounds (1.7 Kgms)

A72:

7.3 pounds (3.3 Kgms)

A73:

15.5 pounds (7.0 Kgms)

STANDARD METER AND RECORDER SCALES

pH: 0-14, 2-12, 4-10, 4-14 and 0-10

ORP: 0-500 and 0-1000

Consult factory for special scales

PRODUCT DESIGNATIONS — MODEL 70 pH and ORP ANALYZERS

The model number is of the form A70-W-X-Y-Z, where W, X, Y and Z are selected from the tables below. NEMA 2 general purpose enclosure is standard.

Optional Enclosures (substitute model number shown for A70)

Model A71: NEMA 12 panel mount - dust tight and drip proof

Model A72: NEMA 4 fiberglass surface mount - weatherproof

Model A73: NEMA 4 fiberglass surface mount - weatherproof (includes recorder)

Suffix W Analyzer Type

1	pH
2	ORP

Suffix X Display

1	Standard 4-1/2" meter. Specify scale from page 2.
3	Strip chart recorder for adjacent mounting. Operates on Suffix Y=0.

Note: Model A73 includes a strip chart recorder. This recorder operates on the 0-1 ma output (Y=0) so this output is not available for external use.

Suffix Y Non-Isolated Current Output with Range Expand

0	0-5 VDC or 0-1 ma analog output is standard.
1	1-5 ma
2	4-20 ma
3	10-50 ma
4	0-20 ma
<u>Isolated Current Output (Range Expand is not Included)</u>	
5	1-5 ma
6	4-20 ma
7	10-50 ma
8	0-20 ma

- Notes: A. The range expand feature is not included on the analog output when the relay configuration is Suffix Z=6 or 7.
- B. Analog outputs (Suffix Y=1, 2, 3, 4, 5, 6, 7 or 8) are not available when the four setpoint controller is ordered (Suffix Z=8).
- C. Relays are not available (Suffix Z must be 0) when an isolated analog output (Suffix Y=5, 6, 7 or 8) is ordered.

Suffix Z Control Contacts

0	None
1	One High Limit
2	One Low Limit
3	One High, One Low
4	Two High Limits
5	Two Low Limits
6	High Control Point (adjustable deadband) and Dual Alarms (fixed deadband)
7	Low Control Point (adjustable deadband) and Dual Alarms (fixed deadband)

Note: Option 6 & 7 - Analyzer has two five-amp relays; one setpoint relay and one relay to alarm either side of setpoint.

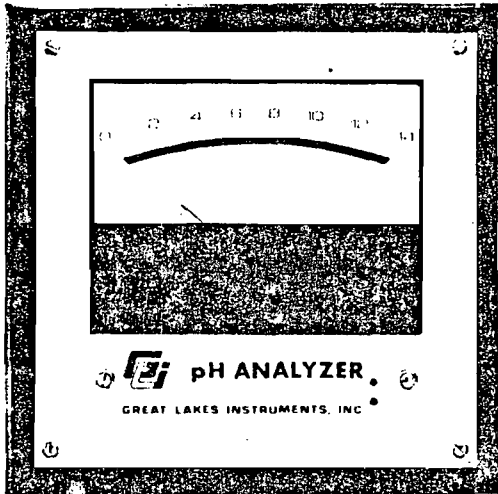
8	Four adjustable setpoints (relays not included) - One high and one low with adjustable deadband; one high and one low with fixed deadband. Outputs energize 24 VDC relay coils.
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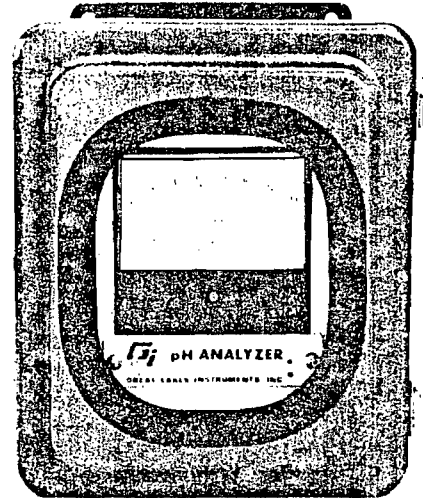
GREAT LAKES INSTRUMENTS, INC.

MODEL 70 pH and ORP ANALYZERS

A70 and A71



A72

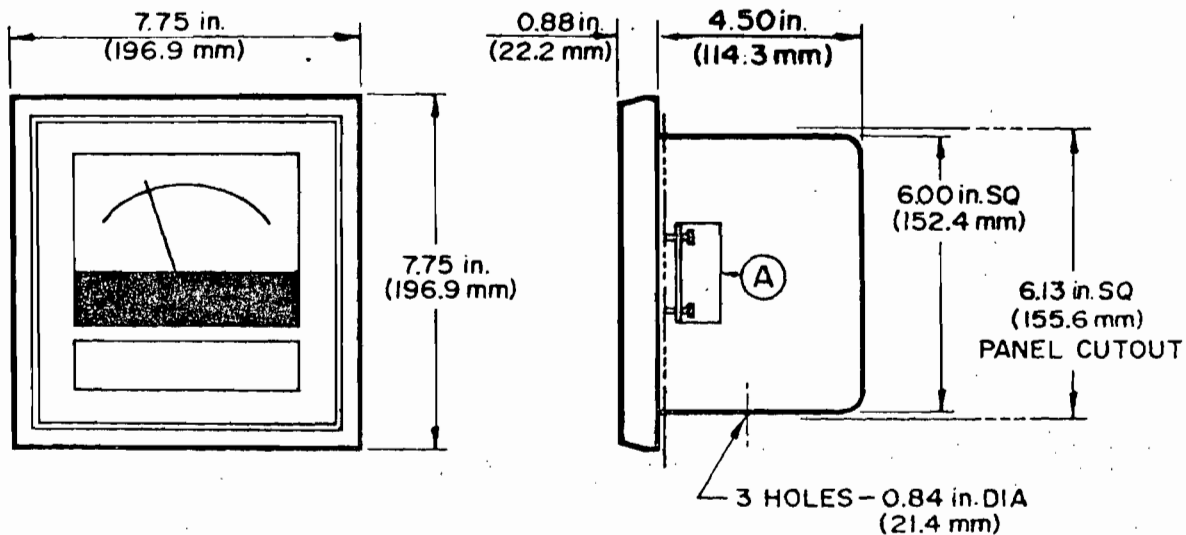


The GLI Model 70 series of pH and ORP indicating transmitters and relay controllers provide many functions found in more expensive analyzers:

1. Designed for operation with GLI's patented differential electrode probes.
2. Automatic temperature compensation.
3. Two-point buffer calibration.
4. 4-1/2 inch mirrored scale.
5. 100 percent solid state circuitry.
6. Panel mount case or optional fiberglass surface mount.
7. Controls mounted behind a coverplate are screwdriver adjustable to discourage tampering.
8. Variety of 5-ampere relay configurations available for ON/OFF control or alarm. LED's indicate when relays are energized.
9. Standard 0-5 VDC/0-1 ma non-isolated analog output. When connected to a voltage recorder the output is 0-5 VDC. When connected to a current recorder the output is 0-1 ma.
10. Optional, non-isolated or isolated analog current outputs (1-5 ma, 4-20 ma, 10-50 ma and 0-20 ma). True current output, no load resistor required.
11. Analog current option includes range expansion so that a subinterval of full scale may be expanded to the full current output. For example, on a 2-12 pH scale, the subinterval 5-10 pH may be expanded so that the analog current output is 4-20 ma over the range of 5-10.

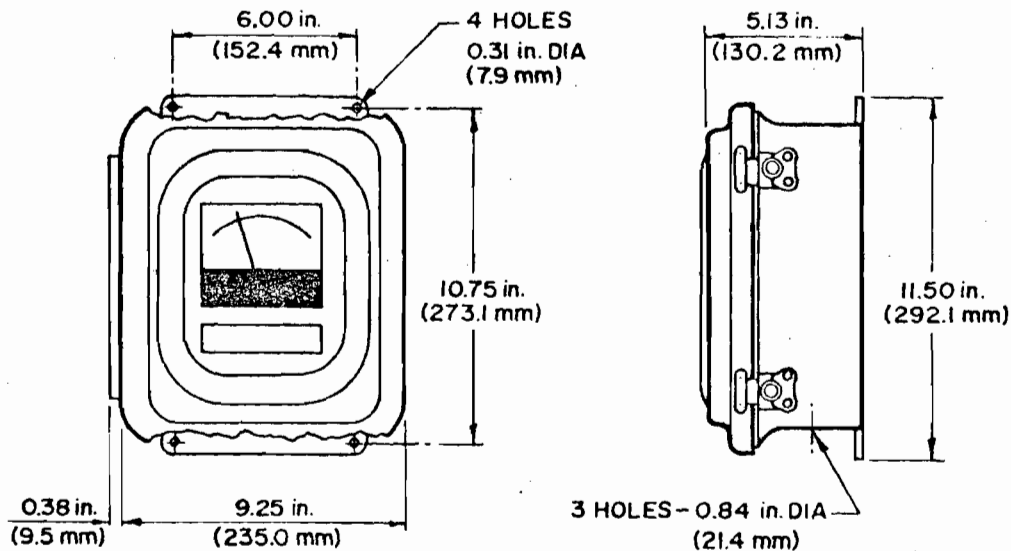
DIMENSIONS AND MOUNTING

A70 and A71 - Panel Mount NEMA 2 and NEMA 12

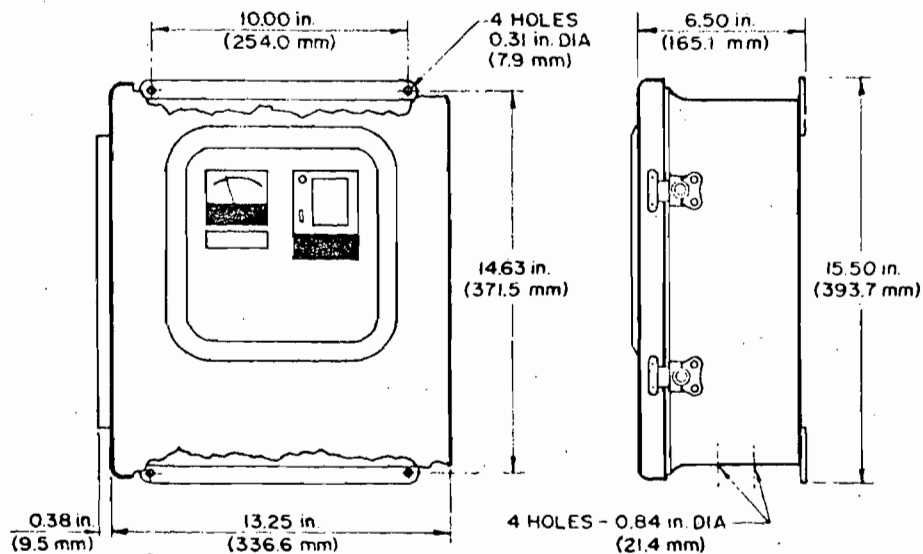


Compression brackets (A) included

A72 - Surface Mount NEMA 4 (No recorder)



A73 - Surface Mount NEMA 4 (Recorder included)



Best Available Copy

S70A

A70 SPECIFICATIONS

METER

4-1/2" mirrored scale (eliminates parallax)

RESPONSE TIME

1 second for 99% response

ANALOG OUTPUTS

One voltage/current signal (standard)

0-1 ma, 100 ohms maximum

0-5 VDC, 50,000 ohms minimum

Not isolated

Optional current signals available,
specify isolated or non-isolated

1-5 ma, 2500 ohms maximum

4-20 ma, 625 ohms maximum

10-50 ma, 250 ohms maximum

0-20 ma, 625 ohms maximum

True current source - no load resistor
needed

Output expansion

The current signal may be expanded up
to 50% of full scale, anywhere in the
full scale range

TEMPERATURE COMPENSATION

Automatic 0°C to 65°C (epoxy cells)

Automatic 0°C to 95°C (Derakane cells)

AMBIENT CONDITIONS

-30°C (-22°F) to +50°C (122°F)

0-100% relative humidity

CELL TO ANALYZER DISTANCE

Up to 3000 feet

CONTROL CONTACTS

28 VDC, 5 amps resistive

115 VAC, 5 amps resistive

Continuously adjustable setpoint
controls, 0 to 100% of full scale

Continuously adjustable deadband
controls, 0 to 15% of full scale

Light emitting diodes indicate that
relays are energized

ELECTRICAL POWER

80 to 130 VAC, 50/60 Hz, less than
10 VA

Connections made to terminal strips.

CLASSIFICATIONS

Electrical - General Purpose

Enclosure - NEMA 2, NEMA 12 and
NEMA 4 optional

CASE MATERIALS

Anodized aluminum and cast epoxy
(NEMA 2 and 12)

Fiberglass and stainless steel
(NEMA 4)

CASE MOUNTING

See Page 4

WEIGHT

A70 and A71:

3.8 pounds (1.7 Kgms)

A72:

7.3 pounds (3.3 Kgms)

A73:

15.5 pounds (7.0 Kgms)

STANDARD METER AND RECORDER SCALES

pH: 0-14, 2-12, 4-10, 4-14 and 0-10

ORP: 0-500 and 0-1000

Consult factory for special scales

PRODUCT DESIGNATIONS — MODEL 70 pH and ORP ANALYZERS

The model number is of the form A70-W-X-Y-Z, where W, X, Y and Z are selected from the tables below. NEMA 2 general purpose enclosure is standard.

Optional Enclosures (substitute model number shown for A70)

Model A71: NEMA 12 panel mount - dust tight and drip proof

Model A72: NEMA 4 fiberglass surface mount - weatherproof

Model A73: NEMA 4 fiberglass surface mount - weatherproof (includes recorder)

Suffix W Analyzer Type

1	pH
2	ORP

Suffix X Display

1	Standard 4-1/2" meter. Specify scale from page 2.
3	Strip chart recorder for adjacent mounting. Operates on Suffix Y=0. Note: Model A73 includes a strip chart recorder. This recorder operates on the 0-1 ma output (Y=0) so this output is not available for external use.

Suffix Y Non-Isolated Current Output with Range Expand

0	0-5 VDC or 0-1 ma analog output is standard.
1	1-5 ma
2	4-20 ma
3	10-50 ma
4	0-20 ma
<u>Isolated Current Output (Range Expand is not Included)</u>	
5	1-5 ma
6	4-20 ma
7	10-50 ma
8	0-20 ma

- Notes: A. The range expand feature is not included on the analog output when the relay configuration is Suffix Z=6 or 7.
- B. Analog outputs (Suffix Y=1, 2, 3, 4, 5, 6, 7 or 8) are not available when the four setpoint controller is ordered (Suffix Z=8).
- C. Relays are not available (Suffix Z must be 0) when an isolated analog output (Suffix Y=5, 6, 7 or 8) is ordered.

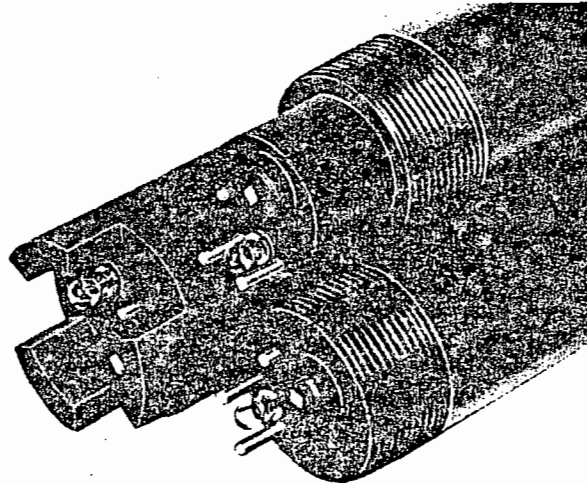
Suffix Z Control Contacts

0	None
1	One High Limit
2	One Low Limit
3	One High, One Low
4	Two High Limits
5	Two Low Limits
6	High Control Point (adjustable deadband) and Dual Alarms (fixed deadband)
7	Low Control Point (adjustable deadband) and Dual Alarms (fixed deadband)
Note:	Option 6 & 7 - Analyzer has two five-amp relays; one setpoint relay and one relay to alarm either side of setpoint.
8	Four adjustable setpoints (relays not included) - One high and one low with adjustable deadband; one high and one low with fixed deadband. Outputs energize 24 VDC relay coils.



GREAT LAKES INSTRUMENTS, INC.

MODEL 60 PROBE ASSEMBLY



The GLI Model 60 Probe incorporates more outstanding features than any other commercially available pH sensor. The major features are:

1. The GLI Standard Electrode is used instead of a reference electrode. This means that no filling solutions, crystals, reservoirs or pressurization schemes are needed for this probe.
2. The GLI Differential Electrode Technique* eliminates noisy signals while maintaining fast response time. The output signals from the probe electronics are strong enough to be sent over 3000 feet of inexpensive cable without degradation.
3. Small size and light weight simplify mounting, handling and calibration.
4. Complete encapsulation eliminates problems due to leaking or high humidity.
5. Temperature compensation is internal and automatic.
6. Intrinsically safe systems are available by coupling the Model 60 probe to the appropriate analyzer in the Model 60 series.



The net result is a compact, rugged probe that provides exceptional performance and reliability even in tough industrial applications. The only service required is periodic cleaning and system recalibration.

The Model 60 Probe can be used with the Model 60 and Model 70 Analyzers. Combined with a GLI Interface Module, the Model 60 Probe can be used with most other manufacturers analyzers or recorder/controllers.

*U.S. Patents 3,709,796 and 3,862,895

SPECIFICATIONS

pH RANGE

Range
-14 pH
Refer to note

Stability
.03 pH units per
day, non-cumulative

Sensitivity
.001 pH unit

Output Impedance
ohm

Pressure Rating
100 psi

Temperature Limits
Derakane: -5 to +95°C
Epoxy: -5 to +65°C

Maximum Flow Rate
10 feet per second (see Note)

Wetted Materials
Standard: Epoxy, ceramic,
glass, titanium palladium
alloy
Optional: Derakane in lieu
of epoxy

Interconnect Cable
Belden 8786

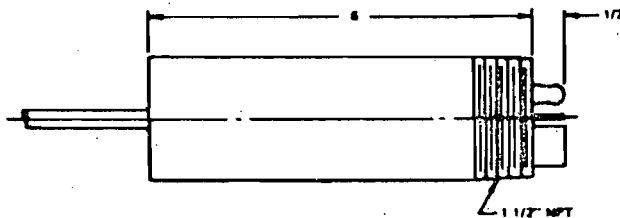
Most pH applications fall in the range of 2 to 12 pH. General purpose pH glass electrodes perform well in this range. A small percentage of industrial applications require accurate measurements and control at pH values below 2 or above 12. Such applications should be discussed with the GLI sales representative or the factory.

FLOW RATE

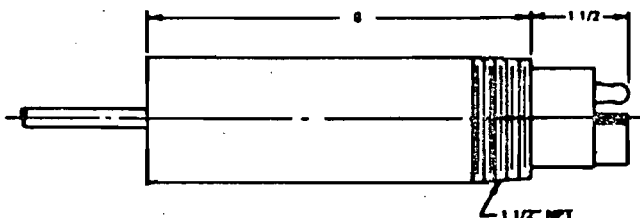
The flow should be as low as possible in low conductivity water and in solutions with high suspended solids.

DIMENSIONS

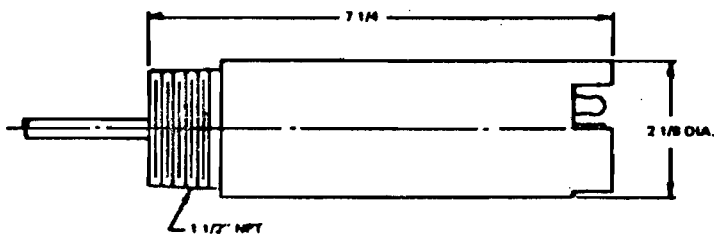
FLOW THRU
P60L - 2 - 1
(STAINLESS TEE)



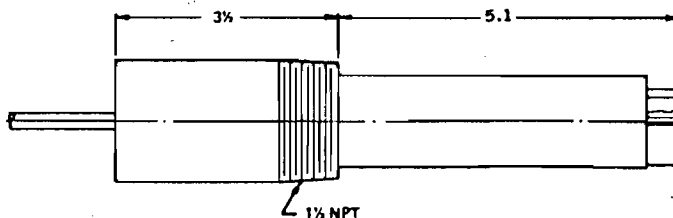
FLOW THRU
P60L - 3 - 1
(PVC TEE)



TANK MOUNT
P60L - 4 - 1



FLOW THRU
P60L - 5 - 1
(UNION)



Caution: Mount these probes vertically (electrodes down) or no more than 75° from the vertical. Other mountings may cause erratic readings.

Note: Antimony electrodes are available. Consult factory. For other probe configurations and mounting hardware see Specification Sheet S60PMH.



GREAT LAKES INSTRUMENTS, INC.

MODEL 60 ORP PROBE

The degree of completion of some chemical reactions depends on the oxidation reduction activity present during the reactions.

The oxidation reduction activity can be measured with a GLI R60 patented* Differential Electrode Technique ORP (oxidation reduction potential or Redox) system. This system is very similar to the P60 pH system except that the pH sensitive glass electrode is replaced by a platinum (or gold) electrode. This electrode senses ORP. Just as pH is related to the logarithm of the hydrogen ion activity, ORP is related to the logarithm of the ratio of oxidation activity to reduction activity. Thus, a solution containing a strong oxidizing agent has a positive ORP. A solution which is neither oxidizing nor reducing has an ORP of zero and a solution containing a strong reducing agent has a negative ORP.

The monitoring of ORP is of great importance in industrial waste disposal because it permits safer, more economical and efficient disposal of wastes.

Typical application of ORP control systems are treatment of chromate waste baths in the metal plating industry and treatment of cyanide wastes produced by metal plating, metal treating, chemical and other plants.

SPECIFICATIONS

Measuring Range :	±2000 mv
Accuracy:	3 mv
Stability:	0.5 mv per 24-hour period, non-cumulative
Temperature:	-5 to 95°C Derakane material of construction -5 to 65°C Epoxy material of construction
Pressure Rating:	To 100 psi
Wetted Materials:	Epoxy, Ceramic, Titanium Palladium, Glass, Platinum (or Gold) Optional Derakane in lieu of epoxy
Interconnect Cable:	Belden 8786

*U.S. Patents 3,709,796 and 3,662,895

ORP PROBE MODEL NUMBERS

The model number is of the form R60L-X-1 for the platinum active electrode and RG60L-X-1 for the gold active electrode.

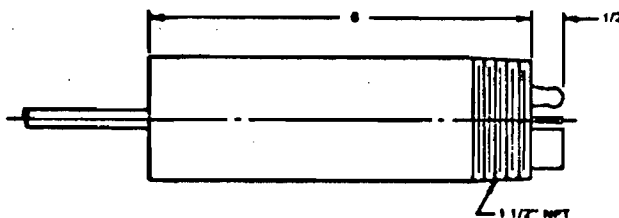
If Derakane vinyl ester is selected as the material of construction, substitute "D" for "L" in the model number.

The suffix X indicates the probe configuration:

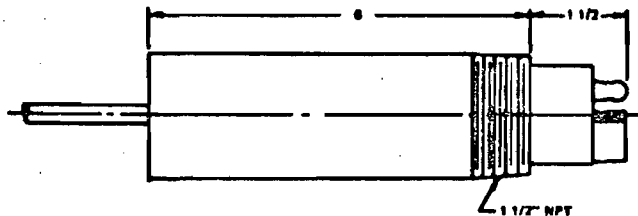
- 2 flow-thru for mounting in 1-1/2" steel tee
- 3 flow-thru for mounting in 1-1/2" PVC tee
- 4 submersion mounting
- 5 flow-thru for mounting in 1-1/2" PVC union fitting

DIMENSIONS*** The model numbers listed below are for epoxy probes with platinum active electrodes.

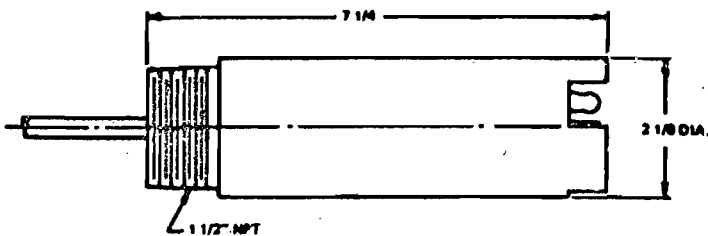
FLOW THRU
R60L - 2 - 1
(STAINLESS TEE)



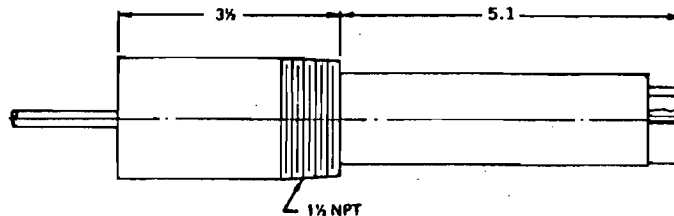
FLOW THRU
R60L - 3 - 1
(PVC TEE)



TANK MOUNT
R60L - 4 - 1



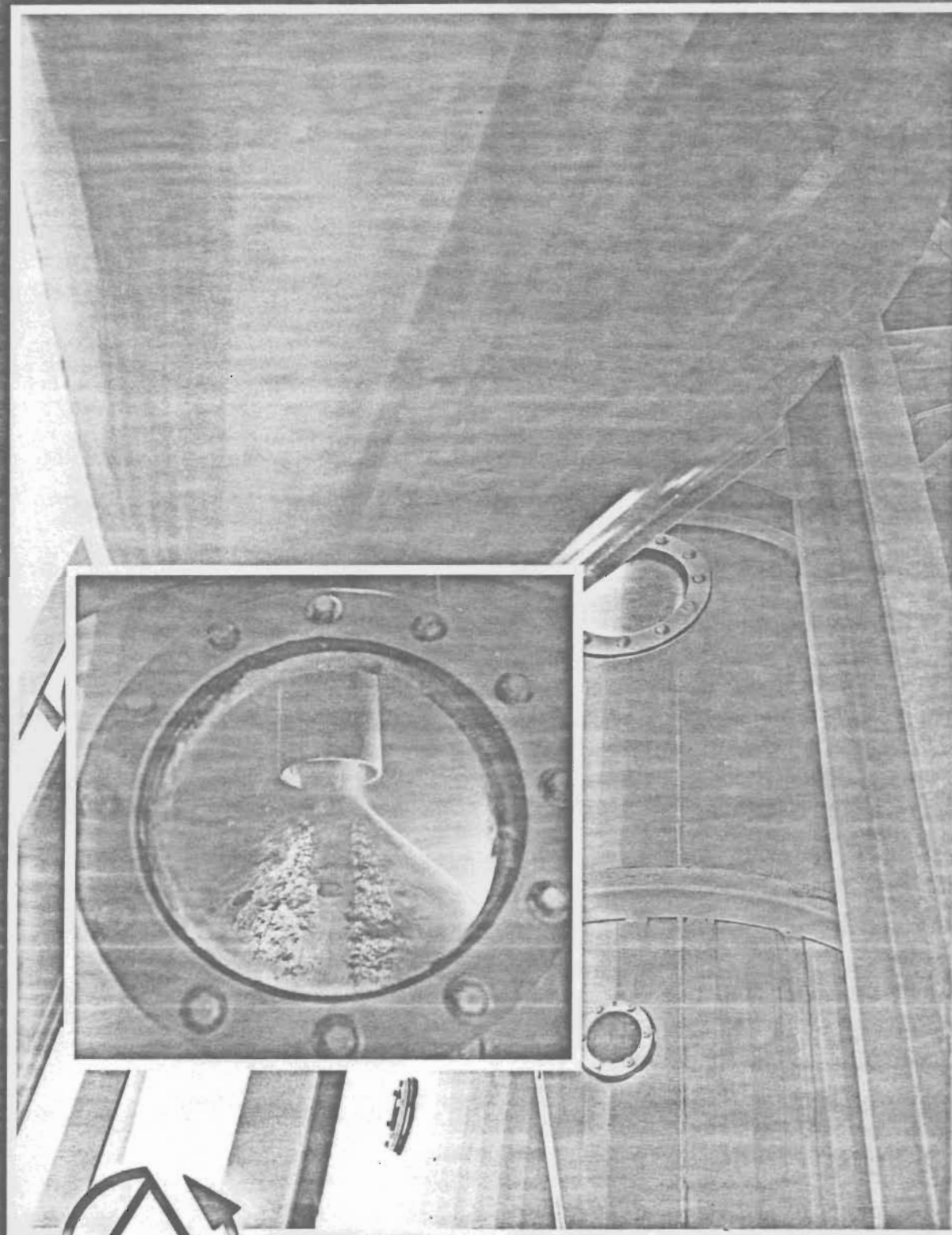
FLOW THRU
R60L - 5 - 1
(UNION)



Caution: Mount these probes vertically (electrodes down) or no more than 75° from the vertical. Other mountings may cause erratic readings.

***For other probe configurations and mounting hardware see GLI data sheet S60PMH.

Parkson



DynaSand™ Filter

A NEW Concept in Sand Filtration

Continuous Sand Filtration

INTRODUCTION

The DynaSand™ Filter is a unique sand filtration system that does not depend on batch backwashing to clean the filter. The sand bed is continuously cleaned and regenerated by recycling internally through an air lift pipe and a sand washer. This means that the filter does not shut down to backwash. This continuous action results in a relatively constant and low pressure drop in the filter. At the same time, some solids are continuously maintained in the sand bed for maximum filtrate quality.

Not only are backwashing tanks and complex sequencing controls deleted, but this excellent performance is obtained with simplicity and no moving parts.

Several advantages result from this unusual cleaning method. Considerably higher than normal solids can be accepted by the DynaSand Filter. Most clarifier upsets can be easily handled. Chemical costs are reduced. Continuous chlorination required with shallow depth filters is eliminated in biological applications. Also, significant power savings result.

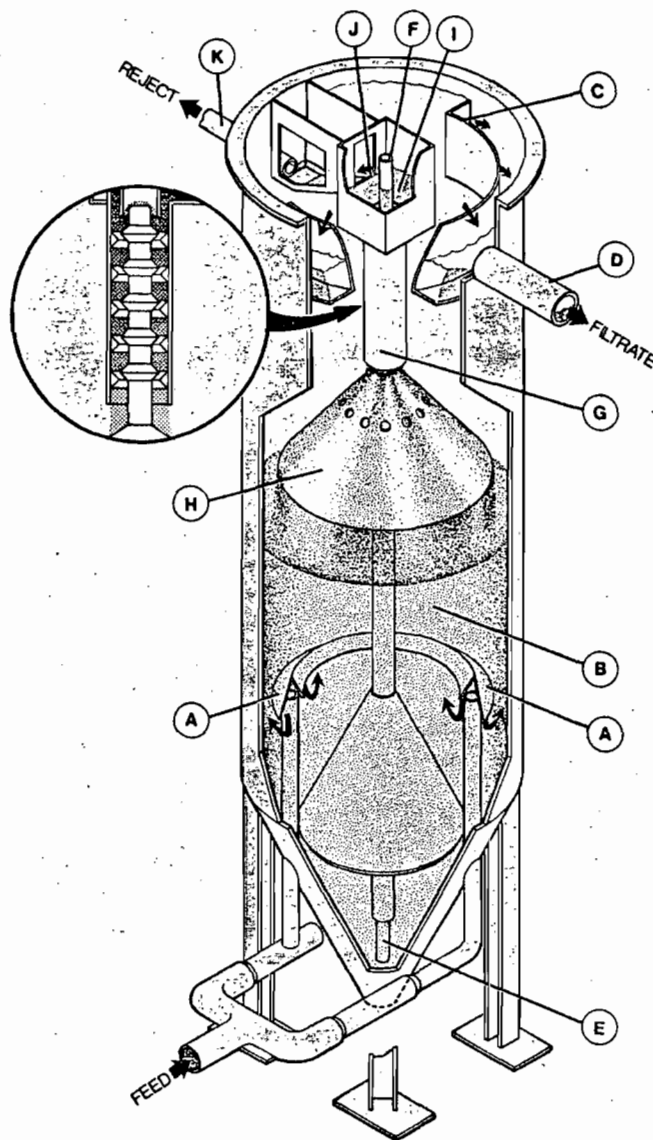
OPERATION

Dirty water is fed to the bottom of the unit and is introduced to the sand bed by a distributor ring (A). Water flows upward through the sand bed (B) which is moving downward. The clear filtrate exits from the sand bed, overflows a weir (C), and is discharged from the unit (D).

Accumulated solids, sand, and water flow into the suction intake of an air lift pipe (E). Air is injected into the bottom of the air lift. A turbulent flow of air, water, and sand loosens the impurities as it moves up to the top of the air lift (F). Sand overflows at the top and additional washing takes place as the sand falls through a washer (G) where final traces of the impurities are removed. Cleaned sand is returned to the top of the sand bed by means of a cone shaped distributor (H).

The impurities removed from the sand are collected in a central compartment (I), overflow an adjustable weir (J), and are discharged from the unit (K). Because of the head difference between the filtrate water level and the reject water level, a small amount of filtrate will flow up through the washer into the reject water flume. This prevents any solids but the sand from being discharged into the filtrate compartment.

Only two parameters are required to control the mode of operation of the filter. One is the air flow rate, which determines the sand recirculation rate; the other is the reject weir setting which determines the reject flow rate.

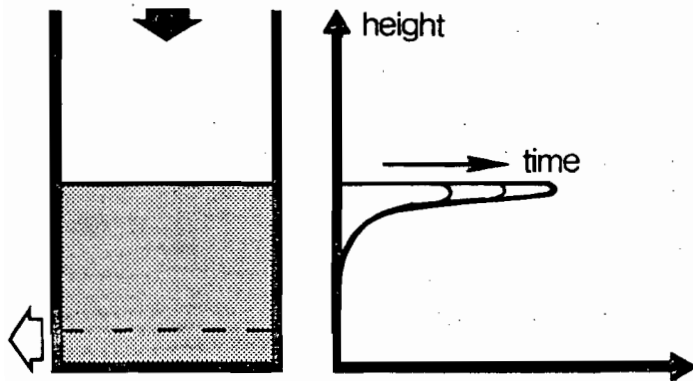


and Filtration...

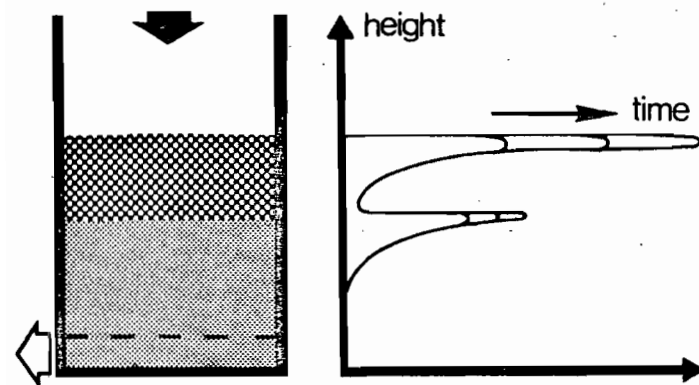


DynaSand™
Filter

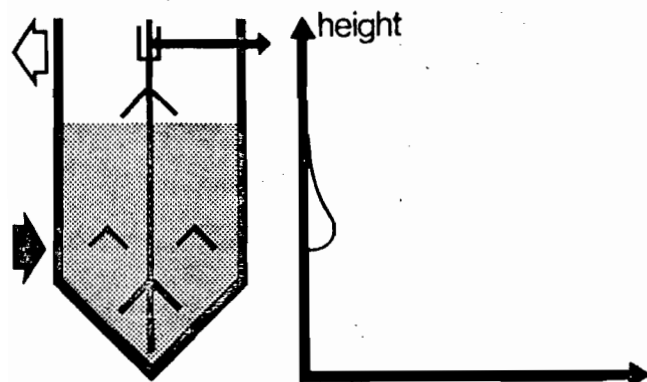
CONVENTIONAL SAND FILTER



MULTIPLE-MEDIA FILTER



THE DynaSand FILTER



HIGH SOLIDS CAPACITY

The figures at left illustrate where and how badly conventional filters tend to clog. When feed solids levels are high, backwashing becomes too frequent to be practical. Often a clarifier is installed up stream of the backwashing types of filters to reduce solids levels in the feed to the filters.

In the DynaSand Filter, the dirtiest sand is just above the feed inlet distributor ring and is constantly moving downward, while clean sand is being recycled to the top of the sand bed (thus avoiding clogging). All the impurities are evenly distributed in the sand bed before moving into the air lift inlet. Consequently, the DynaSand Filter can filter liquids containing 300-800 ppm suspended solids (depending on the application), up to ten times as high as conventional filters can handle.

As a result, clarifiers can be eliminated from certain flowsheets and coagulant/flocculant dosages can be reduced, as no settleable flocs have to be produced. Filtration becomes more efficient since fragile flocs are not destroyed, due to gentle flow as a result of low and even pressure drop.

Most important of all, because of the high solids capacity of the DynaSand Filter, upstream upsets can be taken with no shut down and high quality filtrate still maintained. Conventional filters would shut down the whole system or would have to be bypassed.

SIMPLICITY AND LOW PRESSURE DROP MEAN LOW COST OPERATION

The remarkable simplicity of the DynaSand Filter cannot be over emphasized. This, coupled with low pressure drop, results in lower energy and operating costs.

After setting air and reject rates, the filter will operate day after day without operator attention. Since there are no moving parts, no mechanical breakdowns will occur. The air lift device is a simple pipe where air is injected into the bottom to raise the sand to the static sand washer.

The sand is subject to a very effective scouring action in the air lift as well as the washer. No gradual build-up occurs on the sand grains, and mudballs are eliminated.

Pressure drop is kept at a low or moderate level (1 to 2 ft.). This not only prevents destruction of floc but also results in energy savings from reduced pumping pressure and elimination of high volume backwash pumping.

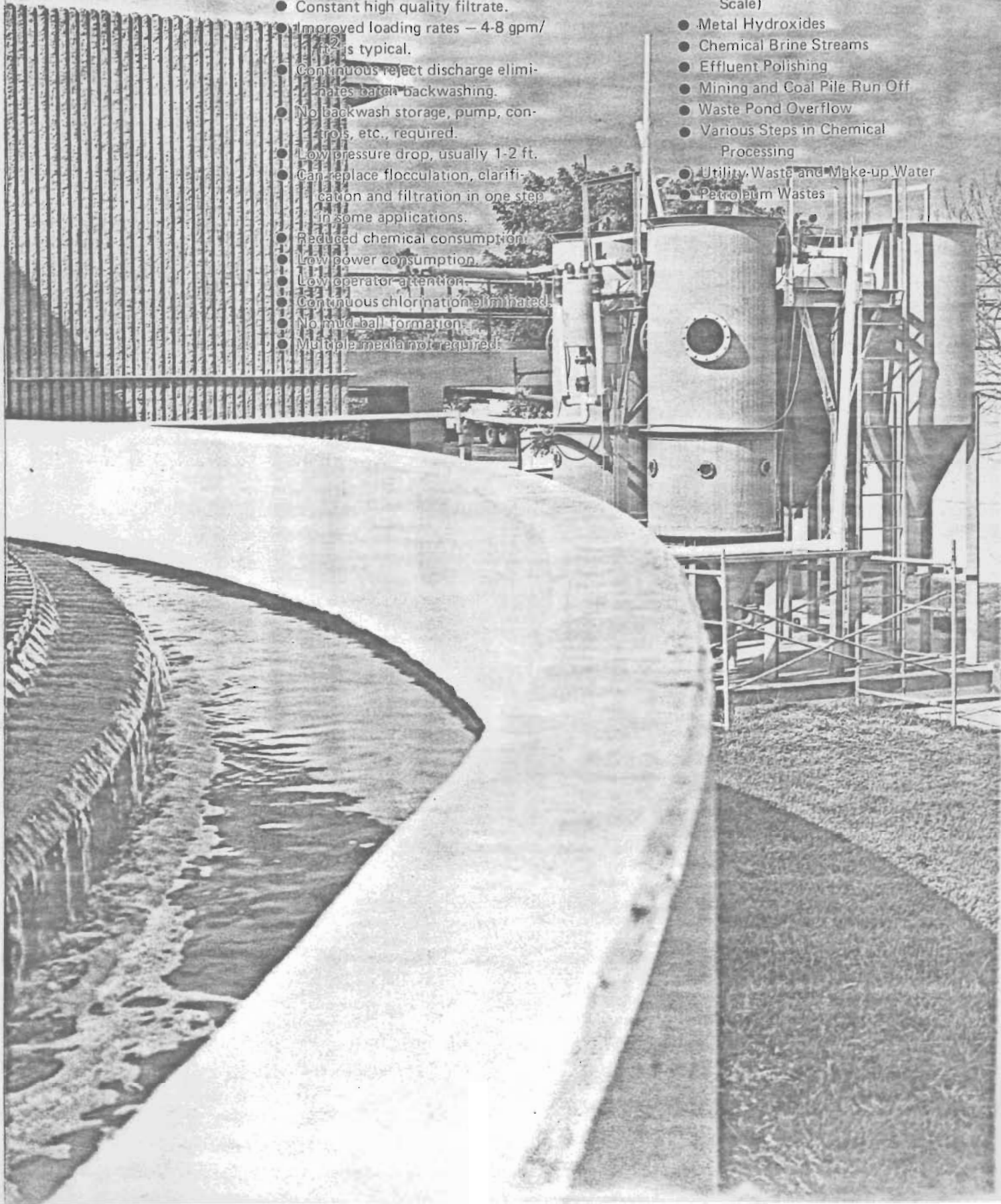
All these factors add up to a unit that can be kept on line continuously, take most upsets with no problem and eliminate all the equipment associated with complex backwashing requirements. This constitutes the simple and energy-efficient DynaSand Filter.

ADVANTAGES

- Higher feed solids capacity (above 500 ppm suspended solids for some applications).
- Continuous operation.
- No moving parts.
- Constant high quality filtrate.
- Improved loading rates — 4-8 gpm/ft² is typical.
- Continuous reject discharge eliminates batch backwashing.
- No backwash storage, pump, controls, etc., required.
- Low pressure drop, usually 1-2 ft.
- Can replace flocculation, clarification and filtration in one step in some applications.
- Reduced chemical consumption.
- Low power consumption.
- Low operator attention.
- Continuous chlorination eliminated.
- No mud ball formation.
- Multiple media not required.

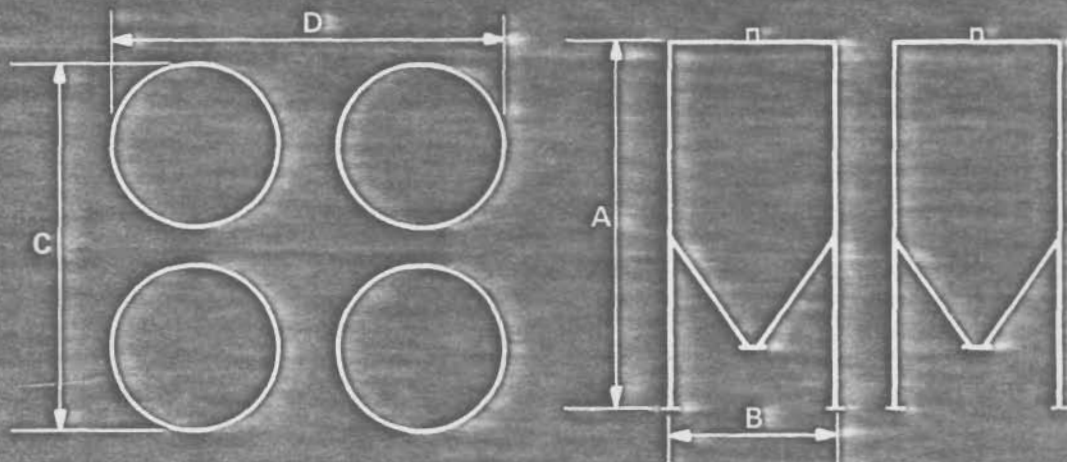
APPLICATIONS

- Municipal WWTP Tertiary Filtration/P Removal
- Potable Industrial Water Production, Especially Direct Filtration.
- Steel Mill Waste (Such as Mill Scale)
- Metal Hydroxides
- Chemical Brine Streams
- Effluent Polishing
- Mining and Coal Pile Run Off
- Waste Pond Overflow
- Various Steps in Chemical Processing
- Utility Waste and Make-up Water
- Petroleum Wastes



DIMENSIONS

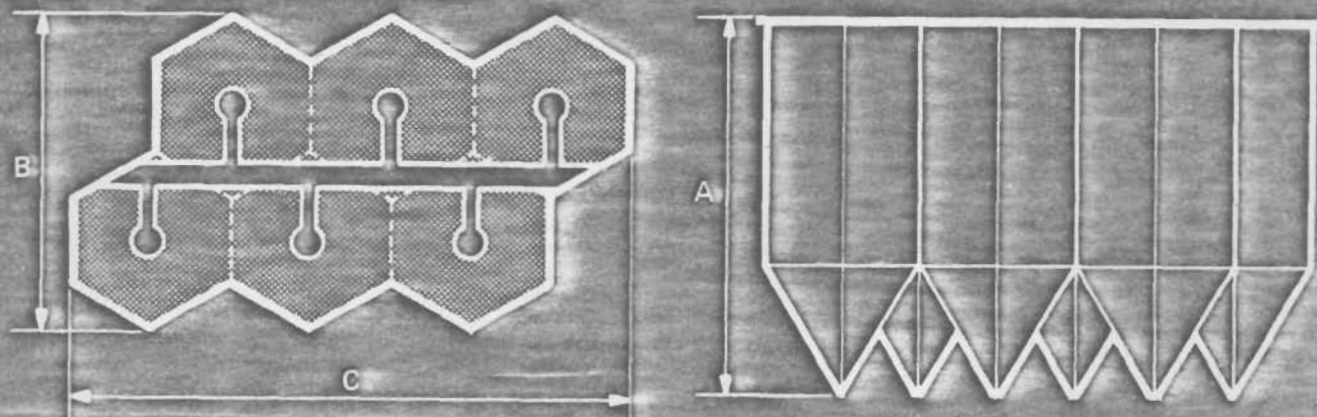
DynaSand™ Filter—Single Module and Freestanding Module Assemblies



Typical Models	Modules	Area Sq. Ft.	A	B	C	D	Nominal Flow GPM
DSF 12	1	12	12'-6"	4'	—	—	Up to 96
DSF 16	1	16	15'	5'	—	—	65-130
DSF 32	1	32	17'	7'	—	—	130-260
DSF 64	1	64	19'	9'	—	—	260-500
DSF 128	2	128	19'	9'	9'	20'	500-1025
DSF 256	4	256	19'	9'	20'	20'	1025-2050
DSF 384	6	384	19'	9'	20'	31'	1525-3050

Standard Materials	Optional Materials
Carbon steel, epoxy paint	Stainless steel
	Fiberglass reinforced plastic

DynaSand™ Poured Concrete Modules



	Typical Layouts*		Area Sq. Ft.	Approx. Flow GPM	Dimensions (Ft.)		
	Cells	Modules			A	B	C
DSF 210	1	6	210	850-1700	20	16	25
DSF 420	2	12	420	1700-3400	20	28	25
DSF 840	3	24	840	3400-6800	20	41	32
DSF 1240	3	36	1240	5000-10000	20	41	44
DSF 1650	4	48	1650	6600-13200	20	53	44

Internals of carbon steel and FRP.
 Bottom cones of concrete or carbon steel.
 *Other arrangements possible

All equipment in this brochure is covered under U.S. patent 4,126,546 and additional patents pending.

Parkson

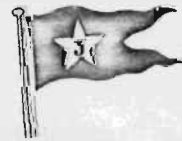


Parkson Corporation offers complete research and development facilities and operations to ensure pre-sale testing and back-up support for its products.

A pilot-size DynaSand Filter is available for on-site testing on a rental basis.

Combination Lamella Gravity Settler/DynaSand Filter installation at a pharmaceutical plant.

Parkson also manufactures the Lamella^{T.M.} Gravity Settler for compact clarification and the Magnum[®] Press for sludge dewatering.



Parkson Corporation
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P. O. Box 24407
Fort Lauderdale, Florida 33307
Phone: (305) 772-6860

7.5M/10-79



ROBERT E. MASON COMPANY
ENGINEERING REPRESENTATIVES

PROCESS AND CONTROL EQUIPMENT FOR THE CAROLINAS

1726 N. Graham St.
Charlotte, N.C. 28233

P.O. Box 33424
Phone 704-375-4464

VII. SPECIFICATIONS - AIR POLLUTION EQUIPMENT

A. Owner Furnished Equipment and Structures

1. For the Fume Scrubbers:
 - a. Two (2) 30 amp, 110 volt, 1 phase, 60 cycle outlets.
 - b. Compressed air 60 pounds (minimum) in 1/2" line with shut off valve.
 - c. Tap water supply.
 - d. Corrosion resistant coatings, as necessary.
 - e. Concrete support pad.
 - f. Erection of steel scrubber platform.
2. Self contained dust collector for the sand blaster.
3. For the Shot Peen Dust Collector:
 - a. Inlet and outlet duct work.
 - b. Final and intermediate surface finishes.
 - c. Equipment erection and installation.
 - d. Utilities.
 - e. Field wiring.
4. Vapor degreaser tank and all associated safety equipment.
5. For the Paint Booth:
 - a. Electrical power and wiring.
 - b. Structural support pad.
 - c. Stack head raincap.

B. Vendor Furnished Equipment

1. One (1) MAPCO Model No. MW-100 fume scrubber with self-contained recirculation system.
2. One (1) MAPCO Model No. MW-100D fume scrubber with dual packing and sprayers and self-contained recirculation system.

3. One (1) Pangborn Model No. 168-CT-614 cloth tube dust collector with casing, pyramid hopper with manual dump valve, and motor operated shaker mechanism.
4. One (1) De Vilbiss Model No. XDF-6215 paint arrestor type spray booth complete with lights, fan, and motor.

MANUFACTURER'S CUT SHEETS AND MODEL NUMBERS

NCA Quotation Proposal
Quotation Number 20/1059/A
July 29, 1980
METALS APPLIED DIVISION
CLEVELAND PNEUMATIC TOOL CORPORATION

We submit the following proposal for Midwest Air Products' Ventilation Systems:

System 1 - P.V.C. Ventilation System for 3 Chrome Tanks ^{25,000} ~~19,000~~ C.F.M.

1. P.V.C. Duct. ^{25,000}
2. MAPCO MW-100 Fume Scrubber ~~19,000~~ C.F.M. w/self-contained recirculation.
3. Transition for above scrubber.
4. MAPCO N.H. Fan #73 w/20 H.P. ^{30HP}
5. Delivery and Installation.

Revised 3-6-81
Bobby CAPEL

System 2 - P.V.C. Ventilation System for Nitric/HCL and Sulfamate Nickel Tanks

1. P.V.C. Duct.
2. P.V.C. Hoods for Nitric/HCL tanks.
P.V.C. Hood for nickel tank.
3. MAPCO MW-100-D Double Pack Fume Scrubber 6,522 C.F.M. w/self-contained recirculation.
4. P.V.C. Transitions for above scrubber.
5. MAPCO N.H. Fan #40 w/10 H.P.
6. Installation and Delivery.

SPECIFICATION SHEET FOR NCA QUOTATION 20/1059/A (CON'T)

Duct System - System 1

25,000

MAPCO P.V.C. Duct systems to ventilate 3 chrome ~~19,000~~ C.F.M. These systems to be fabricated of 3/16", and 1/4" P.V.C. high impact and Type I extruded P.V.C. duct. Duct and equipment to be reinforced as required. Duct connections to be sleeved. All drops to have quadrant type locking dampers unless otherwise specified.

Duct System - System 2

MAPCO P.V.C. Duct systems to ventilate 3 tanks at 6,522 C.F.M. These systems to be fabricated of 3/16", and 1/4" P.V.C. high impact and Type I extruded P.V.C. duct. Duct and equipment to be reinforced as required. Duct connections to be sleeved. All drops to have quadrant type locking dampers unless otherwise specified.

INSTALLATION - Installation Site. The owner will provide access free of any obstruction for the purpose of rigging this equipment. This will be available at time of delivery of equipment. If the installation site, and access to the same has not been cleared at time of delivery of equipment (unless other arrangements were made prior to delivery) there will be an additional charge to cover rehandling and delays.

Services. The customer will provide the following services within twenty feet (20') of the midpoint of the installation site. (A.) Electricity - Two 30 amp., 110 volts, 1 phase, 60 cycle outlets. (B.) Air - Minimum of 60 lbs. in 1/2" line with shut off valve, if available.

Installation of P.V.C. equipment supplied by MAPCO

This installation includes erection of duct, hangers for duct setting of fans and scrubber, wall openings where requested. MAPCO will furnish a crane to lift and skid the equipment to its proper place. This installation does not include plumbing, electrical and painting. Customer to provide utility disconnects to scrubber site area.

This installation does not include concrete pad for scrubbers nor erection of steel scrubber platform.

SPECIFICATION SHEET FOR NCA QUOTATION 20/1059/A

Blower - System 1

Type N.H. MAPCO centrifugal fan number 73 class number 2 arrangement number 9, 17.21 B.H.P. capacity of ²⁵19,000 C.F.M. at 4 S.P. and to be belt driven and equipped with a ²⁰20 H.P. weather proof motor 1750 R.P.M. motor for 230-460 volts 3 phase 60 cycle current. Unit to be equipped with drain, clean out door, flanged inlet and outlet, totally enclosed belt guard, and shaft guard. All P.V.C. housing F.R.P. wheel.

Blower - System 2

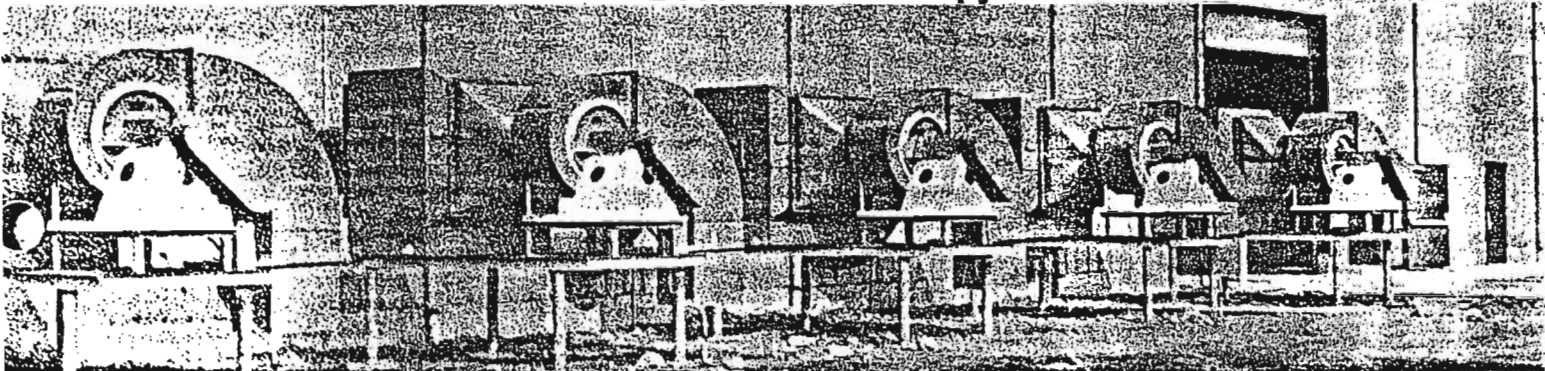
Type N.H. MAPCO centrifugal fan number 40 class number 2 arrangement number 9, 8.1 B.H.P. capacity of 6,522 C.F.M. at 5" S.P. and to be belt driven and equipped with a 10 H.P. weather proof motor 1750 R.P.M. motor for 230-460 volts 3 phase 60 cycle current. Unit to be equipped with drain, clean out door, flanged inlet and outlet, totally enclosed belt guard, and shaft guard. All P.V.C. housing F.R.P. wheel.

Scrubber - System 1

6 Type MW-100 MAPCO fume scrubber, to remove fumes from 3 chrome tanks. Unit to have a capacity of ²⁵19,000 C.F.M. at 2" S.P., to recirculate 60 G.P.M. and use ~~30~~ 30 G.P.M. of make-up water. Unit to be equipped with self-contained recirculation system. Recirculation system to have pump with 1½ H.P., 3600 R.P.M., weather proof motor. Unit to be equipped with flanged inlet and outlet, clear P.V.C. inspection and access door or removal of spray header.

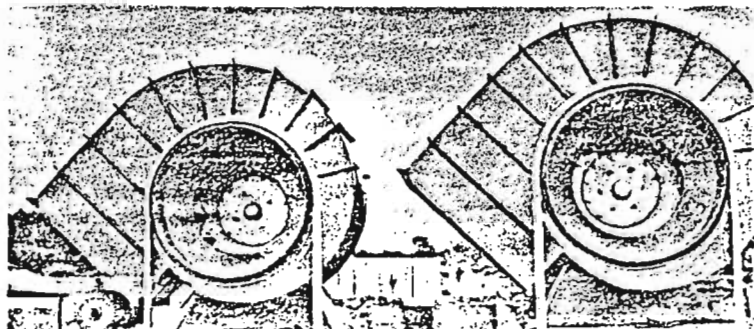
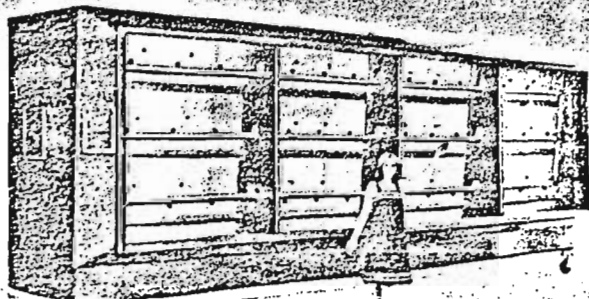
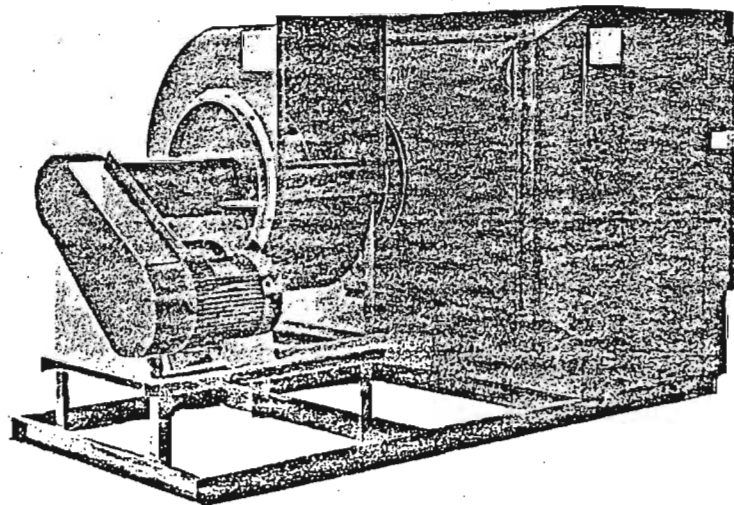
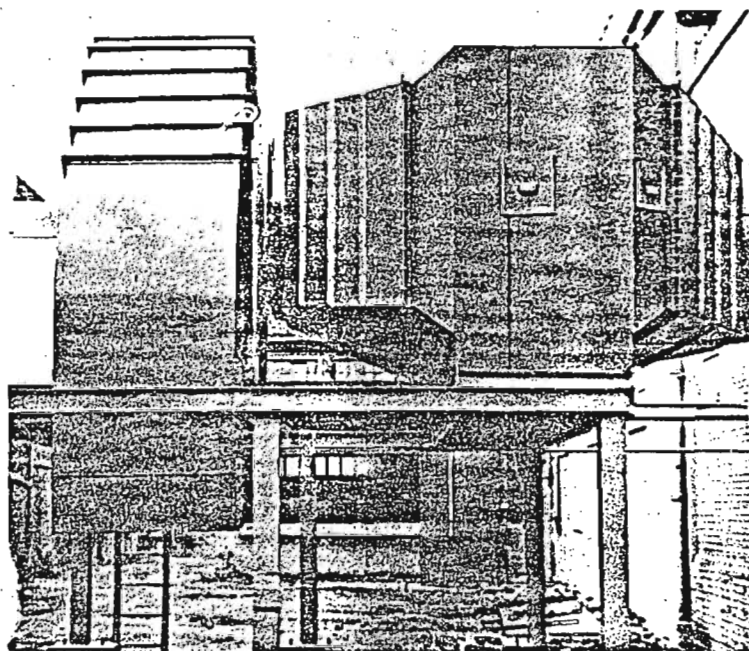
Scrubber - System 2

3 Type MW-100-D MAPCO fume scrubber, to remove fumes from nitric HCL tanks. Unit to have a capacity of 6,522 C.F.M. at 3" S.P., to recirculate 36 G.P.M. and use 1-8 G.P.M. of make-up water. Unit to be equipped with self-contained recirculation system. Recirculation system to have pump with 1½ H.P., 3600 R.P.M., weather proof motor. Unit to be equipped with flanged inlet and outlet, clear P.V.C. inspection and access door or removal of spray header.



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MIDWEST AIR FUME SCRUBBERS SPECIFICATIONS AND EFFICIENCY CHART

DESCRIPTION

MW-100 Horizontal (cross-flow) wet scrubber, four station. maximum efficiency on water soluble contaminants and odors. This unit is also effective on low soluble contaminants when used with chemical neutralizers.

MW-100D Horizontal (cross-flow) wet scrubber, six station. For use on low solubility contaminants or where extremely high scrubbing efficiency is required on normal contaminants.

MW-200 Vertical (counter-flow) wet scrubber, four station, with integral blower. Equal efficiency to MW-100D.

MW-200D Vertical (counter-flow) wet scrubber six station with integral blower. Equal efficiency to MW-100

MW-300 Vertical (counter-flow) wet scrubber four station. Equal efficiency to MW-100.

MW-300D Vertical (counter-flow) wet scrubber, six station. Equal efficiency to MW-100D.

All Midwest Air Fume Scrubbers are fabricated of P.V.C., FRP or Polypropylene resistant to corrosion and are mounted on coated steel base. All models are available with extended neck and eliminator depths.

WATER SUPPLY

Midwest Air Scrubbers can be supplied with water directly from your supply, or from a self-contained or remote recirculation system supplied with the scrubber. It is recommended that a recirculation system be used on all but very low C.F.M. units for water conservation. Fresh water consumption on the single pack series with recirculation is only 0.5 to 0.15 G.P.M./1000 C.F.M., representing 5% of the water being recirculated. Midwest Air Scrubbers are equipped with self draining equipment and may be installed out-doors, operating in sub-zero temperatures without danger of freeze up. When scrubbers are located out-doors a remote recirculation system should be specified and placement in heated area, or self-contained unit with heater/thermostat control package. A chemical metering and pumping system is available on request.

MATERIALS

All Midwest Air Scrubbers are shipped with integral coated steel base. Simply connect the duct, power and water supplies and the unit is ready for operation. Operating and Installation Instructions are supplied with every Midwest Air Scrubber.

PRESSURE DROP

Midwest Air Scrubbers operating at the designed C.F.M. will have the following pressure drop.

MW-100, MW-200 and MW-300 = 2" w.g.

MW-100D, MW-200D and MW-300D = 3" w.g.

Power is designed for 2.0" external S.P. on MW-200 Scrubbers.

MW-200 BLOWER SECTION

MW-200 Fume Scrubber top section consists of a Midwest Air centrifugal blower complete with O.S.H.A. shaft cover and belt guard. All units have the option of rotating the blower section 360° to obtain desired angle between scrubber inlet and blower outlet. NOTE: wheels may be fabricated of fiberglass, stainless steel or rugged steel with 60 mil plastic coating, depending on fume problem requirements.

MAINTENANCE

Low maintenance components are featured throughout every Midwest Air Scrubber. Quick opening inspection doors are mounted at every critical point, with sight-gauges and (see-through) inspection ports available as optional equipment.

SCRUBBING PRINCIPLES

Removing contaminants is accomplished by lowering the travel of fumes to 500 F.P.M. velocity and directing them through two scrubbing stations in single pack models, (four stations in double pack models). Fumes first travel through a water-spray curtain where larger contaminant particles drop out and are collected by first station packing media. Fumes that are remaining are saturated and travel to second station 12" pack of polypropylene high-surface, non-clogging, vertical plate packing media* continually wetted by spray nozzles and optional weir section. Saturated fumes are impinged upon the packing, contaminants are absorbed and carried away in the wash water.

MIST ELIMINATION

Fume mist is moisture laden after passing through the scrubbing sections and must be moved to a two-station gravity mist eliminator where P.V.C. eliminator blades provide four changes in direction eliminating entrained water. When higher elimination is required mesh entrainment eliminators are available.

MIDWEST AIR FUME SCRUBBERS Typical Average Fume Removal Efficiencies

MODELS	Single Pack Series	Double Pack Series	Single Pack Series	Double Pack Series
	MW-100 MW-200 MW-300	MW-100D MW-200D MW-300D	with added Chemical Neutralizer (pH Control)	
CONTAMINATES				
Acetic Acid	94-98	98-99		
Alkaline Cleaners	95-99	98-99		
Aluminum Bright Dip*	75-85	86-90		
Anodizing	95-99	98-99		
Aqua Regia	80-85	85-90	85-90	90-95
Boric Acid	84-90	90-95		
Caustic Cleaners	95-99	99		
Caustic Soda	95-99	99		
Chlorine	80-85	86-90	85-90	90-95
Chromic Acid	96-99	99		
Copper Chloride	75-80	80-85	85-90	90-95
Cyanide Solutions	97-99	99		
Ferric Chloride	81-85	84-88		
Ferric Nitrate	95-98	98-99		
Ferrous Chloride	88-95	96-98		
Ferrous Sulfate	94-97	96-98		
Fluosillicic Acid	94-98	98-99		
Hydrochloric Acid	80-85	85-90	90-95	95-98
Hydrogen Cyanide	84-90	90-95		
Hydrofluoric Acid	88-93	94-98		
Hydrofluosillicic Acid	94-98	98-99		
Hydrogen Peroxide	91-95	98-99		
Hydrogen Sulfide	70-75	75-80	85-90	95-98
Nickel Chloride	79-85	85-90	90-95	95-98
Nickel Sulfate	81-85	85-90	90-95	95-98
Nitric Acid	74-80	85-80		
Nitrogen Dioxide (NO ₂)	45-50	50-60	65-70	70-75
Nitric — HF Acid	72-80	85-90		
Perchloric Acid	94-98	96-99		
Phosphoric Acid	95-99	98-99		
Potassium Dichromate	95-98	98-99		
Selenium Sulfide	95-98	98-99		
Sodium Chloride	95-98	98-99		
Sodium Fluoride	91-95	96-98		
Sodium Glutamate	95-98	98-99		
Sodium Hydroxide	96-99	99		
Sulfur Dioxide	70-75	75-80	80-85	85-90
Sulfuric Acid	95-98	98-99		
Tin Chlorides	75-80	81-85	85-90	90-95
Zinc Chloride	75-80	80-85		
Zinc Nitrate	95-98	98-99		
Zinc Sulfate	95-98	98-99		

*Efficiencies shown above are for the combined nitric and phosphoric fume. The efficiency for the NO₂ portion of the fume only, will be listed above.

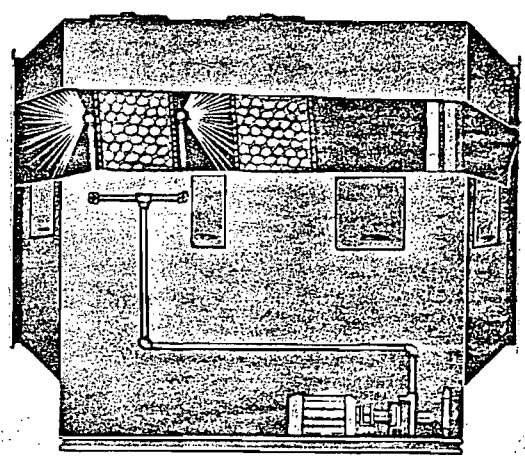
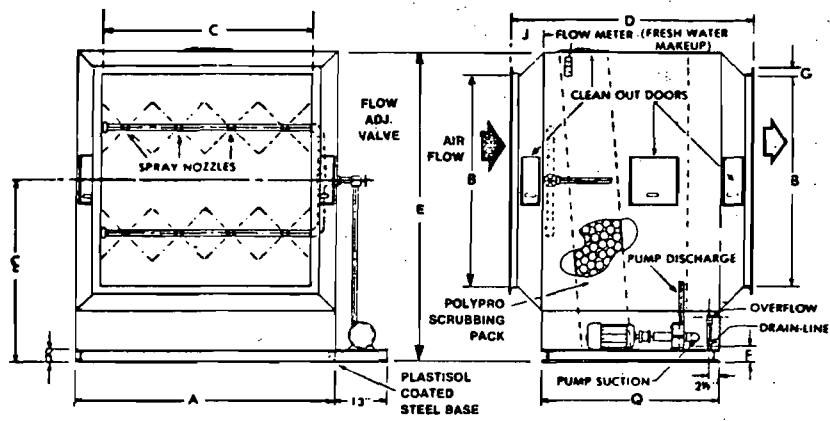
The efficiencies shown above are average values intended as a guide. Specific concentrations and combinations of fumes may result in a significant variation from the above.

MW-100 and MW-100D HORIZONTAL

FUME SCRUBBERS

MW-100 HORIZONTAL SINGLE PACK

Where horizontal installation is desirable, the **MAPCO MW-100** is preferred to our other models. This compact, cross-flow unit is ideal for inside mezanine or roof mountings. Moreover, the **MW-100**, as with our other scrubbers, retains efficiencies of up to 99% for most water soluble contaminants. Our standard open-orifice, non-clogging spray nozzles completely saturate the fumes before entering the mist eliminator section. This final stage of all scrubbers provides four 30° air-directional changes, trapping entrained moisture before discharging the clean air into the atmosphere at low humidity levels.



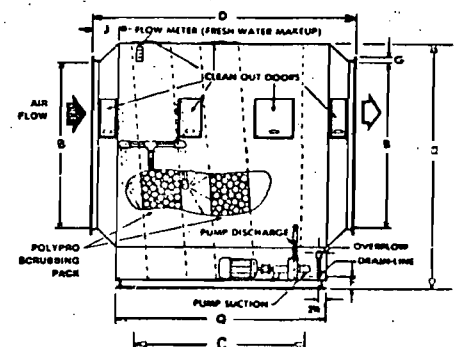
MW-100D FUME SCRUBBER

MW-100 FUME SCRUBBER

CFM	0.5	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60																																																
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269																																																
B	10	14	20	24	29	33	37	44	46	52	57	62	65																																																												
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253																																																
D	49	50	51	52											60	61																																																									
E	30	34	40	44	49	53	58	65	71	77	82	87																																																													
F											3.5											4.5																																																			
G											1.5											2																																																			
H	21	23	26	28	30.5	32.5	35.5	39	42	45	47.5	50																																																													
K											2											3																																																			
DRAIN LINE																															1.5																																										
PUMP DISCHARGE																															.75											1	1.25	1.25	1.5	2	2.5	3																									
PUMP SUCTION																																									1											1.25											1.5	2	2.5	3							
Q	37	38	39	40											41	42	43	44	45																																																						
J																																									6											8											10										

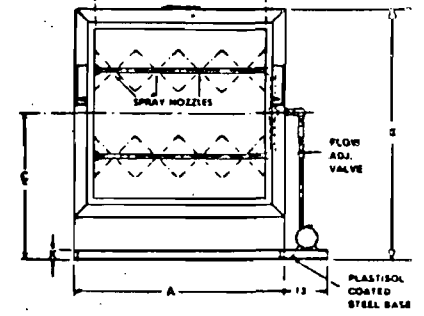
MW-100D HORIZONTAL DOUBLE PACK

As with all our double pack units, the **MW-100D** is used for especially difficult, low soluble fumes. Some typical applications are aluminum bright dip, nitric strip tank, etching, and odor fumes. This model incorporates two packing sections and two sets of spray nozzles for a total of six scrubbing stages. The packing sections contain various lab-tested filter media, depending on the application, to eliminate bed settling and achieve high efficiency mass transfer and continuous backflushed particle filtration. This keeps maintenance at an absolute minimum. To aid in inspection and periodic cleaning, easily opened access doors are provided in strategic locations.



MW-100D FUME SCRUBBER

CFM	0.5	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60																																																
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269																																																
B	10	14	20	24	29	33	37	44	46	52	57	62	65																																																												
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253																																																
D	70	71	72	73	74	75	80	81	82																																																																
E	30	34	40	44	49	53	58	65	71	77	82	87																																																													
F											3.5											4.5																																																			
G											1.5											2																																																			
H	21	23	26	28	30.5	32.5	35.5	39	42	45	47.5	50																																																													
K											2											3																																																			
Drain Line																															1.5																																										
Pump Discharge																															.75											1	1.25	1.25	1.5	2	2.5	3	4																								
Pump Suction																																									1											1.25											1.5	2	2.5	3	4						
Q	58	59	60	61	62	63	64	65	66																																																																
J																																									6											8											10										



RECOMMENDED SPECIFICATIONS FOR POLYVINYL CHLORIDE (P.V.C.) EXHAUST DUCT & EQUIPMENT

EXHAUST DUCT

All ventilation duct to be fabricated of Midwest Air Type 2, grade 1, high impact P.V.C. Extruded Type 1 P.V.C. duct 6" diameter to 18" diameter will be acceptable where applicable.

All MAPCO systems are designed in accordance with the recommended practice of the American Conference of Governmental Industrial Hygienists and fabricated in accordance with (SMACNA) Sheet Metal and Air Conditioning Contractors National Association, manual on Thermo Plastic Construction.

All P.V.C. used in fabrication of MAPCO products is unplasticized and conforms U.S. Commercial Standard CS 201-55 and also ASTM D 1784-69, Type II, Grade 1 LP-535b, Type II, Grade GU. All P.V.C. conforms to ASTM standard D 635 and has a flame spread rating of 20.

FITTINGS — ROUND & RECTANGULAR DUCT

Flanges - To be made of P.V.C. Type 1 or Type angle material formed and continuously back welded to duct. 1.5 x 1.5 x .1875" (3/16) angle and 2" x 2" x .250" angle are used in relationship to duct sizes. Bolt holes to be .3125" (5/16) diameter for .25" stainless steel bolts and no more than four (4)" inches apart on centers. Gasket material to be of soft mastic type or foam P.V.C.

Sleeves - To be formed from four (4) inch wide flat P.V.C. material of a thickness equal to or greater than the wall thickness of duct to be joined. Weld to one end of duct section leaving one-half the sleeve length for adjoining section to slip into.

Elbows - To have a minimum center line radius of 1½ times diameter unless field conditions make it impossible. Ninety degree elbows to have five (5) gores and forty-five degree elbows to have three (3) gores. All elbows come equipped with couplings for connections to duct.

Branches - To enter main at no more than forty-five degrees (thirty degrees preferred) to direction of flow and wherever practical to enter on an enlarging taper section. Branches should not enter opposite each other. Branches to be continuously welded to main.

Taper Section - 1" change in diameter to every 5" in length, where practical.

CONSTRUCTION - RECTANGULAR DUCT

All straight lengths to have formed corner construction for maximum strength. This includes taper sections where practical. Elbows to have welded corner construction.

INSTALLATION

All joints to be flanged or sleeved and made water-tight. Sleeves may be welded or cemented. Flanged joints should be provided at all connections where dismantling may be required.

A drain connection is installed at the low point on each trunk line, and on all hood bottoms.

Ductwork should be fitted with saddle bands at 8' to 12' centers suspended with all-thread rod. Ductwork should also be suspended at each change in direction.

Welding shall be done by the hot gas fusion welding method utilizing P.V.C. welding. Ductwork, hoods and similar air passage enclosures must be finished completely air and water tight. Ductwork shall be completely free from cracks, distortions or other imperfections.

EXHAUST BLOWERS

Exhaust blowers shall be centrifugal, arrangement 9 with backwardly inclined wheels Type NH and CI as manufactured by Midwest Air Products Company. Wheels shall be steel with a minimum 60 mil. P.V.C. coating, fiberglass or stainless steel.

Coating will be spark tested to insure integrity. Housings shall be constructed of Midwest Air Type 2, Grade 1, high impact P.V.C. Frames shall be steel with coating. All blowers shall be equipped with a vacuum formed inlet cone, drain, access door, O.S.H.A. approved belt and shaft guards and flanged inlet and outlet. All exhaust blowers shall carry a one year replacement guarantee against failure due to corrosion. Fans to be balanced prior to shipment.

FUME SCRUBBERS

Midwest Air Products wet type fume scrubber shall be provided to meet the following manufacturing specifications:

MATERIAL

Fume scrubbers shall be constructed of Midwest Air Type 2, Grade 1, high impact P.V.C. or Polypropylene. Bolts, nuts and all reinforcing framework used inside scrubbers shall be P.V.C. or No. 316 stainless steel. Scrubbers to be complete with epoxy coated steel base of sufficient strength to make unit self-supporting.

All in-scrubber piping shall be P.V.C. or Polypropylene. Spray nozzles shall be full cone, non-clogging, open orifice type.

SCRUBBING & ELIMINATING SURFACE

A packed scrubber bed at least 12" deep shall be provided. The packing material shall consist of 2.5" diameter polypropylene, non-clogging, spherical plate type, shapes with a minimum surface area of 40 sq. ft. per cu. ft. The scrubbing section shall be constantly wetted by non-clogging, continuous flow spray nozzles, and overhead weir. A minimum 8" deep mist eliminator section shall be provided. This shall consist of vertically mounted P.V.C. eliminators providing at least four (4) changes in direction of the air flow and eliminate entrained water from the air stream before it leaves the scrubber. Scrubbers shall be sized for a maximum of 500 F.P.M. at the packing face.

A pre-wet section shall be provided at the entrance to the scrubber consisting of a bank of spray nozzles headed into the air stream. The nozzles shall be sufficient in number to blanket the inlet cross section with mist. Overhead weir to be used when complete, continual saturation is required.

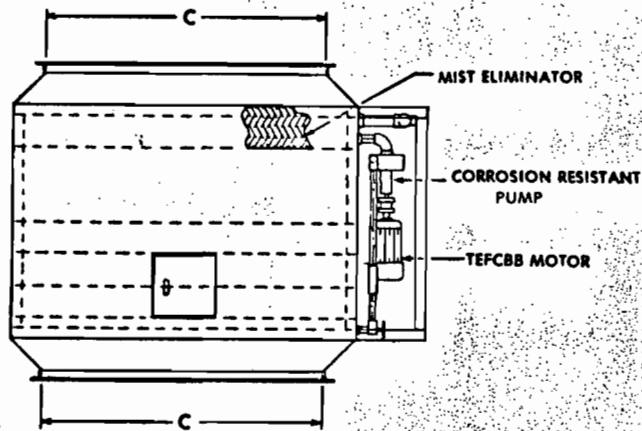
A flow meter shall be provided at the fresh water inlet. Water-tight access doors shall be provided to permit easy access to scrubber bed and eliminators for maintenance purposes and to permit inspection while in use.

Inlet and outlet openings shall be flanged or sleeved.

EXHAUST HOODS

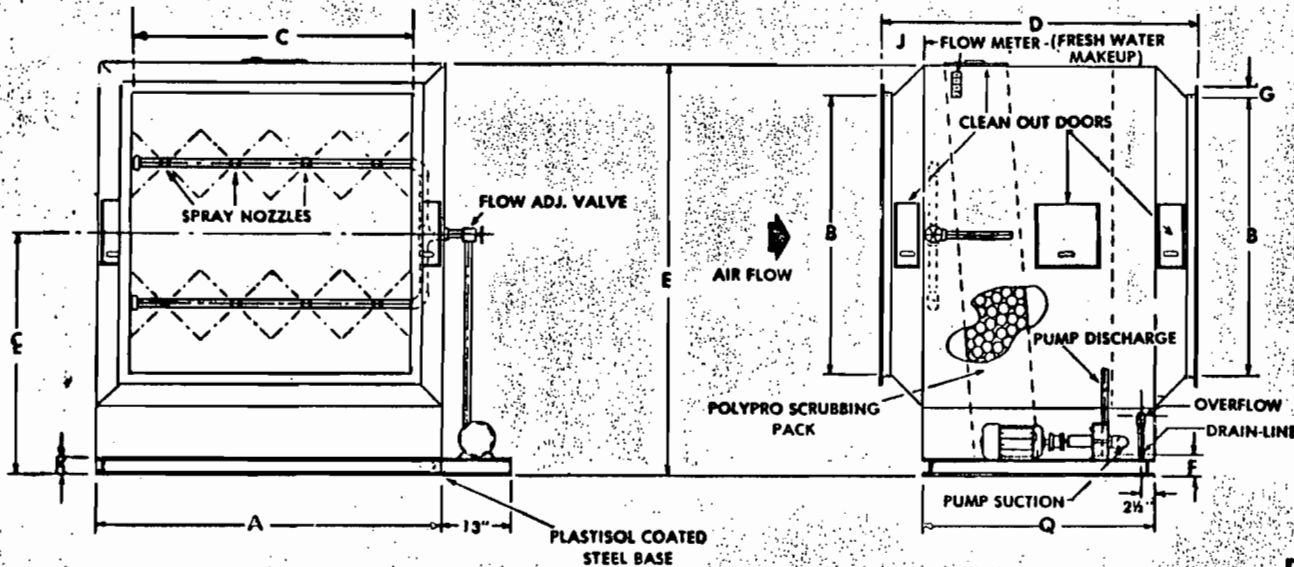
All exhaust hoods to be fabricated of Midwest Air Type 2, Grade 1, high impact P.V.C.

The basic hood shape shall be fabricated of .1875" (3/16) thick P.V.C. All P.V.C. sheet used as reinforcing to be .25" (¼) thick P.V.C. "T-Bar" spaced not greater than 12" c.c. shall be used internally to reinforce slot dividers on vertical type hoods. All lip type hoods to have top and bottom of slot section reinforced with .25" (¼) P.V.C. Additional P.V.C. reinforcing shall be used as required to strengthen the hood at critical points and prevent warping. P.V.C. exhaust hoods shall be fabricated basically by hot gas welding, but welds will not be allowed at corners along the length of the hood. All such corners are to be heat formed. All welded joints shall be welded inside and out whenever possible. All hoods are to be equipped with a means of preventing liquid from accumulating in the bottom. Hoods having a plenum lower than the lowest slot shall have a drain crease in the bottom with a 1" threaded coupling. All hoods shall be equipped with an outlet connection as indicated on the drawings. Face damper shall be used on hoods when exact C.F.M. cannot be predetermined.

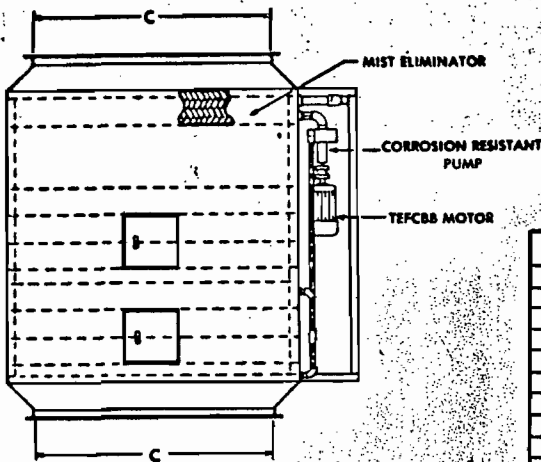


**MW-100 SCRUBBER WITH SELF-CONTAINED RECIRCULATION
(IN THOUSANDS)**

CFM	0.5	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269
B	10	14	20	24	29	33	37	44	46	52	57	62	65	61											
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253
D	49	50	51	52	53		54	59	60	61															
E	30	34	40	44	49	53	58	65	71	77	82	87	91												
F	3.5			4.5											5.5										
G	1.5			2											3										
H	21	23	26	28	30.5	32.5	35.5	39	42	45	47.5	50	52.5												
K	2			3											4										
DRAIN-LINE													1.5												
PUMP DISCHARGE	.75			1											1.25	1.25	1.5		2		2.5		3		
PUMP SUCTION	1			1.25											1.5		2		3						
Q	37	38	39	40	41	42	43	44	45	46															
J	6			8											10										

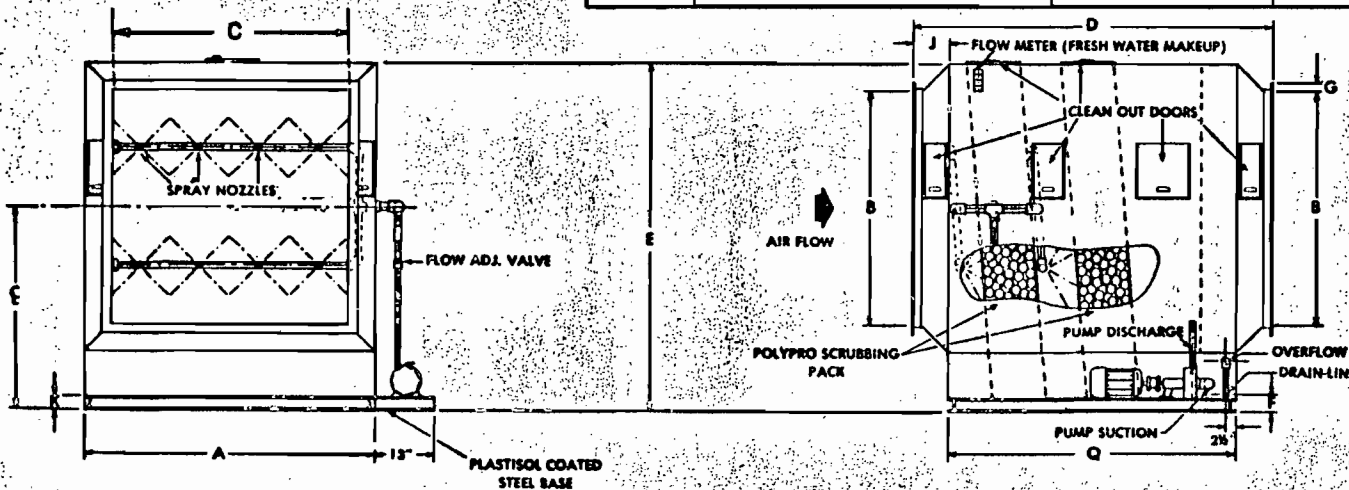


MW-100 FUME SCRUBBER		
With Self Contained Recirculation System		
MIDWEST AIR PRODUCTS COMPANY, Inc.		
Owosso, Mich. 48867		
DRAWN BY	USER	
DATE	PURCH.	
JOB NO.	LOCA.	
CFM	SP	GPM REQ.
GPM FRESH WATER MAKE UP REQUIRED		



MW-100D FUME SCRUBBER With Self Contained Recirculation System

CFM	0.5	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269
B	10	14	20	24	29	33	37	44	46	52	57	62	65	81											
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253
D	70	71	72	73	74	75	80	81	82																
E	30	34	40	44	49	53	58	65	71	77	82	87	91												
F	3.5					4.5					5.5														
G	1.5										2														
H	21	23	26	28	30.5	32.5	35.5	39	42	45	47.5	50	52.5												
I	2					3					4														
Drain Line Pump Discharge	.75		1		1.25		1.5		2		2.5		3		4										
Pump Suction	1		1.25		1.5		2		2.5		3		4		3		4								
J	58	59	60	61	62	63	64	65	66	67															
K	6					8					10														



MW-100D FUME SCRUBBER
With Self Contained Recirculation System
MIDWEST AIR PRODUCTS COMPANY, Inc.
Owosso, Mich. 48867

DRAWN BY	USER	
DATE	PURCH.	
JOB NO.	LOCA.	
CFM	SP	GPM REQ.
GPM FRESH WATER MAKE UP REQUIRED		



**MAPCO MW-100
O.S.H.A. & E.P.A. TECHNICAL DATA**

CFM	PACK FACE AREA (ft-2)	TOTAL SQ. FT. PACK SURFACE (ft-2)	VELOCITY THRU PACK (fpm)	TYPE PACKING
500	2.25	90	222	(1/2" BALLAST RINGS)
1,000	3.34	133.6	299	
2,000	5.42	216.8	369	
3,000	7.07	282.8	424	
4,000	9.50	380.0	421	
5,000	11.66	466.4	428	
6,000	14.08	562.4	426	
8,000	18.74	749.6	426	
10,000	23.32	932.8	428	
12,000	28.40	1136.0	422	
14,000	33.06	1322.4	423	
16,000	37.94	1517.6	421	
18,000	43.30	1732.0	415	
20,000	47.02	1880.8	425	
22,000	51.86	2074.4	424	
24,000	55.56	2222.4	431	
26,000	59.88	2395.2	434	
28,000	65.76	2630.4	425	
30,000	72.18	2867.2	415	
35,000	83.94	3357.6	416	
40,000	95.70	3828.0	417	
45,000	108.00	4320.0	416	
50,000	119.76	4790.4	417	
55,000	132.06	5282.4	416	
60,000	143.82	5752.80	417	



MIDWEST AIR PRODUCTS CO., INC.

TECHNICAL BULLETIN

MW-100 SCRUBBER WITH SELF-CONTAINED RECIRCULATION SYSTEM

CFM	DRY WT.	INTERNAL RECIRCULATION TANK CAPACITY		OPER. WT.
		GAL.	LBS.	
500	251	23	192	443
1000	282	29	241	523
2000	344	37	307	651
3000	385	43	360	745
4000	458	51	427	885
5000	601	57	473	1073
6000	698	64	532	1230
8000	815	76	630	1445
10000	933	86	720	1653
12000	1042	98	813	1855
14000	1146	105	876	2022
16000	1249	115	961	2210
18000	1402	126	1052	2454
20000	1513	140	1168	2681
22000	1624	155	1288	2912
24000	1710	166	1380	3090
26000	1811	178	1486	3297
28000	1946	196	1632	3578
30000	2094	215	1792	3886
35000	2351	250	2084	4435
40000	2669	285	2375	5044
45000	2953	322	2681	5634
50000	3220	357	2972	6192
55000	3498	393	3275	6773
60000	3764	429	3570	7334

MW-100D SCRUBBER WITH SELF-CONTAINED RECIRCULATION SYSTEM

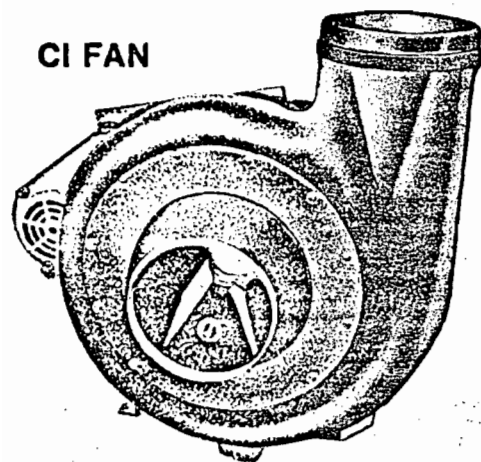
CFM	DRY WT.	INTERNAL RECIRCULATION TANK CAPACITY		OPER. WT.
		GAL.	LBS.	
500	346	36	301	647
1000	402	45	375	777
2000	504	57	477	981
3000	685	67	554	1239
4000	798	78	652	1450
5000	881	87	722	1603
6000	1028	97	805	1833
8000	1235	113	945	2180
10000	1433	129	1071	2504
12000	1632	144	1200	2832
14000	1816	155	1294	3110
16000	1998	169	1409	3407
18000	2292	185	1542	3834
20000	2483	204	1701	4184
22000	2674	225	1875	4549
24000	2820	241	2010	4830
26000	3001	260	2165	5167
28000	3236	285	2377	5613
30000	3544	313	2610	6154
35000	4021	364	3035	7056
40000	4509	415	3460	7969
45000	5003	469	3905	8908
50000	5520	520	4330	9850
55000	5998	573	4775	10773
60000	6486	624	5200	11686

TYPE CI AND NH FANS

CENTRIFUGAL FANS

**TYPE CI and NH IN SIZES TO OVER
70,000 CFM — 100% CORROSION WARRANTY**

CI FAN

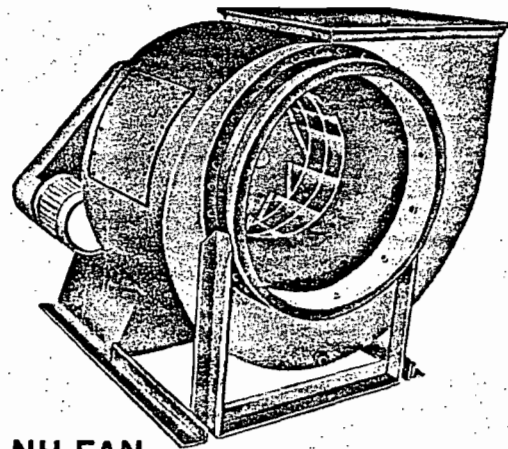


CI FANS INCLUDE:

- BOTTOM DRAIN
- FORMED COLLARS
- FORMED HOUSING
- OSHA BELT GUARD

NH FANS INCLUDE:

- ACCESS DOOR
- BOTTOM DRAIN
- FLANGED INLET
- FLANGED OUTLET
- OSHA BELT GUARD



NH FAN

★ **ECONOMICAL OPERATION** ★

QUICK EASY INSTALLATION ★ **HIGH EFFICIENCY**

EXCELLENT PERFORMANCE ★ **LOW MAINTENANCE**

To Specify Your
Requirements Accurately
You Will Need

1. Volume at the inlet in CFM.
2. The inlet static pressure.
3. The inlet air temperature.
4. If gas, not air, the density or specific gravity.
5. Elevation above sea level.
6. Characteristics of the electric current

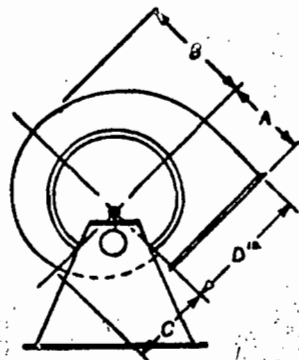
MAPCO Type CI Fans are constructed with a heavy gauge P.V.C. vacuum formed housing or a formed F.R.P. housing. Either F.R.P., coated steel, or stainless steel wheels will be used with these housings. The CI fan is completely corrosion resistant inside and out, is suitable for continuous operation from 300 to 3,800 CFM to 10" S.P. and higher performance pressure data is available on request.

MAPCO Type NH Fans with the FRP WHEEL is considered a criterion of excellence. All wheels are both statically and dynamically balanced prior to final assembly. Steel reinforced plastic coated wheels will also be quoted with this fan. The coated steel is spark tested for integrity. Other features include heavy angle iron bracing and over capacity shaft and bearings.

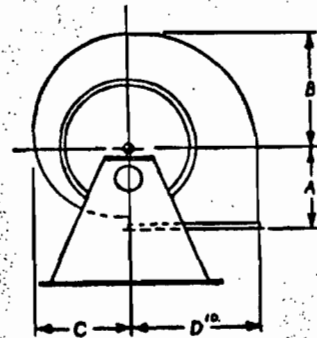
Formed venturi inlet and matching wheel cone result in a streamlined flow. Heavy duty housing construction and the FRP wheel make this fan inherently quiet. Other standard features of this outstanding fan include a epoxy coated steel base and OSHA belt and shaft guard. All fans are equipped with TEFCBB motor and convenient access door. Sizes from 2,000 to over 70,000 CFM are standard.

PVC, FRP, STEEL OR STAINLESS STEEL CONSTRUCTION

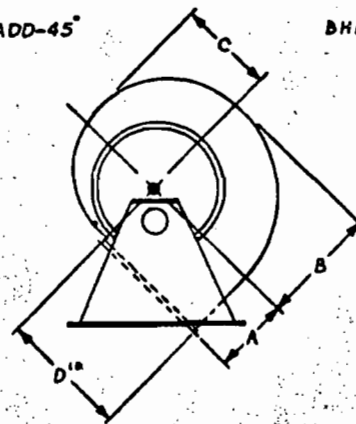
TADD-45°



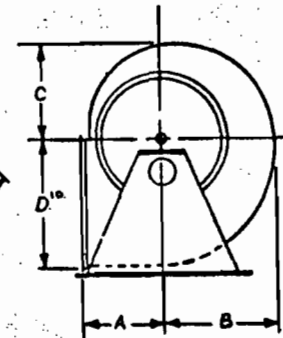
DBD



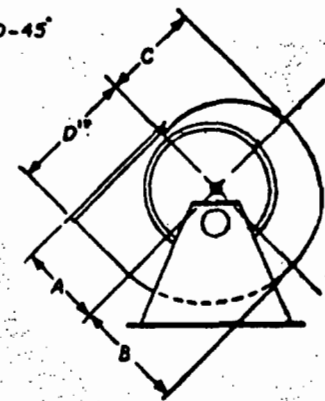
BADD-45°



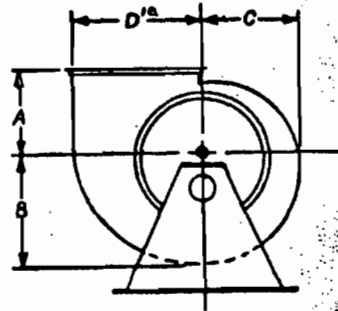
BHD



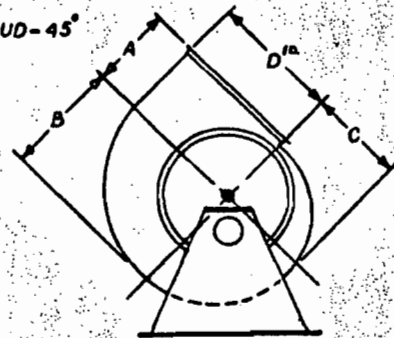
BAUD-45°



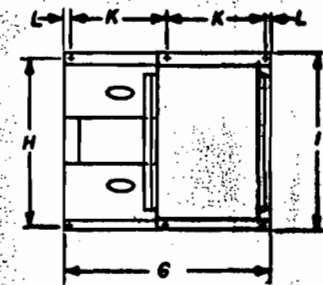
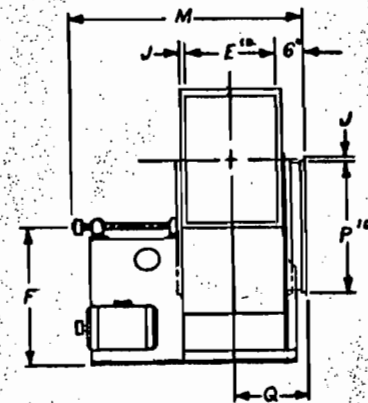
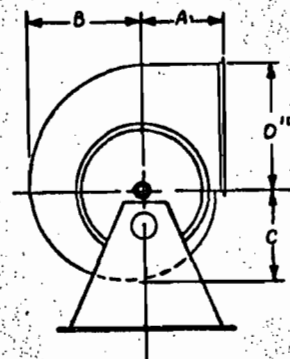
UBD



TAUD-45°



THD



NOTE:

ON DBD, BADD AND BHD UNITS
CONSULT FACTORY FOR Q DIMEN-
SION AS HOUSING COULD COME
BELOW FRAME OR INTERFERE
WITH CONNECTING ANGLES.

Fan No.	A	B	C	I.D. D	I.D. E	F	G	H	I	J	K	L	M	I.D. P	Q	Shaft Dia.	Koy Way	Blt Hole Dia.
24.5	10.187	11.298	9.75	12.76	9.76	14.5	26.062	19.25	21.25	1.5	12.031	1	33.825	13.25	10.875	1.187	.25 x .125	.5
27	10.875	12.453	10.625	14	10.75	16	27.062	20.25	22.25	1.5	12.531	1	34.625	14.25	11.375	1.187	.25 x .125	.5
30	11.687	13.703	11.687	15.375	11.75	17.5	35	22	24	1.5	16.5	1	43	15.5	11.875	1.312	.625 x .125	.5
33	12.312	14.968	12.625	17.125	13.125	19.5	38.875	23.375	25.375	1.5	18.437	1	43.312	17.375	12.562	1.312	.312 x .125	.5
36.5	13.5	16.609	14.031	19	14.5	20.5	39.75	25	27	1.5	18.875	1	48.125	19.25	13.25	1.437	.375 x .187	.5
40	14.625	18.187	15.375	20.875	15.876	23.5	43.375	27.5	30	1.5	20.312	1.25	51.187	21	13.937	1.687	.375 x .187	.5
44.5	16	20.546	17.093	23.25	17.825	25	45	31	33.5	1.5	21.25	1.25	52	23.825	14.812	1.587	.375 x .187	.5
49	17.375	22.281	18.187	25.5	19.5	27	47.5	33.125	35.825	1.5	22.5	1.25	55.562	28	15.75	1.937	.5 x .26	.5
54	18.937	24.593	20.75	28.125	21.5	30	49.5	36.25	38.75	1.5	23.5	1.25	57.812	29	16.75	1.937	.5 x .25	.5
60	20.812	27.296	23.031	31.25	23.75	33	51.875	40.5	42.25	1.5	24.687	1.25	60.562	32	17.875	2.187	.5 x .25	.5
66	22.625	30	25.312	34.375	26.25	36	55.5	44	47	1.5	26.25	1.5	63.812	34.5	19.125	2.437	.625 x .312	.625
73	24.875	33.156	28	38	29	40	59.25	48	51	1.5	28.375	1.5	66.687	38.5	20.5	2.437	.625 x .312	.625
80.5	27.75	36.593	30.875	42	32	43.75	63	53	56	2	30	1.5	72	42.25	22	2.687	.625 x .312	.625
89	30.5	40.484	34.156	46.5	35.375	44.75	68.875	58	61	2	31.937	1.5	76.562	46.25	23.687	2.937	.75 x .375	.625
98	33.75	44.562	37.625	51.125	39	48	77.5	64	67	2	37.25	1.5	81.875	51.25	26.5	3.187	.75 x .375	.625
108	37	49.312	41.625	56.5	43.125	52	81.5	69	72	2	39.25	1.5	91.812	56	27.562	3.437	.75 x .375	.625
120	41	54.593	46.625	62.5	47.75	57.75	86	76	78	2	41.5	1.5	98.375	62	29.875	3.937	.75 x .375	.625

CENTRIFUGAL
NH Fan No.

MIDWEST AIR PRODUCTS COMPANY, Inc.
Owosso, Mich. 48867

DRAWN BY	USER	CLASS
DATE	LOCA.	ARR
ROTATION	PURCH.	CFM
V PH CY	LOCA.	SP
CERTIFIED BY	JOB NO.	BHP

Specifications

PANGBORN

16.0 Ventilation

- 16.1 One dust collector system to serve ventilating requirements of foregoing Rotoblast equipment, handling 11,500 CFM from system connections, generally per drawing H-800541. System comprising:

No. 168 Type CT-614 cloth tube dust collector. Collector has 3074 square feet cloth area.

Collector casing fabricated of steel sheets, designed for suction operation up to and including 10" S.P.W.G.

Magnehelic gauge included to indicate pressure drop across the tubes.

168 tubes fabricated from polyester twill fabric and suitable for a maximum temperature of 275 degrees F. Filter tubes are secured to the tube plate at the bottom by a screw type metal clamp offering positive seal; tubes can be removed quickly by using only a simple tool.

Collector casing equipped with one 60 degree slope pyramid hopper complete with manual dump valve.

Outside mounted shaker mechanism is motor operated.

Structural steel supports for collector provide 5'-0" hopper clearance for dust removal. Includes two outside walkways and two inside walkways located one at the tube sheet and one at the shaker level.



Standard Rotoblast® Systems

The Carborundum Company
Pangborn Division
P.O. Box 380
Hagerstown, Maryland 21740

Specifications

PANGBORN

Handling the specified CFM will be an exhaust fan with a multiple V-belt drive and guard.

The dust collector casing and hopper is shipped as a welded unit. Tubes, support and walkways shipped knocked down, requiring field assembly.

16.2 Motors

Pangborn's standard stock motors offered on this equipment are from major producers and normally are 1965 rerate "T" frame sizes. Special brands and requests for special frame sizes, etc., will generally require additional charges (consult Hagerstown).

One (1) 3 HP, 1800 RPM, TE, BB motor for tube shaker mechanism.

One (1) 30 HP, 1800 RPM, TE, BB motor with base for exhauster.

16.3 Controls

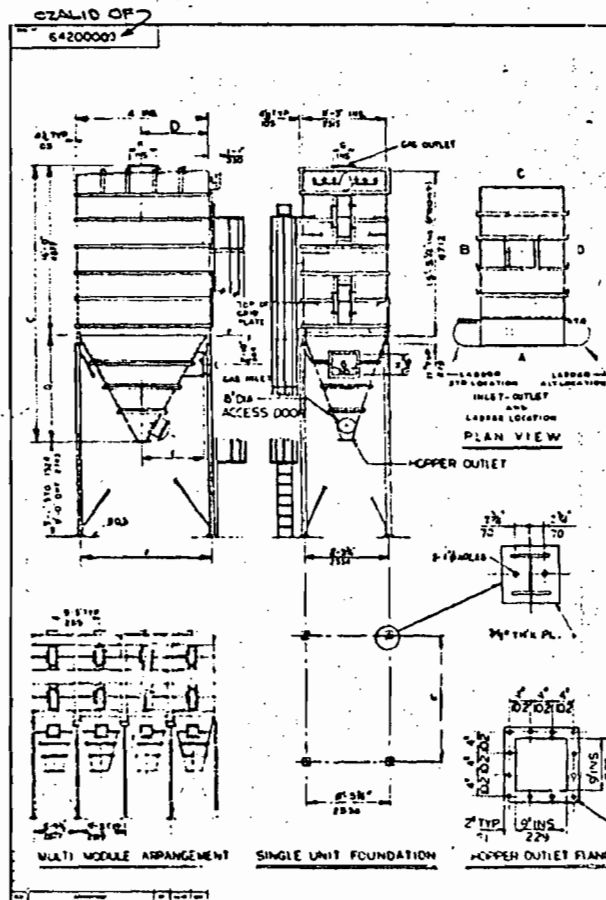
One control addition to the blast machine electrical panels, including one reset timer in NEMA 12 enclosure to automatically operate tube shaker mechanism motor for a short period of time whenever the exhauster motor is manually shut down.

PRICE (16.1-16.3) ----- SEE SUMMARY SHEET

Note: Customer is to provide inlet and outlet duct work, dust removal, final and intermediate surface finishes, erection and installation, utilities, and field wiring. Responsibility for free flow and discharge from hopper of collected material resides with the purchaser.



DWG. NO.
H 800541



PLEASE SELECT FROM THE FOLLOWING OPTIONAL FEATURES, SIGN BELOW & RETURN TWO COPIES OF APPROVED DRAWINGS WITH YOUR PURCHASE ORDER. CHECK PROPOSAL FOR ITEMS MARKED * CUSTOMER: _____ PROPOSAL NO. _____ PO. NO. _____

- OPTIONS AVAILABLE:
- GAS INLET LOCATION FIELD CUT BY OTHERS A B C D
 - * DUST DISCHARGE CONVEYOR 9" DIA SCREW CONVEYOR UNDER HOPPER ONLY OTHER NONE
 - * DUST DISCH. CONV. DRIVE INCLUDED NONE
 - * DUST DISCHARGE VALVE 9" FABRICATED M.S. ROTARY VALVE OTHER NONE
 - * DUST DISCH. VALVE DRIVE SLIDE GATE (SUCTION ONLY) MANUAL VALVE
 - * PRESSURE GAUGE SLAVE DRIVEN BY S/C SEPARATE DRIVE
 - * SUPPORT STEEL U TUBE MANOMETER MAGNETIC DRIVE
 - * LADDER 5'-0" 6'-0" NONE
 - * SYSTEM FAN STD. LOCATION ALT. LOCATION
 - * FAN-DISCHARGE LOCATION U B T H B M ROTATION CW CCW
 - * ELECTR. MOTOR ENCLOSURE T.E.F.C. Q.D.P. OTHER N/A
 - * ELECTRICAL SUPPLY 575/3/60 460/3/60
 - * BAG MATERIAL POLYESTER OTHER

APPROVED FOR GENERAL ARRANGEMENT AND OPTIONS
SIGNED: _____ DATE: _____

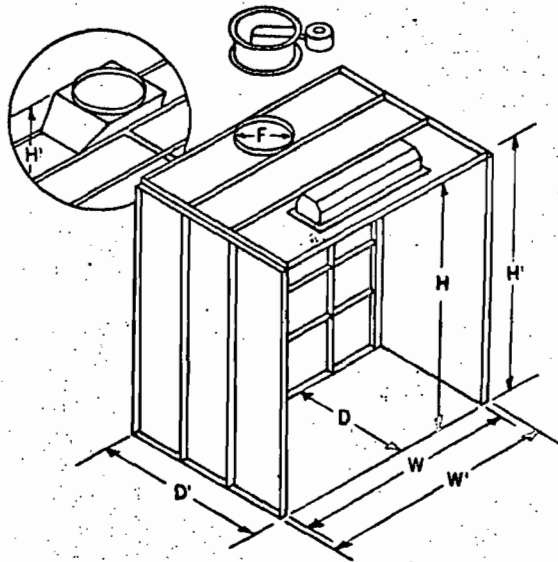
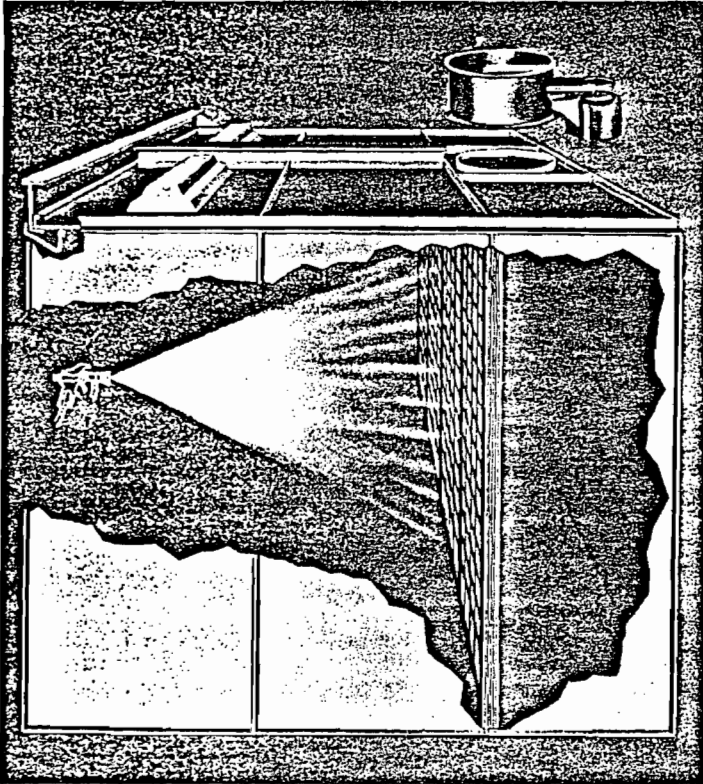
MODEL CT 614 SHAKER COLLECTOR DIMENSIONS AND WEIGHTS										
MODEL	A	B	C	D	E	F	G	H	CLOTH AREA	FRAME WEIGHT
120-CT-614	5'-6"1676	6'-2"1850	22'-2"6562	9'-8"318	2'-5"737	5'-6"1695	2'-6"437	2'-6"437	2196'1'234"	290-242
144-CT-614	5'-6"1911	6'-2"2130	22'-2"6754	5'-3"1991	2'-11"889	6'-6"2000	2'-6"437	2'-6"437	2635'1'245"	520-260C
168-CT-614	7'-6"2286	6'-2"1860	22'-2"6756	5'-9"1143	3'-5"1041	7'-6"2303	2'-6"610	2'-6"437	3071'1'244"	6200-288
192-CT-614	8'-6"2594	7'-6"2286	25'-6"7163	5'-2"965	3'-11"1194	8'-6"2640	2'-6"610	2'-6"437	3241'1'225"	6578-2490
216-CT-614	9'-6"2896	7'-6"2286	25'-6"7163	5'-6"1067	4'-5"1346	9'-6"2985	2'-6"610	2'-6"610	3953'1'367"	7800-3275
240CT-614	10'-6"3200	8'-6"2585	24'-5"7442	5'-3"1600	4'-11"1499	10'-6"3219	2'-6"610	2'-6"610	4392'1'408"	7822-3546
264-CT-614	11'-6"3505	9'-3"2819	25'-3"7694	5'-9"1733	5'-5"1651	11'-6"3524	2'-6"610	2'-6"610	4831'1'449"	8317-3790
288-CT-614	12'-6"3810	10'-3"3073	26'-1"7951	6'-3"1905	5'-11"1803	12'-6"3822	2'-6"610	2'-6"610	5270'1'490"	8750-3976

NOTE:
1. DIMENSIONS APPROX. DO NOT USE FOR CONSTRUCTION
2. ALL METRIC DIMENSIONS IN MILLIMETRES, UNLESS NOTED OTHERWISE

DRAWN	POWELL	ORDER NO.	BMS-
CHK.		TITLE	GENERAL ARRANGEMENT
APP.	<i>[Signature]</i>	MODEL CT614 SHAKER	
DATE	5-1-80	WITH PYRAMID HOPPER	
SCALE:	NONE		
DO NOT SCALE DRAWING		PANGBORN	DWG. NO.
MACHINING TOLERANCES UNLESS OTHERWISE SPECIFIED			H-800541
FRACTIONAL SIZE 1/64			SHEET 1 OF 1
DECIMAL SIZE 2.005			

DEVILBISS 

PAINT ARRESTOR TYPE SPRAY BOOTHS



uses

for removal of air-borne paint particles from spray booth exhaust air by means of disposable filters. Requires regular schedule of filter replacement. Ideally suited for limited or intermittent spray operations, such as refinish shops, schools and production lines where paint consumption is moderate.

standard equipment

▣ **lights**—3 tube, vapor-proof type, rapid-start fluorescent fixtures provide broad source illumination for maximum reduction of shadows in work area.

▣ **fan rings**—provide reinforced flange type mounting to exhaust stack.

▣ **DF-483 draft gauge**—for compliance with OSHA.

▣ **exhaust fan**—Correct size and capacity to produce required air velocity for booths with or without conveyor openings. Open type motor is standard; explosion-proof or totally enclosed available. Fans conform to O.S.H.A. required noise levels of 90 db(A) or less.

▣ **paint arrester pads**—Full set of pads sufficient for initial operating period; plus generous supply for replacement.

▣ **hardware**—All nuts, bolts, fittings, seals, floor clip and tie angles furnished.

important: Specify electric current from which fan motor is to operate. Order required components for exhaust stack. (See pages 46-47).

exhaust chambers

Ideal for special enclosures constructed from standard panels, beams, etc. (see pages 42 and 43)—or for installation in a "spray finishing room." Consist of the complete exhaust chamber section (without the painting area enclosure), paint arrester frame and retainers and arrester pads. See pages 50 and 51 for accessories.

Note: Arrester booths may be erected for top or back exhaust outlet.

PAINT ARRESTOR TYPE SPRAY BOOTHS

Models and Specifications												100 fpm air velocity without conveyor openings						125 fpm air velocity without conveyor openings 100 fpm air velocity with conveyor openings up to 20% of booth frontal area						
DIMENSIONS Working Chamber (in feet)				Booth Overall (in feet and inches)				No. of Lights	No. of 20 x 25 Filters		Exhaust Chamber Only— No Fan	Booths with Lights, Fan and Motor	Booths with Fan and Motor with Light Openings Without Lights	Booths with Fan and Motor Without Light Openings and Lights	Fan less Motor	Dia. (in.)	H.P.	Exhaust Chamber Only— No Fan	Booths with Lights, Fan and Motor	Booths with Fan and Motor with Light Openings Without Lights	Booths with Fan and Motor Without Light Openings and Lights	Fan less Motor	Dia. (in.)	H.P.
W	H	D	W	H	D	Req.	Fur.																	
4	7	6	4.4	7-2	9-2	—	12	36	XCF-600	—	—	XDF-6132	JH-4842	24	1½	XCF-600	—	—	XDF-6332	JH-4844	24	¾		
6	7	6	6-4	7-2	9-2	1	18	36	XCF-601	XDF-6000	XDF-6066	XDF-6133	JH-4846	24	1	XCF-601	XDF-6200	XDF-6266	XDF-6333	JH-4850	24	1½		
6	7	9	6-4	7-2	12-2	1	18	36	XCF-601	XDF-6001	XDF-6067	—	JH-4846	24	1	XCF-601	XDF-6201	XDF-6267	—	JH-4850	24	1½		
6	8	6	6-4	8-2	9-2	1	18	36	XCF-602	XDF-6002	XDF-6068	XDF-6134	JH-4850	24	1½	XCF-602	XDF-6202	XDF-6268	XDF-6334	JH-4429	24	1½		
6	8	9	6-4	8-2	12-2	1	18	36	XCF-602	XDF-6003	XDF-6069	—	JH-4850	24	1½	XCF-602	XDF-6203	XDF-6269	—	JH-4428	24	1½		
8	7	6	8-4	7-2	9-2	1	24	36	XCF-603	XDF-6004	XDF-6070	XDF-6135	JH-4427	24	1½	XCF-603	XDF-6204	XDF-6270	XDF-6335	JH-4428	24	2		
8	7	9	8-4	7-2	12-2	1	24	36	XCF-603	XDF-6005	XDF-6071	—	JH-4427	24	1½	XCF-603	XDF-6205	XDF-6271	—	JH-4429	24	2		
8	8	6	8-4	8-2	9-2	1	24	36	XCF-605	XDF-6006	XDF-6072	XDF-6136	JH-4428	24	1½	XCF-605	XDF-6206	XDF-6272	XDF-6336	JH-4430	24	3		
8	8	9	8-4	8-2	12-2	1	24	36	XCF-605	XDF-6007	XDF-6073	—	JH-4428	24	1½	XCF-605	XDF-6207	XDF-6273	—	JH-4430	24	3		
10	7	6	10-4	7-2	9-2	2	36	36	XCF-607	XDF-6008	XDF-6074	XDF-6137	JH-4429	24	2	XCF-607	XDF-6208	XDF-6274	XDF-6337	JH-4425	24	3		
10	7	9	10-4	7-2	12-2	2	36	36	XCF-607	XDF-6009	XDF-6075	—	JH-4429	24	2	XCF-607	XDF-6209	XDF-6275	—	JH-4425	24	3		
10	8	6	10-4	8-2	9-2	2	36	36	XCF-609	XDF-6010	XDF-6076	XDF-6138	JH-4430	24	3	XCF-610	XDF-6210	XDF-6276	XDF-6338	JJ-4404	34	2		
10	8	9	10-4	8-2	12-2	2	36	36	XCF-609	XDF-6011	XDF-6077	—	JH-4430	24	3	XCF-610	XDF-6211	XDF-6277	—	JJ-4404	34	2		
10	8	12	10-4	8-2	15-2	4	36	36	XCF-609	XDF-6012	XDF-6078	—	JH-4430	24	3	XCF-610	XDF-6212	XDF-6278	—	JJ-4404	34	2		
10	10	6	10-4	10-2	9-2	2	48	72	XCF-611	XDF-6013	XDF-6079	—	JJ-4841	34	2	XCF-611	XDF-6213	XDF-6279	—	JJ-4400	34	3		
10	10	9	10-4	10-2	12-2	2	48	72	XCF-611	XDF-6014	XDF-6080	—	JJ-4841	34	2	XCF-611	XDF-6214	XDF-6280	—	JJ-4400	34	3		
10	10	12	10-4	10-2	15-2	4	48	72	XCF-611	XDF-6015	XDF-6081	—	JJ-4841	34	2	XCF-611	XDF-6215	XDF-6281	—	JJ-4400	34	3		
12	7	6	12-4	7-2	9-2	2	42	72	XCF-613	XDF-6016	XDF-6082	XDF-6139	JJ-4431	24	3	XCF-614	XDF-6216	XDF-6282	XDF-6339	JJ-4404	34	2		
12	7	9	12-4	7-2	12-2	2	42	72	XCF-613	XDF-6017	XDF-6083	—	JH-4431	24	3	XCF-614	XDF-6217	XDF-6283	—	JJ-4404	34	2		
12	8	6	12-4	8-2	9-2	2	42	72	XCF-615	XDF-6018	XDF-6084	XDF-6140	JJ-4839	34	1½	XCF-615	XDF-6218	XDF-6284	XDF-6340	JJ-4400	34	3		
12	8	9	12-4	8-2	12-2	2	42	72	XCF-615	XDF-6019	XDF-6085	—	JJ-4839	34	1½	XCF-615	XDF-6219	XDF-6285	—	JJ-4400	34	3		
12	8	12	12-4	8-2	15-2	4	42	72	XCF-615	XDF-6020	XDF-6086	—	JJ-4839	34	1½	XCF-615	XDF-6220	XDF-6286	—	JJ-4400	34	3		
12	8	15	12-4	8-2	18-2	4	42	72	XCF-615	XDF-6021	XDF-6087	—	JJ-4839	34	1½	XCF-615	XDF-6221	XDF-6287	—	JJ-4400	34	3		
12	10	6	12-4	10-2	9-2	2	56	72	XCF-617	XDF-6022	XDF-6088	—	JJ-4400	34	3	XCF-617	XDF-6222	XDF-6288	—	JJ-4402	34	5		
12	10	9	12-4	10-2	12-2	2	56	72	XCF-617	XDF-6023	XDF-6089	—	JJ-4400	34	3	XCF-617	XDF-6223	XDF-6289	—	JJ-4402	34	5		
12	10	12	12-4	10-2	15-2	4	56	72	XCF-617	XDF-6024	XDF-6090	—	JJ-4400	34	3	XCF-617	XDF-6224	XDF-6290	—	JJ-4402	34	5		
12	10	15	12-4	10-2	18-2	4	56	72	XCF-617	XDF-6025	XDF-6091	—	JJ-4400	34	3	XCF-617	XDF-6225	XDF-6291	—	JJ-4402	34	5		
14	7	6	14-4	7-8	9-2	2	48	72	XCF-619	XDF-6026	XDF-6092	XDF-6141	JJ-4839	34	1½	XCF-619	XDF-6226	XDF-6292	XDF-6341	JJ-4400	34	3		
14	7	9	14-4	7-8	12-2	2	48	72	XCF-619	XDF-6027	XDF-6093	—	JJ-4839	34	1½	XCF-619	XDF-6227	XDF-6293	—	JJ-4400	34	3		
14	8	6	14-4	8-8	9-2	2	48	72	XCF-621	XDF-6028	XDF-6094	XDF-6142	JJ-4405	34	3	XCF-621	XDF-6228	XDF-6294	XDF-6342	JJ-4401	34	5		
14	8	9	14-4	8-8	12-2	2	48	72	XCF-621	XDF-6029	XDF-6095	—	JJ-4405	34	3	XCF-621	XDF-6229	XDF-6295	—	JJ-4401	34	5		
14	8	12	14-4	8-8	15-2	4	48	72	XCF-621	XDF-6030	XDF-6096	—	JJ-4405	34	3	XCF-621	XDF-6230	XDF-6296	—	JJ-4401	34	5		
14	8	15	14-4	8-8	18-2	4	48	72	XCF-621	XDF-6031	XDF-6097	—	JJ-4405	34	3	XCF-621	XDF-6231	XDF-6297	—	JJ-4401	34	5		
14	10	6	14-4	10-8	9-2	2	64	72	XCF-623	XDF-6032	XDF-6098	—	JJ-4401	34	5	XCF-624	XDF-6232	XDF-6298	—	JK-4401	42	5		
14	10	9	14-4	10-8	12-2	2	64	72	XCF-623	XDF-6033	XDF-6099	—	JJ-4401	34	5	XCF-624	XDF-6233	XDF-6299	—	JK-4401	42	5		
14	10	12	14-4	10-8	15-2	4	64	72	XCF-623	XDF-6034	XDF-6100	—	JJ-4401	34	5	XCF-624	XDF-6234	XDF-6300	—	JK-4401	42	5		
14	10	15	14-4	10-8	18-2	4	64	72	XCF-623	XDF-6035	XDF-6101	—	JJ-4401	34	5	XCF-624	XDF-6235	XDF-6301	—	JK-4401	42	5		
16	7	6	16-4	7-8	9-2	2	54	72	XCF-626	XDF-6036	XDF-6102	XDF-6143	JJ-4405	34	3	XCF-626	XDF-6236	XDF-6302	XDF-6343	JJ-4401	34	5		
16	7	9	16-4	7-8	12-2	2	54	72	XCF-606	XDF-6037	XDF-6103	—	JJ-4405	34	3	XCF-626	XDF-6237	XDF-6302	—	JJ-4401	34	5		
16	8	6	16-4	8-8	9-2	2	54	72	XCF-628	XDF-6038	XDF-6104	XDF-6144	JJ-4400	34	3	XCF-628	XDF-6238	XDF-6304	XDF-6344	JJ-4402	34	5		
16	8	9	16-4	8-8	12-2	2	54	72	XCF-628	XDF-6039	XDF-6105	—	JJ-4400	34	3	XCF-628	XDF-6239	XDF-6305	—	JJ-4402	34	5		
16	8	12	16-4	8-8	15-2	4	54	72	XCF-628	XDF-6040	XDF-6106	—	JJ-4400	34	3	XCF-628	XDF-6240	XDF-6306	—	JJ-4402	34	5		
16	8	15	16-4	8-8	18-2	4	54	72	XCF-628	XDF-6041	XDF-6107	—	JJ-4400	34	3	XCF-628	XDF-6241	XDF-6307	—	JJ-4402	34	5		
16	10	6	16-4	10-8	9-2	2	72	72	XCF-631	XDF-6042	XDF-6108	—	JJ-4402	34	5	XCF-632	XDF-6242	XDF-6308	—	JK-4402	42	5		
16	10	9	16-4	10-8	12-2	2	72	72	XCF-631	XDF-6043	XDF-6109	—	JJ-4402	34	5	XCF-632	XDF-6243	XDF-6309	—	JK-4402	42	5		
16	10	12	16-4	10-8	15-2	4	72	72	XCF-631	XDF-6044	XDF-6110	—	JJ-4402	34	5	XCF-632	XDF-6244	XDF-6310	—	JK-4402	42	5		
16	10	15	16-4	10-8	18-2	4	72	72	XCF-631	XDF-6045	XDF-6111	—	JJ-4402	34	5	XCF-632	XDF-6245	XDF-6311	—	JK-4402	42	5		
18	7	6	18-4	7-8	9-2	3	60	72	XCF-634	XDF-6046	XDF-6112	XDF-6145	JJ-4400	34	3	XCF-634	XDF-6246	XDF-6312	XDF-6345	JJ-4402	34	5		
18	7	9	18-4	7-8	12-2	3	60	72	XCF-634	XDF-6047	XDF-6113	—	JJ-4400	34	3	XCF-634	XDF-6247	XDF-6313	—	JJ-4402	34	5		
18	8	6	18-4	8-8	9-2	3	60	72	XCF-637	XDF-6048	XDF-6114	XDF-6146	JJ-4401	34	5	XCF-638	XDF-6248	XDF-6314	XDF-6346	JK-4405	42	5		
18	8	9	18-4	8-8	12-2	3	60	72	XCF-637	XDF-6049	XDF-6115	—	JJ-4401	34	5	XCF-638	XDF-6249	XDF-6315	—	JK-4405	42	5		
18	8	12	18-4	8-8	15-2	6	60	72	XCF-637	XDF-6050	XDF-6116	—	JJ-4401	34	5	XCF-638	XDF-6250	XDF-6316	—	JK-4405	42	5		
18	8	15	18-4	8-8	18-2	6	60	72	XCF-637	XDF-6051	XDF-6117	—	JJ-4401	34	5	XCF-638	XDF-6251	XDF-6317	—	JK-4405	42	5		
18	10	6	18-4	12-8	9-2	3	80	108	XCF-640	XDF-6052	XDF-6118	—	JK-4405	42	5	XCF-641	XDF-6252	XDF-6318	—	JL-4400	48	5		
18	10	9	18-4	12-8	12-2	3	80	108	XCF-640	XDF-6053	XDF-6119	—	JK-4405	42	5	XCF-641	XDF-6253	XDF-6320	—	JL-4400	48	5		
18	10	12	18-4	12-8	15-2	6	80	108	XCF-640	XDF-6054	XDF-6120	—	JK-4405	42	5	XCF-641	XDF-6254	XDF-6320	—	JL-4400	48	5		
18	10	15	18-4	12-8	18-2	6	80	108	XCF-640	XDF-6055	XDF-6121	—	JK-4405	42	5	XCF-641	XDF-6255	XDF-6321	—	JL-4400	48	5		
20	7	6	20-4	7-8	9-2	4	72	72	XCF-624	XDF-6056	XDF-6122	XDF-6147	JJ-4401	34	5	XCF-643	XDF-6256	XDF-6322	XDF-6347	JK-4401	42	5		
20	7	9	20-4	7-8	12-2	4	72	72	XCF-642	XDF-6057	XDF-6123	—	JJ-4401	34	5	XCF-643	XDF-6257	XDF-6323	—	JK-4401	42	5		
20	8	6	20-4	8-8	9-2	4</																		

APPENDIX 1
SOLUBILITY GRAPHS

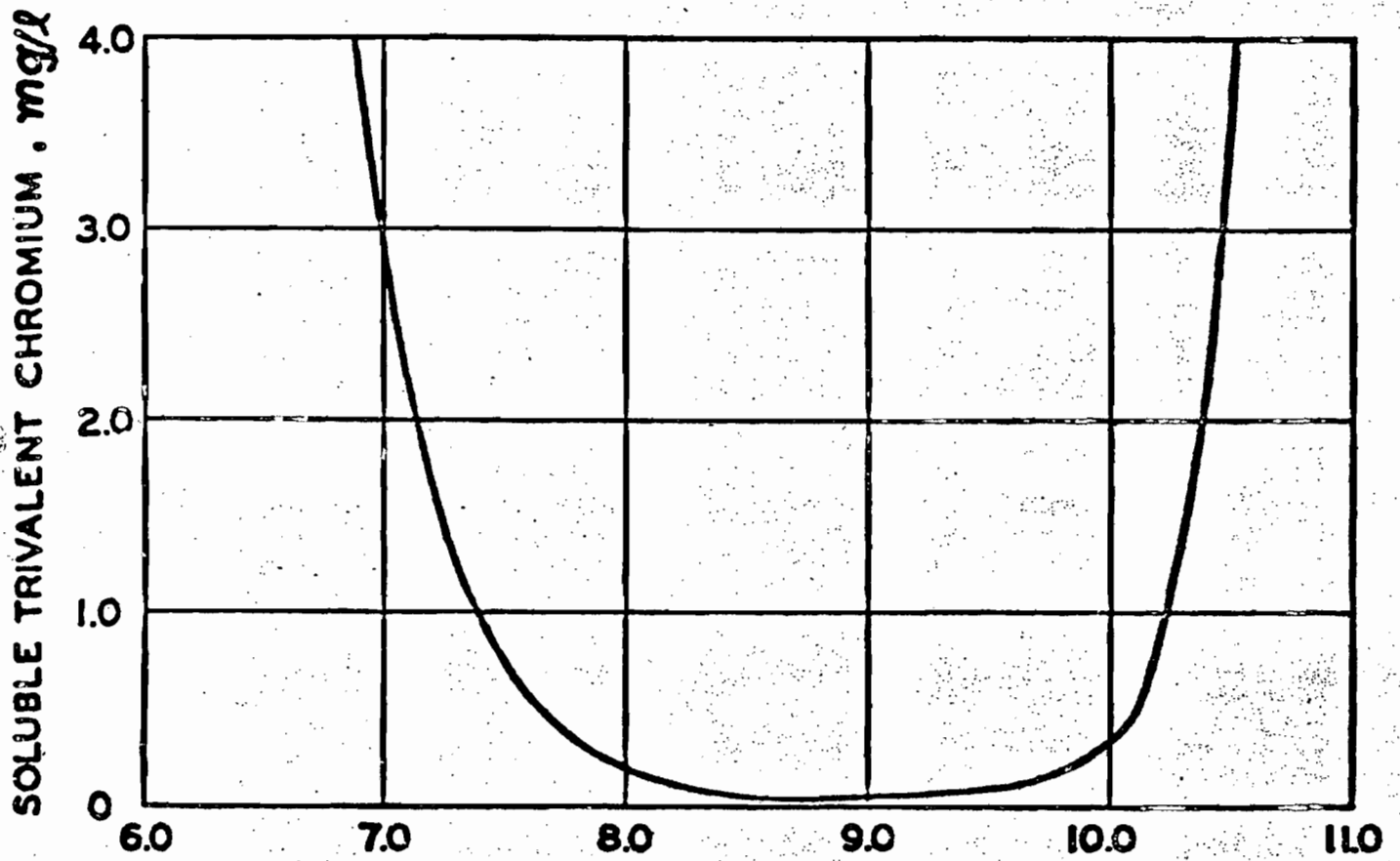


FIGURE 7-10
EFFECT OF PH ON SOLUBILITY OF TRIVALENT CHROMIUM.

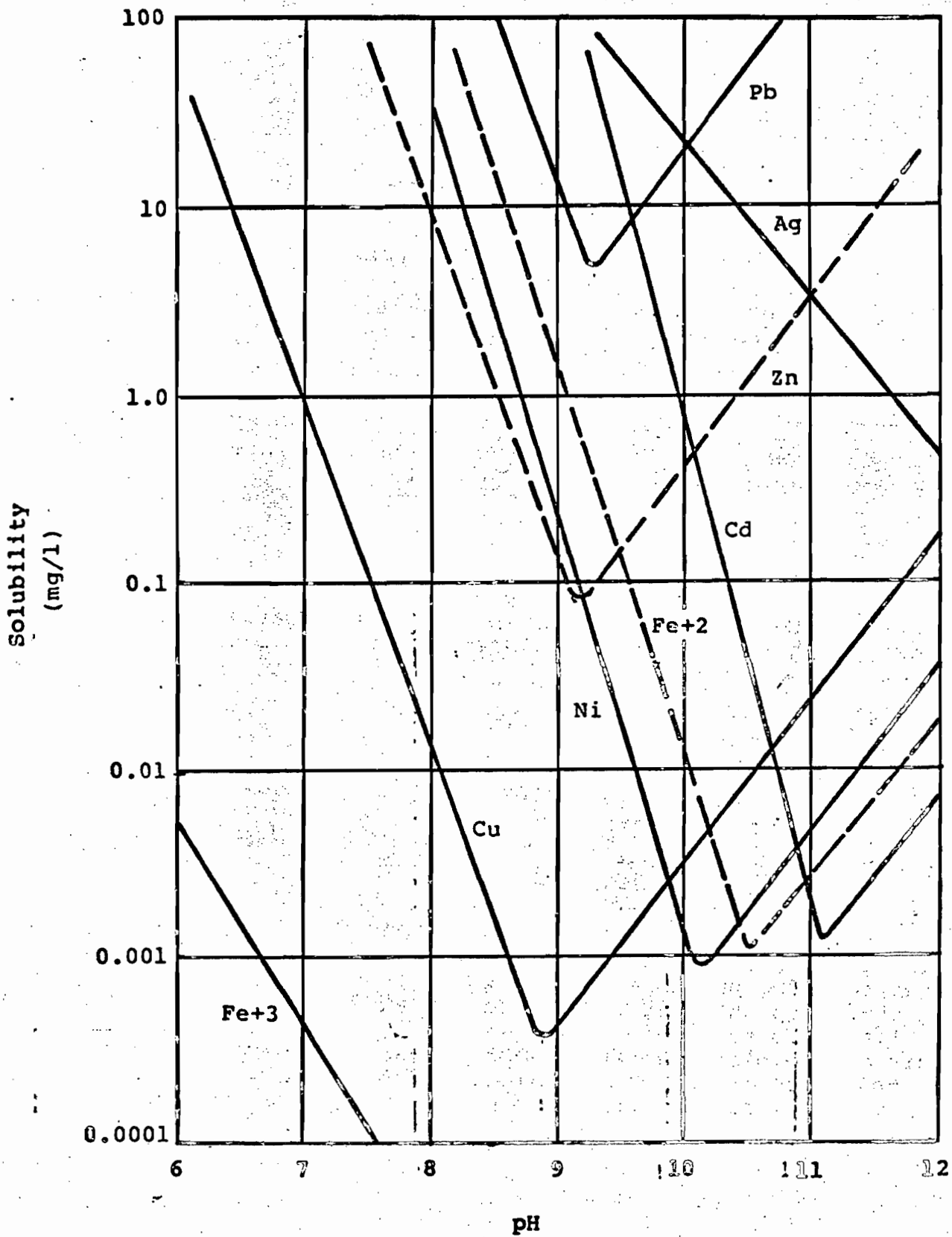


FIGURE 7-4

SOLUBILITIES OF METAL HYDROXIDES AS A FUNCTION OF pH

APPENDIX 2
EPA PRETREATMENT GUIDELINES
(EXCERPTS)

Wednesday
January 28, 1981



Part III

**Environmental
Protection Agency**

**Effluent Guidelines and Standards;
Electroplating Point Source Category
Pretreatment Standards for Existing
Sources**

Subpart B—Electroplating of Precious Metals Subcategory

- 413.20 Applicability: Description of the electroplating of precious metals subcategory.
- 413.21 Specialized definitions.
- 413.22 [Reserved]
- 413.24 Pretreatment standards for existing sources.

Subpart C—Electroplating of Specialty Metals Subcategory [Reserved]

Subpart D—Anodizing Subcategory

- 413.40 Applicability: Description of the anodizing subcategory.
- 413.41 Specialized definitions.
- 413.42 [Reserved]
- 413.44 Pretreatment standards for existing sources.

Subpart E—Coatings Subcategory

- 413.50 Applicability: Description of the coatings subcategory.
- 413.51 Specialized definitions.
- 413.52 [Reserved]
- 413.54 Pretreatment standards for existing sources.

Subpart F—Chemical Etching and Milling Subcategory

- 413.60 Applicability: Description of the chemical etching and milling subcategory.
- 413.61 Specialized definitions.
- 413.62 [Reserved]
- 413.64 Pretreatment standards for existing sources.

Subpart G—Electroless Plating Subcategory

- 413.70 Applicability: Description of the electroless plating subcategory.
- 413.71 Specialized definitions.
- 413.74 Pretreatment standards for existing sources.

Subpart H—Printed Circuit Board Subcategory

- 413.80 Applicability: Description of the printed circuit board subcategory.
- 413.81 Specialized definitions.
- 413.84 Pretreatment standards for existing sources.

Authority: Secs. 301, 304(g), 307, 308, 309, 402, 405, 501(a) of the Clean Water Act, as amended (33 U.S.C. §§ 1311, 1314.(g), 1317, 1318, 1319, 1322, 1325, and 1341(a)).

General Provisions

§ 413.01 Applicability.

(a) This Part shall apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts, whether such operations are conducted in conjunction with electroplating, independently or part of some other operation. The compliance deadline for integrated facilities shall be 3 years from the effective date of 40 CFR 403.6(e). The compliance deadline for non-integrated facilities shall be May 12, 1983.

(b) Operations similar to electroplating which are specifically excepted from coverage of this Part include: (1) Electrowinning and electrorefining conducted as a part of nonferrous metal smelting and refining (40 CFR 421); (2) Metal surface preparation and conversion coating conducted as a part of coil coating (40 CFR 465); (3) Metal surface preparation and immersion plating or electroless plating conducted as a part of porcelain enameling (40 CFR 466); and (4) electrodeposition of active electrode materials, electroimpregnation, and electroforming conducted as a part of battery manufacturing (40 CFR 461).

(c) Metallic platemaking and gravure cylinder preparation conducted within printing and publishing facilities, and continuous strip electroplating conducted within iron and steel manufacturing facilities which introduce pollutants into a publicly owned treatment works are exempted from the pretreatment standards for existing sources set forth in this Part.

§ 413.02 General definitions.

In addition to the definitions set forth in 40 CFR 401 and the chemical analysis methods set forth in 40 CFR 136, both of which are incorporated herein by reference, the following definitions apply to this Part:

(a) The term "C.N.A." shall mean cyanide amenable to chlorination as defined by 40 CFR 136.

(b) The term "C.N.T" shall mean cyanide, total.

(c) The term "Cr, VI" shall mean hexavalent chromium.

(d) The term "electroplating process wastewater" shall mean process wastewater generated in operations which are subject to regulation under any of subparts A through H of this Part.

(e) The term "total metal" is defined as the sum of the concentration or mass of Copper (Cu), Nickel (Ni), Chromium (Cr) (total) and Zinc (Zn).

(f) The term "strong chelating agents" is defined as all compounds which, by virtue of their chemical structure and amount present, form soluble metal complexes which are not removed by subsequent metals control techniques such as pH adjustment followed by clarification or filtration.

(g) The term "control authority" is defined as the POTW if it has an approved pretreatment program; in the absence of such a program, the NPDES State if it has an approved pretreatment program or EPA if the State does not have an approved program.

(h) The term "integrated facility" is defined as a facility that performs electroplating as only one of several

operations necessary for manufacture of a product at a single physical location and has significant quantities of process wastewater from non-electroplating manufacturing operations. In addition, to qualify as an "integrated facility" one or more plant electroplating process wastewater lines must be combined prior to or at the point of treatment (or proposed treatment) with one or more plant sewers carrying process wastewater from non-electroplating manufacturing operations.

§ 413.03 [Reserved.]

§ 413.04 Standards for integrated facilities.

Pretreatment standards for integrated facilities shall be computed as required by § 403.6(e) of EPA's General Pretreatment Regulations. In cases where electroplating process wastewaters are combined with regulated wastewaters which have 30 days average standards, the corresponding 30 day average standard for the electroplating wastewaters must be used. The 30 day average shall be determined for pollutants in the relevant subcategory from the corresponding daily and 4 day average values listed in the table below.

Of the maximum for any 1 day is	And the 3 day average is	Then the 30 day average is
0.6	0.0	0.3
1.2	.7	.5
1.9	1.0	.65
4.1	2.0	1.8
4.2	2.8	1.8
4.5	2.7	1.8
5.0	2.7	1.5
7.0	4.0	2.5
10.5	3.0	5
20.0	13.4	10
23	16	12
47	20	20
53	35	27
74	39	21
107	38	45
169	60	49
130	130	70
164	102	70
178	105	70
273	158	88
365	228	160
374	232	160
401	241	160
410	267	165
623	257	223
835	300	445

§ 413.05 [Reserved]

Subpart A—Electroplating of Common Metals Subcategory

§ 413.10 Applicability: Description of the electroplating of common metals subcategory.

The provisions of this subpart apply to dischargers of pollutants in process

wastewaters resulting from the process in which a ferrous or nonferrous basis material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

§ 413.11 Specialized definitions.

For the purpose of this subpart:
 (a) The term "sq m" ("sq ft") shall mean the area plated expressed in square meters [square feet].
 (b) The term "operation" shall mean any step in the electroplating process in which a metal is electrodeposited on a basis material and which is followed by a rinse; this includes the related operations of alkaline cleaning, acid pickle, stripping, and coloring when each operation is followed by a rinse.

§ 413.12 [Reserved]

§ 413.14 Pretreatment standards for existing sources.

Except as provided in 40 CFR 403.7 and 40 CFR 403.13, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR Part 403 and this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieved compliance with these standards.

(b) For a source discharging less than 38,000 liters (10,000 gal.) per calendar day of electroplating process wastewater the following limitations shall apply:

Subpart A.—Common Metals Facilities Discharging Less Than 38,000 Liters Per Day PSES Limitations (mg/l)

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
CN, A.....	5.0	2.7
Pb.....	.8	.4
Cd.....	1.2	.7

(c) For plants discharging 38,000 liters (10,000 gal) or more per calendar day of electroplating process wastewater the following limitations shall apply:

Subpart A.—Common Metals Facilities Discharging 38,000 Liters or More Per Day PSES Limitations (mg/l)

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
CN, T.....	1.9	1.0
Cu.....	4.5	2.7

Subpart A.—Common Metals Facilities Discharging 38,000 Liters or More Per Day PSES Limitations (mg/l)—Continued

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
Ni.....	4.1	2.6
Cr.....	7.0	4.0
Zn.....	4.2	2.6
Pb.....	.8	.4
Cd.....	1.2	.7
Total metals.....	10.5	6.8

(d) Alternatively, the following mass-based standards are equivalent to and may be applied in place of those limitations specified under paragraph (c) of this section upon prior agreement between a source subject to these standards and the publicly owned treatment works receiving such regulated wastes:

Subpart A.—Common Metals Facilities Discharging 38,000 Liters or More Per Day PSES Limitations (mg/sq m-Operation)

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
CN, T.....	76	39
Cu.....	176	105
Ni.....	160	100
Cr.....	273	156
Zn.....	164	102
Pb.....	23	16
Cd.....	47	29
Total metals.....	410	287

(e) For wastewater sources regulated under paragraph (c) of this section, the following optional control program may be elected by the source introducing treated process wastewater into a publicly owned treatment works with the concurrence of the control authority. These optional pollutant parameters are not eligible for allowance for removal achieved by the publicly owned treatment works under 40 CFR 403.7. In the absence of strong chelating agents, after reduction of hexavalent chromium wastes, and after neutralization using calcium oxide (or hydroxide) the following limitations shall apply:

Subpart A.—Common Metals Facilities Discharging 38,000 Liters or More Per Day PSES Limitations (mg/l)

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
CN, T.....	1.9	1.0
Pb.....	.3	.4
Cd.....	1.2	.7

Subpart A.—Common Metals Facilities Discharging 38,000 Liters or More Per Day PSES Limitations (mg/l)—Continued

Pollutant or pollutant property	Maximum for any 1 day	Average of daily values for 4 consecutive monitoring days shall not exceed
TSS.....	20.0	13.0
pH.....		

*Within the range 7.5 to 10.0.

Subpart B.—Electroplating of Precious Metals Subcategory

§ 413.20 Applicability: Description of the electroplating of precious metals subcategory.

The provisions of this subpart apply to discharges of process wastewaters resulting from the process in which a ferrous or nonferrous basis material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination of these.

§ 413.21 Specialized definitions.

For the purpose of this subpart:
 (a) The term "sq m" ("sq ft") shall mean the area plated expressed in square meters [square feet].
 (b) The term "operation" shall mean any step in the electroplating process in which a metal is electrodeposited on a basis material and which is followed by a rinse; this includes the related operations of alkaline cleaning, acid pickle, stripping, and coloring when each operation is followed by a rinse.

§ 413.22 [Reserved]

§ 413.24 Pretreatment standards for existing sources.

Except as provided in 40 CFR § 403.7 and § 403.13, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR Part 403 and achieve the following pretreatment standards for existing sources (PSES):

(a) No user introducing wastewater pollutants into a publicly owned treatment works under the provisions of this subpart shall augment the use of process wastewater or otherwise dilute the wastewater as a partial or total substitute for adequate treatment to achieve compliance with this standard.

(b) For a source discharging less than 38,000 liters (10,000 gal) per calendar day of electroplating process wastewater the following limitations shall apply:

APPENDIX 3

APPLICATION FOR PERMIT TO CONSTRUCT/OPERATE

WASTEWATER PRETREATMENT FACILITIES,

DADE COUNTY, FLORIDA

**METROPOLITAN DADE COUNTY
ENVIRONMENTAL RESOURCES MANAGEMENT**
909 SE 1st Avenue (Brickell Plaza) Rm. 402
Miami, Florida 33131
Telephone: 579-2760

Page No. W-1 of 11

Code No. _____

File No. _____

NOTE: FOR ADDITIONAL INFORMATION SEE ENGINEERING REPORT BY ENWRIGHT ASSOCIATES, INC. DATED MARCH 1981.

Application for PERMIT TO CONSTRUCT X, TO OPERATE X, ALL INDUSTRIAL AND COMMERCIAL LIQUID OR SOLID WASTE POLLUTION SOURCES.

0 Basics

A	S.E.C.No. SIC number 3728			e. Solid Waste Yes	f. Liquid Waste Yes
	Section	Township	range	C	
B				Effluent Point UTM GRID N. _____ E. _____	MAP _____ a. QUADR. _____ SECT. _____
	D Address Code:			E State Permit No.	a. Date 3-6-81

Name of Establishment: Cleveland Pneumatic Product Service Division, Inc.

Location: Bldg. #2121, Miami International Airport, Miami, Florida

Type of Business: Aircraft Landing Gear Part Rebuilding Tel. No.: Not Available

Owner or Authorized Person: Ned Agene Title: V.P. of Operations

Business Mailing Address: P. O. Box 52 0320, Bldg. #2121

MIAD, Miami International Airport Tel. No.: _____

Miami, Florida 33152

Finished Product: Rebuilt Aircraft Landing Gear Assemblies

Type of Pollution Source: Metal Plating Wastewaters

New Source X Existing Source _____ Modification _____ Relocation _____

Days per year in Operation 200 No. of Shifts 2 (Normally, per day)
Days per week in Operation 5
Hours per day in Operation 16

SEASONAL OPERATION:
From N/A To N/A

Number of Employees: 100

NOTE: ALL CHANGES OF ADDRESSES AND OWNERSHIP OF ESTABLISHMENTS OR PERMANENT INCREASES OF NORMAL PRODUCTION QUANTITIES REQUIRE NEW PERMITS. NOTIFY DADE COUNTY POLLUTION CONTROL WITHIN 10 DAYS.

Mr. Ned Agene X
Owner or Responsible Official
Vice President of Operations
Title
March 6, 1981
Date

Inspector _____
Hand Delivered _____ Date _____
Mailed _____ Date _____
P. C. Engineer _____

**METROPOLITAN DADE COUNTY
ENVIRONMENTAL RESOURCES MANAGEMENT**

Page No W-2

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

Estimated cost of Liquid Waste control facilities:

Type of Treatment Units Chrome treatment reactor, cyanide treatment reactor, 2-stage neutralization-precipitation, flocculation, 2 clarifiers, sand filter, chemical addition tanks and pumps, sludge dewatering bag filter.

Cost: \$100,000

Type of Collection System: Three sump tanks with pumps, one holding tank with pump, associated piping.

Cost: \$ 10,000

TOTAL COST: \$110,000

I. GENERAL

B. Water Supply

1. Sources: Public Water Main

Utility Company Name: Dade County Aviation Dept.

Number of Own Wells

0

2. Volume Used Cu/Ft/Mo.

or Gal./mo.

325,000 gal/month
(Process Water)

C. Industrial Waste Source

1. Type of industry and products manufactured: Rebuilt Aircraft Landing Gear Assemblies

2. Raw materials and chemicals used; specify:

Nickel, boric acid, sulfuric acid, hydrofluoric acid, sodium hydrosulfite, cadmium, sodium cyanide, sodium carbonate, sodium hydroxide, chromium, sodium dichromate, chromic acid, nitric acid and hydrochloric acid.

3. Estimated production rate (tons/day, lbs/day, units/day, etc.)

See attached report.

4. Attach an 8½" x 11" schematic flow diagram showing the source of each waste, method of collection, measurement and transmission to the treatment plant, or effluent disposal point.

5. Include a map detailing the location of the establishment, all permanent structures and roadways in the vicinity, the receiving stream and points of effluent discharge.

6. Submit a diagrammatic layout of the treatment plant units and indicate the direction of waste flow.

See attached report.

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

C. Waste Characteristics:

	Before Treatment	Final Effluent mg/l
Suspended Solids		5
Dissolved Solids	Present	
Settleable Solids		
Total Solids		
Odor		
Turbidity		
Color		
Specific Conductance	unknown	
Temperature		<150°F
Dissolved Oxygen	unknown	
B.O.D.	N/A	
C.O.D.		
Total Coliform (MPN)		
Fecal Coliform		
Organic Nitrogen		
Ammonia Nitrogen		
Nitrate Nitrogen		
Total Nitrogen		
Radioactive Materials		
Sulfates	Present	
Sulfides		
Total Phosphate		
Surface-active agents (LAS)		
Oils and Greases		
Carbon Chloroform Extr.		
Chlorides		
Fluorides		
Phenolic Compounds		
pH		5.5 to 9.5 units
Iron	Present	
Cyanides	Present	≤ 0.01
Cyanates		Present
Hex. Chromium	Present	0.5
Total Chromium	Present	1.0
Copper		
Zinc		
Lead		
Arsenic		
Silver		
Mercury		
Cadmium	Present	0.5
Potassium		
Algicides		
Pesticides		
Fecal Strep		
Others: Nickel	Present	2.6

*Final effluent samples for analyses should be collected prior to chlorination or after dissipation of excessive residual chlorine in polishing ponds.

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

III. Treatment and Disposal Units:

A. List the sequence and name the treatment units and disposal systems and specify the number, dimensions, capacity and design criteria. Use additional sheets if necessary.

TREATMENT or DISPOSAL UNITS	DIMENSIONS, AREAS, CAPACITIES, and OTHER DESCRIPTIVE DATA	DESIGN CRITERIA
Chrome Treatment Reactor	330 gallon tank	16 mins. retention at 20 gpm
Cyanide Treatment Reactor	330 gallon tank	16 mins. retention at 20 gpm
Neutralization - Precipitation	2 - 330 gallon tanks	16 mins. retention at 20 gpm (each)
Flocculation	150 gallon tank	7 mins. retention at 20 gpm
Clarifiers	2 - 1250 gallon tanks	2 hrs. retention at 20 gpm
Sand Filter	Upflow, continuous backwash type	2.85 gpm/ft ² (max.)
Sludge Dewatering	Bag Filter Type	35 gals. of 15% solids per 24 hours

NOTE: See attached report for further details.

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

D. Chlorination:

1. Yes _____ No X
2. Points of Application:
3. Type of Chlorinator:
4. Maximum Capacity of Chlorinator:
5. Chlorine Dosage:
6. Retention Time in Contact Tank During Peak Flow:
7. Average Chlorine Residual in Effluent

IV. Ultimate Effluent Disposal:

1. Surface Waters: N/A Fresh _____, Brackish _____
River _____, Canal _____, Ditch _____, Lake _____, Bay _____, Ocean _____
Other: _____

Give Name of Receiving Body and Location of Effluent Point:

UTM Grid Location _____

Description of Receiving Water:

(Weekly flow, physical, chemical and biological characteristics)

Describe Outfall:

Diameter of Outfall _____ Length of Outfall from plant _____

Length of Outfall from Shore _____

Water Depth at Outfall (During Low Water Level): _____

Outfall Invert Over Normal Receiving Water Level _____ Inches

Outfall Invert Below Normal Receiving Water Level _____ Inches

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

2. Ground Disposal: N/A

Type of Disposal Structures

Surface Irrigation _____ **Subsurface Irrigation** _____

Ponding & Percolation _____

Drainage Well _____*

***(State Permit No.** _____ **Date** _____)

Soakage Pit _____**

**** (County Permit No.** _____ **Date** _____)

Details of Ground Disposal:

Area Irrigated: _____ **Acres** **Crop** _____

Irrigation Rate:

Percolation Rate:

Describe Irrigation Equipment:

Disposal of Runoff:

Size of Pond: _____ **Depth of Pond** _____

Percolation Rate:

Overflow Disposal:

Soakage Pit Size _____ **Depth of Soakage Pit** _____

Percolation Rate:

Overflow Disposal:

**METROPOLITAN DADE COUNTY
ENVIRONMENTAL RESOURCES MANAGEMENT**

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NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

Drainage Well Depth _____ **Diameter** _____

Quantities Drained _____ **GPD**

Supply Water Well Depth _____ **Feet**

**Distance from Drainage Well or
Other Disposal Site to Well** _____ **Ft.** (Indicate on Layout sketch)

**Number and Distance of Other
Fresh Water Wells within 500 feet
distance from Disposal Site:**

Ground Water Elevation:

Ground Water Flow Direction:

3. Connected to Public Sewer System:

Name of Utility: Dade County Aviation Department (DCAD)

Location of Sewer Connection: approximately 180 feet south of the northwest corner of Bldg. #2121 at the Miami International Airport.

Date of Approval by Utility to Connect to their sewer:

Pending approval of attached report by D.C.A.D.

4. Holding Tank:

Capacity of Tank: N/A **Location:** **Above Ground** _____

Type of Waste: **Below Ground** _____

Frequency of Pump Out:

Collected by:

Disposal at:

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

V. OTHER INFORMATION:

A. Sludge and Waste Handling and Disposal

1. List sludge treatment units

Bag Filter Sludge Dewatering Unit

2. Volume and composition of Final Sludge:

Max. of 35 gallons per day of metal hydroxide sludge at 15% solids.

3. Method and location of ultimate sludge disposal:

Interim storage in 55 gal. drums, then to approved hazardous wastes site.

4. Name of Disposal Company: (Proposed)

Collection Waste Management
Emelle, Alabama
Alabama Approval #ALC000622464

Other Wastes

Solid Waste: Metallic scraps to recycler; paint filters to Alabama.

1. Composition:
2. Quantity per Week:
3. Method & Location of Disposal:
4. Name of Disposal Company:

Liquid Waste (Disposed of in Drums or Containers) Solvent to recycler.

1. Composition:
2. Quantity per Week:
3. Method & Location of Disposal:
4. Name of Disposal Company:

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

B. Own Laboratory

1. List tests which can be performed: pH
2. Sampling point locations: Treated Effluent
3. Frequency of Sampling and Analyses:
4. Date of Last Test Report to Pollution Control

Name of Outside Laboratory Envirofact, Inc.

C. Operation:

NAMES OF OPERATORS & SUPERVISORS	QUALIFICATIONS	TELEPHONE
William D. Propes Quality Control Lab Supervisor	WWTP Operator 6 Yrs. (Certified Illinois) Service Tech; DMP, 2 Yrs.	Unknown
David Sibila Operator	6 months experience with Metals Applied, Cleveland, Ohio	Unknown

Duration of Time the Plant is under supervision: 8 hrs/day

D. State if and when any treatment units will be bypassed:

See attached report

NAME OF COMPANY: Cleveland Pneumatic Product Service Division, Inc.

E. Is Auxiliary power provided for:

Treatment facilities No

Lift Stations No

Chlorinator Not Applicable

F. List all standby equipment provided:

See Attached Report

G. In plant waste reduction and/or reuse:

See Attached Report

H. State total amount of water for different processes and amount of process effluents reused:

See Attached Report

APPENDIX 4

APPLICATION FOR PERMIT TO CONSTRUCT/OPERATE
AIR POLLUTION SOURCES, DADE COUNTY, FLORIDA

NOTE: FOR ADDITIONAL INFORMATION SEE ENGINEERING REPORT BY ENWRIGHT ASSOCIATES, INC., DATED MARCH 1981.

METROPOLITAN DADE COUNTY, FLORIDA



ENVIRONMENTAL RESOURCES MANAGEMENT
909 S.E. FIRST AVENUE
BRICKELL PLAZA BUILDING—RM. 402
MIAMI, FLORIDA 33131
(305) 579-2760

APPLICATION FOR PERMIT TO CONSTRUCT/OPERATE AN AIR POLLUTION SOURCE

FOR DERM USE ONLY:

PERMIT CLASSIFICATION _____

— A fee of \$ _____ must accompany this application. Make checks payable to Metropolitan Dade County.

— Authority to construct or install granted by _____ on _____ 19 _____.

INSTRUCTIONS:

All information spaces must be completed in full. Submitting this application DOES NOT relieve you of any responsibility for complying with orders issued to you by the ENFORCEMENT SECTION or stop or delay any normal enforcement procedures. Read this application carefully BEFORE you begin to fill it out. Call the Air Section at 579-2760, if there are any questions. Please include ALL equipment, operations, procedures, and activities which have a potential to emit air pollutants. Failure to include any potential source of air pollutants, could initiate enforcement action. Please type or print.

1. PERMIT TO BE ISSUED TO:

Cleveland Pneumatic Product Service Division, Inc.

Business Name

c/o P.O. Box 52 0320, Bldg. 2121 MIAD, Miami International Airport, Miami, Florida 33152

Mailing Address

City

Zip Code

2. Permit request for construction or installation change of operator, leasee or owner transfer of location existing equipment.

— Estimated completion date April, 1981

3. Pollution Permit issued previously NO YES Permit No. _____

4. Brief Process Description: Cleveland Pneumatic will disassemble, rebuild, and reassemble aircraft landing gear parts.

5. List or describe equipment: Fume Scrubbers(2), Dust Collectors(2), Vapor Degreaser(1), Arrestor Type Spray Booth.

(See Attached Report)

6. Address where equipment located: Bldg. #2121, Miami International Airport, Miami, 33152

Street Address

City

Zip Code

7. Normal equipment operating time 16 hrs/day 5 days/wk 40 wks/yr. (Fume Scrubbers will operate 24 hrs/day)

COMBUSTION SOURCES SUMMARY

8. Source Type: None
9. Manufacturer N.A. Model No. _____ Serial No. _____
Horsepower or BTU rating _____
10. Used to generate: Steam at _____ psig Hot water
Other Specify _____
11. Type of fuel: Gas Oil Type _____
12. Burner Manufacturer _____ Model No. _____
Size _____ Maximum Firing Rate _____ Gal/Hr.

B OVEN SUMMARY

13. Manufacturer _____ Model No. _____ Serial No. _____
14. Oven Dimensions (Inside) 86" wide 60" high 118" deep Oven #1
54" wide 48" high 93" deep. Oven #2
15. Fuel Electric BTU _____

C SPRAYBOOTH AND/OR EXHAUST SYSTEM SUMMARY

16. DeVilbiss XDF-6215
Manufacturer Model No. Serial No.
17. Exhaust Fan Data: Manufacturer _____ No. of fans 1
Model No. JJ-440 Fan speed (RPM) _____
Horsepower 3 Volume (CFM) _____
18. Exhaust Filters: No. 48 Dimensions 20" x 25" x 1"
Type of material multilayer; expanded fiber
19. Spraybooth Data: Automotive Floor Bench
Dimensions: 10' wide 10' high 12' deep. (Inside)
20. Exhaust hood dimensions: N/A wide _____ long.
34" Diameter Stack

21. Brief description of exhaust emission controls. (Give cyclone type, dia, length of cone; for baghouse, give no. of bags, length & diameter of bags, and type of material; for emission scrubbers or waterwash give capacity in gallons per minute & motor HP; if other type of control, specify).

See Attached Report

CLEANING AND COATING SOLVENTS:

Please supply formulation data for all cleaning and coating products which your operation uses, so that your status as per Florida State Rule, Chapter 17-2, may be determined. Use extra sheets as may be required.

Operation	Products Used	Weight (lbs) Per Gallon	% Solvent by WT.	Solvent Names	Vapor Pressure mmHg @ 68°F	Utilization Rate (GPD)
Vapor Degreaser		12.2	100	Trichloro Ethylene	100	20 gpd
				or		
		11.2	100	1,1,1,-Tri Chloroethane		

NB. Your surface preparation description must state whether method used is wet cloth, spray, solvent tank, etc.

below
↑

If the above data entries do not adequately pertain to your specific operation, then please explain your surface preparation method below.

GENERAL PROJECT INFORMATION:

CHECK THE APPROPRIATE BOXES WHICH BEST DESCRIBE YOUR OPERATIONS.

Painting Operations: brush by hand; air spraying; pressure airless spraying; heat curing and drying.

Adhesive, Glue, Cement Operations: brush by hand; air spraying; pressure; airless spraying; heat curing and drying.

Woodworking Operations: cutting; sanding; planing.

Plastic Working Operations: cutting; sanding; Injection molding; pressure forming; Heat molding.

Textile Operations: cutting; dyeing; printing; heat setting; Knitting or weaving.

Fiberglass Operations: hand layup; chopper gun layup; gelcoat application; sanding; cutting.

The issuing of an AIR POLLUTION CONTROL OPERATING PERMIT for the equipment herein described is subject to FIELD ENGINEERING INVESTIGATION AND EVALUATION. Please notify this office of the completion of this installation or construction.

Let it be known that any statements shown on this document are made in full knowledge of the contents of Section 21-24.1, Code of Metropolitan Dade County, titled "False Statements with Intent to Receive Benefit" which states "It shall be unlawful for any person directly or indirectly on his own behalf or on behalf of another or others to make to or file with any officer or employee or department or division of the county any false statement or representation with knowledge of the falsity thereof and for the purpose or with the intention of receiving for himself or another or others any benefit, including but not limited to, any permit, license, service, certificate, contract"...conviction of a violation of this section is punishable by a \$500.00 fine or sixty (60) days imprisonment, or both. It is with full understanding of all of the above that these statements are made:

I, Mr. Ned Angene, Vice President of Operations
Name In Print (A Corporate Officer) Title
of Cleveland Pneumatic Product Service Division, Inc.
Business Name

NOTARY PUBLIC
OR DERM OFFICER

Signature

Date

APPENDIX 5

STATE OF FLORIDA AIR POLLUTION APPLICATION

NOTE: FOR ADDITIONAL INFORMATION SEE ENGINEERING REPORT BY ENWRIGHT ASSOCIATES, INC. DATED MARCH 1981.



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
APPLICATION TO OPERATE/CONSTRUCT
AIR POLLUTION SOURCES

SOURCE TYPE: Plating Operations New¹ Existing¹
APPLICATION TYPE: Construction Operation Modification
COMPANY NAME: Cleveland Pneumatic Product Service Division COUNTY: Dade

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) fume scrubbers (2), dust collectors (2), vapor degreaser (1), arrestor type spray booth (1).

SOURCE LOCATION: Street Bldg. #2121 Miami International Airport City Miami
UTM: East 570000m. North 2853000m.
Latitude 25° 47' 45" N Longitude 80° 18' 05" W

APPLICANT NAME AND TITLE: Ned Angene, Vice President of Operations
APPLICANT ADDRESS: P.O. Box 52 0320, Bldg. 2121, MIAD, Miami Intl. Airport, Miami, Fla., 33152

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Cleveland Pneumatic Product Service Division (see list above)

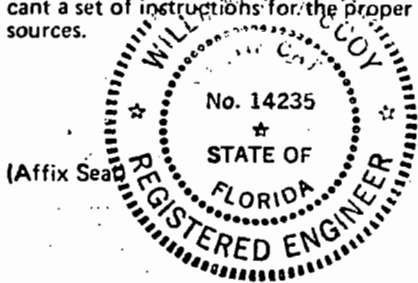
I certify that the statements made in this application for a permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: [Signature]
Ned Angene, Vice President of Operations
Name and Title (Please Type)
Date: [Signature] Telephone No. _____

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.



Signed: William R. McCoy
William R. McCoy
Name (Please Type)
Enwright Associates, Inc.
Company Name (Please Type)
Post Office Box 5287, Sta. B., Greenville, S.C. 29606
Mailing Address (Please Type)
Date: 3-5-81 Telephone No. 803/288-5190

Florida Registration No. 14235

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.
Two (2) water spray fume scrubbers for metal plating bath fumes; Two (2) dust collectors - one (1) fully self-contained (no discharge) for sand blasting operations - one (1) cloth tube bag collector for shot peen operations, one (1) vapor degreaser unit, and one (1) paint arrestor type spray booth - (see attached report).

B. Schedule of project covered in this application (Construction Permit Application Only)
 Start of Construction March 1981 Completion of Construction April 1981

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Fume Scrubbers:	\$60,000
Dust Collector:	\$ 8,000
Vapor Degreaser:	\$ 1,000
Spray Booth:	\$12,000

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.
None

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? Yes No

F. Normal equipment operating time: hrs/day 16; days/wk 5; wks/yr 40; if power plant, hrs/yr N/A; if seasonal, describe: all air pollution equipment will operate when required. Due to job nature of operations, equipment will not operate continuously.

G. If this is a new source or major modification, answer the following questions. (Yes or No)

- | | |
|---|------------|
| 1. Is this source in a non-attainment area for a particular pollutant? | <u>yes</u> |
| a. If yes, has "offset" been applied? | <u>N/A</u> |
| b. If yes, has "Lowest Achievable Emission Rate" been applied? | <u>N/A</u> |
| c. If yes, list non-attainment pollutants.
<u>Ozone</u> | |
| 2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. | <u>No</u> |
| 3. Does the State "Prevention of Significant Deterioration" (PSD) requirements apply to this source? If yes, see Sections VI and VII. | <u>No</u> |
| 4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? | <u>No</u> |
| 5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? | <u>No</u> |

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Trichloroethylene	VOC	100	15.25	N/A
1.1.1. Trichloroethane	VOC	100	14.00	N/A
Paint	VOC	30	1	N/A
		45%	1.5	

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): _____ N/A
2. Product Weight (lbs/hr): _____ N/A

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission ¹		Allowed Emission ² Rate per Ch. 17-2, F.A.C.	Allowable ³ Emission lbs/hr	Potential Emission ⁴		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
VOC's	16.	26			16.	26.	
Paint	1	4			1	4	
Dust							

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles ⁵ Size Collected (in microns)	Basis for Efficiency (Sec. V, It ⁵)
Mapco Model #MW-100 Fume Scrubber	Metal Plating Bath Fumes	97%	N/A	Vendor
Mapco Model #MW-100D Fume Scrubber	Metal Plating Bath Fumes	99%	N/A	Vendor
Vacu-Blast Dust Collector	Sandblasting Dust	No Discharge	N/A	N/A
Pangborn Model #168-CT-614 Dust Collector	Shot Peen Dust	99.99%	To 0.5 Micron	Vendor
Vapor Degreaser Tank	Solvent Cleaning Solution	N/A	N/A	N/A
DeVilbiss Model #XDF-6215 Paint Arrestor	Spray Paint Particles			

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard

⁴Emission, if source operated without control (See Section V, Item 3)

⁵If Applicable

E. Fuels

N/A

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating. Annual Average N/A Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

Liquid waste from fume scrubbers overflow will be treated in wastewater pretreatment plant. Paint filters and dust will be disposed of in accordance with appropriate regulations.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack): Paint Arrestor Spray Booth

Stack Height: To 3 feet above roof line ~~ft~~ Stack Diameter: 34 inches ~~ft~~

Gas Flow Rate: 12,500 ACFM Gas Exit Temperature: N/A °F.

Water Vapor Content: N/A % Velocity: 100 FPM ~~ft/min~~

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ days/week _____

Manufacturer _____

Date Constructed _____ Model No. _____

NOT APPLICABLE

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: Cyclone Wet Scrubber Afterburner Other (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

SECTION V: SUPPLEMENTAL REQUIREMENTS

SEE ATTACHED REPORT

Please provide the following supplements where required for this application.

1. Total process input rate and product weight – show derivation.
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.).
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

- 9. An application fee of \$20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.
- 10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

NOT APPLICABLE

- A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
 Yes No

Contaminant	Rate or Concentration

- B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) Yes No

Contaminant	Rate or Concentration

- C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

- D. Describe the existing control and treatment technology (if any).

- | | |
|---------------------------|----------------------|
| 1. Control Device/System: | 4. Capital Costs: |
| 2. Operating Principles: | 6. Operating Costs: |
| 3. Efficiency: * | 8. Maintenance Cost: |
| 5. Useful Life: | |
| 7. Energy: | |
| 9. Emissions: | |

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

NOT APPLICABLE

10. Stack Parameters

- | | | | |
|---------------|------|-----------------|-----|
| a. Height: | ft. | b. Diameter: | ft. |
| c. Flow Rate: | ACFM | d. Temperature: | °F |
| e. Velocity: | FPS | | |

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

- a. Control Device:
- b. Operating Principles:

- c. Efficiency*:
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy*:
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

- a. Control Device:
- b. Operating Principles:

- c. Efficiency*:
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy**:
- h. Maintenance Costs:
- i. Availability of construction materials and process chemicals:

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power — KWH design rate.

3.

- a. Control Device:
- b. Operating Principles:

- c. Efficiency*:
- d. Capital Cost:
- e. Life:
- f. Operating Cost:
- g. Energy:
- h. Maintenance Cost:

*Explain method of determining efficiency above.

- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

- a. Control Device
- b. Operating Principles:
- c. Efficiency*:
- d. Capital Cost:
- e. Life:
- f. Operating Cost:
- g. Energy:
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

- 1. Control Device:
- 2. Efficiency*:
- 3. Capital Cost:
- 4. Life:
- 5. Operating Cost:
- 6. Energy:
- 7. Maintenance Cost:
- 8. Manufacturer:
- 9. Other locations where employed on similar processes:

a.

- (1) Company:
- (2) Mailing Address:
- (3) City:
- (4) State:
- (5) Environmental Manager:
- (6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

- (1) Company:
- (2) Mailing Address:
- (3) City:
- (4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

NOT APPLICABLE

A. Company Monitored Data

1. _____ no sites _____ TSP _____ () SO²* _____ Wind spd/dir

Period of monitoring _____ / _____ / _____ to _____ / _____ / _____
 month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? _____ Yes _____ No

b) Was instrumentation calibrated in accordance with Department procedures? _____ Yes _____ No _____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from _____ / _____ / _____ to _____ / _____ / _____
 month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO ²	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

APPENDIX 6
FLORIDA AIR POLLUTION RULES
(EXCERPTS)

terminals and the appurtenant equipment necessary to load the tank truck or trailer compartments.

2. Emission Limiting Standards

Sources affected under 17-2.16(6)(j)l. shall not allow mass emissions of volatile organic compounds from control equipment to exceed 4.7 grains per gallon (80 milligrams per liter) of gasoline loaded.

3. Control Technology

No person shall load gasoline into any tank trucks or trailers from any bulk gasoline terminal unless:

- a. Displaced vapors and gases are vented only to the vapor control system; and,
- b. A means is provided to prevent liquid waste from the loading device at disconnect or when it is not in use; and,
- c. All loading and vapor lines equipped with fittings are vapor tight; and.

d. The bulk gasoline terminal is equipped with a vapor control system, capable of complying with 17-2.16(6)(j) 2., properly installed, in good working order, in operation, and consisting of one of the following:

- (i) A vapor recovery system which processes and recovers vapors and gases from the equipment being controlled; or,
- (ii) A vapor collection system which directs all vapors to a fuel system.

(k) Gasoline Service Stations Stage I —

1. Applicability

Emission limiting standards and control technology set forth in 17-2.16(6)(k) shall apply to all gasoline dispensing facilities.

2. Control Technology

a. Except as provided under 17-2.16(6)(k) 1., no owner or operator shall transfer or cause or allow the transfer of gasoline from any delivery vessel into any stationary storage tank located at a gasoline dispensing facility, with a capacity of 2,000 gallons (7,570 liters) or more unless the tank is equipped for submerged filling and the vapors displaced from the storage tank during filling are processed by a vapor control system in accordance with 16-2.16(6)(k) 2.b.

b. The vapor control system required by 17-2.16(6)(k) 2.c. shall include one or more of the following control methods:

(i) A vapor-tight line from the storage tank to the delivery vessel and a system that will ensure the vapor line is connected before gasoline can be transferred into the tank; or,

(ii) A system designed to recover at least 80 milligrams per liter of the organic compounds in the displaced vapor.

c. The vapor-laden delivery vessel shall be subject to the following conditions:

(i) The delivery vessel shall be designed and maintained to be vapor tight at all times except for normal pressure vacuum venting as required by the Federal Department of Transportation or for maintenance inspection, or gauging.

(ii) The vapor-laden delivery vessel shall be refilled only at bulk gasoline plants complying with 17-2.16(6)(i) or 17-2.16(6)(j) or at bulk gasoline plants or terminals using Reasonably Available Control Technology

(RACT), (if such points or terminals are located in a nonattainment area), but in no case shall RACT be less stringent than the regulations contained in 17-2.16(6)(k) and 17-2.16(6)(j).

(1) Petroleum Refinery Sources —

1. Applicability

The emission limiting standards and control technology set forth in 17-2.16(6)(1) shall apply to vacuum-producing systems, wastewater separators, and process unit turnarounds at petroleum refining sources.

2. Control Technology

a. The owner or operator of any vacuum producing systems at a petroleum refinery shall not permit the emission of any noncondensable volatile organic compounds from the condensers, hot wells, or accumulators of the system.

b. The emission limit under 17-2.16(6)(1) 2.a. shall be achieved by:

(i) Piping the noncondensable vapors to a firebox or incinerator; or,

(ii) Compressing the vapors and adding them to the refinery fuel gas.

c. The owner or operator of any wastewater (oil/water) separators handling wastewater (containing volatile organic compound) at a petroleum refinery shall:

(i) Provide covers and seals on all separators and forebays; and,

(ii) Equip all openings in covers, separators, and forebays with lids or seals so that the lids or seals are in the closed position at all times except on demand for sampling, maintenance, repair, or necessary operational practice.

d. The owner or operator of a petroleum refinery shall develop a detailed procedure for minimization of volatile organic compound emissions during process unit turnaround. As a minimum, the procedure shall provide for:

(i) Depressurization venting of the process unit or vessel to a vapor recovery system, flare, or firebox; and,

(ii) No emission of volatile organic compounds from a process unit or vessel until its internal pressure is 19.7 psia (136 kilopascals) or less.

(m) Solvent Metal Cleaning —

1. Applicability

a. The emission limiting standards and control technology set forth in 17-2.16(6)(m) shall apply to cold cleaning, open-top vapor degreasing, and conveyORIZED degreasing operations.

b. The provisions of 17-2.16(6)(m) shall apply with the following exceptions:

(i) Open-top vapor degreasers with an open area smaller than 10.8 square feet (one square meter) shall be exempt from 17-2.16(6)(m) 3.c.,

(ii) ConveyORIZED degreasers with an air/vapor interface smaller than 21.5 square feet (2.0 square meters) shall be exempt from 17-2.16(6)(m) 4.b.

2. Cold Cleaning Control Technology

Except as provided under 17-2.16(6)(m) 1., the owner or operator of a cold cleaning facility shall comply with each of the following requirements:

a. Equip the cleaner with a cover. The cover shall be so designed that it can be easily operated with one hand if:

(i) The solvent volatility is greater than 0.3 pounds per square inch (15 millimeters of mercury or 2 kilopascals) measured at 100 degrees F (38 degrees C);

(ii) The solvent is agitated;

(iii) The solvent is heated.

b. Equip the cleaner with a facility for draining cleaned parts. The drainage facility shall be constructed internally so that parts are enclosed under the cover while draining if the solvent volatility is greater than 0.6 pounds per square inch (31 millimeters of mercury or 4.1 kilopascals) measured at 100 degrees F (38 Degrees C), except that the drainage facility may be external for the applications where an internal type cannot fit into the cleaning system.

c. Install one of the following control devices if the solvent volatility is greater than 0.6 pounds per square inch (31 millimeters of mercury or 4.1 kilopascals) measured at 100 degrees F (38 degrees C), or if the solvent is heated above 120 degrees F (50 degrees C);

(i) Freeboard that gives a freeboard ratio greater than or equal to 0.7; or,

(ii) Water cover (solvent must be insoluble in and heavier than water); or

(iii) Other systems of equivalent control such as refrigerated chiller or carbon absorption.

d. Provide a permanent, conspicuous label summarizing the operating requirements.

e. Store waste solvent only in covered containers and do not dispose of waste solvent or transfer it to another party, such that greater than 20 percent of the waste solvent (by weight) can evaporate into the atmosphere.

f. Close the cover whenever parts are not being handled in the cleaner.

g. Drain the cleaned parts for at least 15 seconds or until dripping ceases.

h. If used, supply a solvent spray that is a solid fluid stream (not a fine, atomized, or shower-type spray) at a pressure which does not cause excessive splashing.

3. Open Top Vapor Degreaser Control Technology

Except as provided under 17-2.16 (6) (m), the owner or operator of an open top vapor degreaser shall comply with each of the following requirements:

a. Equip the vapor degreaser with a cover that can be opened and closed easily without disturbing the vapor zone.

b. Provide the following safety switches:

(i) A condenser flow switch and thermostat which shut off the heat if the condenser coolant is either not circulating or too warm; and,

(ii) A spray safety switch which shuts off the spray pump if the vapor level drops more than 4 inches (10 centimeters) below the bottom condenser coil; and,

(iii) A vapor level control thermostat which shuts off the heat when the vapor level rises too high.

c. Install one of the following control devices:

(i) A freeboard ratio greater than or equal to 0.75, and a powered or mechanically assisted cover if the degreaser opening is greater than 10.8 square feet (1.0 square meter); or,

(ii) Refrigerated chiller; or,

(iii) An enclosed design (cover or door opens only when the dry part is actually entering or exiting the degreaser); or,

(iv) A carbon adsorption system, with ventilation greater than or equal to 50 cubic feet per minute per square foot (15 cubic meters per minute per square meter) of air/vapor area (when cover is open), and exhausting less than 25 parts per million of solvent averaged over one complete adsorption cycle.

d. Keep the cover closed at all times except when processing work loads through the degreaser.

e. Minimize solvent carryout by:

(i) Racking parts to allow complete drainage; and,

(ii) Moving parts in and out of the degreaser at less than 11 feet per minute (3.3 meters per minute); and,

(iii) Holding the parts in the vapor zone at least 30 seconds or until condensation ceases; and,

(iv) Decanting any pools of solvent on the cleaned parts before removal from the vapor zone; and,

(v) Allowing parts to dry within the degreaser for at least 15 seconds or until visually dry.

f. Not degrease porous or absorbent materials, such as cloth, leather, wood, or rope.

g. Not occupy more than half of the degreaser's open-top area with a workload.

h. Not load the degreaser to the point where the vapor level would drop more than 4 inches (10 centimeters) below the bottom condenser coil when the workload is removed from the vapor zone.

i. Always spray below the vapor level.

j. Repair solvent leaks immediately, or shut down the degreaser.

k. Store waste solvent only in covered containers and do not dispose of waste solvent or transfer it to another party, such that greater than 20 percent of the waste solvent (by weight) can evaporate into the atmosphere.

l. Not operate the cleaner so as to allow water to be visually detectable in solvent exiting the water separator.

m. Not use ventilation fans near the degreaser opening, nor provide exhaust ventilation exceeding 66 cubic feet per minute per square foot (20 cubic meters per minute per square meter) of degreaser open area, unless necessary to meet OSHA requirements.

n. Provide a permanent, conspicuous label, summarizing the operating procedure of 17-2.16(6) (m) 3.d. through 3.1.

4. Conveyorized Degreaser Control Technology

Except as provided under 17-2.16(6)(m)1., the owner or operator of a conveyorized degreaser shall comply with the following requirements:

a. Not use work-place fans near the degreaser opening, nor provide exhaust ventilation exceeding 66 cubic feet per minute per square foot (20 cubic meters per minute per square meter) of degreaser opening, unless necessary to meet Occupational Safety and Health Administration (OSHA) requirements. OSHA regulations are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., and may be inspected at the Department's Tallahassee Office.

b. Install one of the following control devices:

(i) Refrigerated chiller; or,

(ii) Carbon absorption system, with ventilation greater than or equal to 49 cubic feet per minute per square foot (15 cubic meters per minute per square meter) of air/vapor area (when downtime covers are open), and exhausting less than 25 parts per million of solvent by volume averaged over a complete absorption cycle.

c. Equip the cleaner with equipment, such as a drying tunnel or rotating (tumbling) basket, sufficient to prevent cleaned parts from carrying out solvent or liquid vapor.

d. Provide the following safety switches:

(i) A condenser flow switch and thermostat which shut off the sump heat if the condenser coolant is either not circulating or too warm; and,

(ii) A spray safety switch which shuts off the spray pump or the conveyor if the vapor level drops more than 4 inches (10 centimeters) below the bottom condenser coil; and,

(iii) A vapor level control thermostat which shuts off the heat when the vapor level rises too high.

e. Minimize openings during operation so that entrances and exits will silhouette workloads with an average clearance between the parts and the edge of the degreaser opening of less than 4 inches (10 centimeters) or less than 10 percent of the width of the opening.

f. Provide downtime covers for closing off the entrance and exit during shutdown hours.

g. Minimize carryout emissions by:

(i) Racking parts for best drainage; and,

(ii) Maintaining the vertical conveyor speed at less than 11 feet per minute (3.3 meters per minute).

h. Store waste solvent only in covered containers and not dispose of waste solvent or transfer it to another party, such that greater than 20 percent of the waste solvent (by weight) can evaporate into the atmosphere.

i. Repair solvent leaks immediately, or shut down the degreaser.

j. Not operate the cleaner so as to allow water to be visually detectable in solvent exiting the water separator.

k. Place downtime covers over entrances and exits of conveyorized degreasers immediately after the conveyors and exhausts are shutdown and do not remove them until just before startup.

(n) Cutback Asphalt —

1. Applicability

The emission limiting standard or control technology set forth in 17-2.16(6)(n)2. shall apply to the manufacture and use of cutback asphalts for paving or maintaining roads, streets, highways, and parking lots.

2. Control Standards

No person shall cause, allow, or permit the manufacture, mixing, storage, use, or application of cutback asphalts except where:

a. Long-life storage of liquid asphalt is necessary; or,

b. Stockpile storage of cold mixed asphaltic concrete patching material is necessary; or,

c. The use or application at ambient temperature less than 50 degrees F (10 degrees C) as determined by the nearest National Weather Bureau Station is necessary; or,

d. The cutback asphalt is to be used solely as a penetrating prime coat; or,

e. The cutback asphalt is to be used in a sand seal coat; or,

f. The cutback asphalt is to be used as a tack coat in the routine maintenance of public roads, or the minor betterment of public roads.

17-2.17 New Source Review for Nonattainment Areas

(1) Applicability

(a) General. Except for the statewide compliance provisions, 17-2.17(5)(a)3., the provisions of sections 17-2.17, 17-2.18, and 17-2.19 apply only to the emission of the air pollutant for which the nonattainment area is designated. For ozone nonattainment areas the provisions of Sections 17-2.17, 17-2.18, and 17-2.19 apply to the emission of volatile organic compounds (VOC).

(b) Nonattainment Areas

The provisions of Sections 17-2.17, 17-2.18, 17-2.19, and 17-2.20 apply to all sources or modifications which are located in or are proposed to be located in any nonattainment area, and which emit or may emit the affected air pollutant, unless specifically exempted by a provision of Section 17-2.17, 17-2.18, or 17-2.19.

(c) Areas Adjacent to Nonattainment Areas

1. All sources located at a distance greater than 50 kilometers from the boundary of a nonattainment area are exempt from the provisions of Sections 17-2.17, 17-2.18, and 17-2.19.

2. The following sources which are located within the area of influence are exempt from the provisions of Sections 17-2.17, 17-2.18, and 17-2.19:

a. All VOC sources.

b. All minor sources or minor modifications except for a series of modifications as set forth in Subsection 17-2.17(7)(b).

c. A major source or major modification which has a maximum predicted impact within the nonattainment area that is equal to or less than the significance levels set forth in Table I, Subsection 17-2.17(2)(c).

The impact prediction shall be made as specified in 17-2.18(5) and shall not take into account the impact of any emission offsets. For a major modification, the predicted impact shall be only for the increase in emissions that would result from the proposed modification or series of modifications.

d. New sources of fugitive particulate matter that are to be located more than five kilometers outside of the boundary of a particulate nonattainment area.

e. The following exemptions and special provisions are also applicable to the area of influence: Permit Exemptions (17-2.17(3)(a)1.a.(i)) Limited NSR Exemption (17-2.17(3)(a)1.a.(ii)) Mandatory Fuel Conversion Exemption (17-2.17(3)(a)1.b.) Resource Recovery Projects Exemption (17-2.17(3)(a)1.c.) Complex Source Rule Exemption (17-2.17(3)(a)2.c.) Facility Relocation (17-2.17(3)(b)1.a.) Standby Units (17-2.17(3)(b)1.b.) Open Burning (17-2.17(3)(b)1.c.) Source Reclassification (17-2.19) Intra-Facility Emission Banking (17-2.20)

(2) Special Provisions for Non-Exempt Sources Within the Area of Influence

(a) Provisions for Fugitive Particulate Matter

A new source of Fugitive Particulate Matter which is

APPENDIX 7

DADE COUNTY PRETREATMENT GUIDELINES

(EXCERPTS)

SUMMARY OF INDUSTRIAL WASTE DISCHARGE REGULATIONS

EFFLUENTS TO SEWERAGE SYSTEMS & RECEIVING WATERS

↓ both ↗
 † SECTION 24-11(9)
METRO-DADE COUNTY CODE

↓
 † MIAMI-DADE
 WATER AND
 SEWER AUTHORITY

EFFLUENTS TO
RECEIVING WATERS
 † ~~CITY OF MIAMI~~
DADE COUNTY CODE
SECTION 24-11

	150 ^o F 25-100*	150 ^o F 5.5-9.5	150 ^o F 25-100*	92 ^o F 30
Temperature	150 ^o F	150 ^o F	150 ^o F	92 ^o F
Grease & Oil	25-100*		25-100*	30
pH	5.5-9.5	5.5-9.5	5.5-9.5	6.0-8.5
BOD		210	300	15
Coliform				1000 Total; 0-Fec
Suspended Solids		210	300	15
Chlorine Demand			15	
Dissolved Oxygen				2.0 or greater
Turbidity				50 JCU
Chlorides				500
Detergents (LAS)				6.0
Phenols	.005	0.5	0.005	.001
Cn	.01	2.0	0.01	.01
Cu (Total)	0.5	10.0	0.5	0.5
Cr (Hex)	0.5		0.5	0.5
Cr (Total)	1.0	10.0	1.0	1.0
cd	0.5	2.0	0.5	
Zn (Total)	1.0	10.0	1.0	1.0
Boron		1.0		
Pb		0.1		0.5
Hg		2.0		None
Ni		10.0		
Fe		25.0		0.3
Ag				
Arsenic				.05
Sulfides				0.2

Note: Data expressed in mg/liter unless otherwise noted.

* 25/mg/l daily average

* 100 ** grab sample

Pond Master

1 APPLIES

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public utility which is in contempt of the board a sum of up to one hundred dollars (\$100.00) for each contemptuous act, payable to the Dade County finance director within fifteen (15) days of the board's ruling. (Ord. No. 75-27, § 6, 5-7-75)

Sec. 24-11. Prohibitions against water pollution.

(1) **PROHIBITIONS AGAINST DISCHARGE.** It shall be unlawful for any person to throw, drain, run or otherwise discharge into any of the waters of this county, or to cause, permit or suffer to be thrown, run, drained, allowed to seep, or otherwise discharged into such water any organic or inorganic matter which shall:

- (a) Breach the values set forth in section 24-11(2);
- (b) Cause water pollution as herein defined; or
- (c) Cause a nuisance or sanitary nuisance as herein defined.

(2) **EFFLUENT STANDARDS FOR DADE COUNTY.** All sewage treatment plants and industrial waste treatment plants (except those discharging to approved ocean outfalls) shall effect ninety per cent (90%) treatment or better at the defined sampling point (24-11(5)(a)). However, in no case shall the following effluent standards be exceeded (except where the standard is noted to be a minimum).

Chemical, physical, or biological characteristic

Dissolved oxygen	Not less than 2.0 mg/l.
Suspended solids	40 mg/l
Biochemical oxygen demand	30 mg/l
Floating solids	None visible to the naked eye
pH	6.0—8.5
Settleable solids	Not greater than 0.1 ml/l on Imhoff cone 1 hr. test
Oil and grease	30 mg/l
Odor producing substances	None attributable to sewage or industrial wastes

Chemical, physical, or biological characteristic

Temperature	Sources permitted after July 1, 1972	92°F
	Fresh water	(June-September) 92°F
	Salt water	(October-May) 90°F
Turbidity		50 JCU
Chlorides		500 mg/l ¹
Chromium		
Hexavalent		.5 mg/l
Total		1.0 mg/l
Copper		.5 mg/l
Cyanides		0.01 mg/l
Color		Not more than 10 units above normal background of the receiving water.
Foam		Effluent shall not cause foaming in the stream
Chlorine		Minimum residual level of .5 mg/l after a ½ hour contact time at peak flow, where the nature of the waste requires disinfection.
LAS		6.0 mg/l
Mercury		None detectable
Lead		0.05 mg/l
Arsenic		.05 mg/l
Phenol		0.001 mg/l
Iron		.3 mg/l
Zinc		1.0 mg/l
Sulfides		0.2 mg/l
Coliform organisms (MPN 100 ml)		1,000 total 0 Fecal
	In waters other than fresh water, waste shall not increase natural background more than ten per cent (10%).	

Chemical, physical, or biological characteristic

Other compounds

Other toxic or undesirable compounds than those listed above may occur in individual waste streams. Limits for these components may be specified by the pollution control officer based on the latest scientific knowledge concerning toxicity and adverse effects on the intended water use.

Synergistic action

Whenever scientific evidence indicates that a combination of pollutants exert a greater effect than the individual pollutants, the pollution control officer may, on the basis of these findings, lower the herein established limits to the level necessary to prevent damage to the waters of the county.

(3) **DISCHARGES AFFECTING WATER QUALITY.** It shall be unlawful for any person to discharge sewage, industrial wastes, cooling water and solid wastes, or any other wastes into the waters of this county, including but not limited to surface water, tidal salt water estuaries, or ground water in such quantities, and of such characteristics as:

- (a) May cause the receiving waters, after mixing with the waste streams, to be of poorer quality than the water quality standards set forth in 24-11(4);
- (b) To cause water pollution as defined in 24-3(31); or
- (c) To cause a nuisance or sanitary nuisance as herein defined.

(4) WATER QUALITY STANDARDS FOR DADE COUNTY:

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Supp. No. 119

647

Supp. No. 116

648

Chemical, Physical or Biological Characteristic	Fresh Water (water containing less than 500 ppm chlorides)	Tidal Salt Water (water containing more than 500 ppm chlorides)	Groundwater
Dissolved oxygen (mg/l)	5 ppm during at least 10 hours per 24-hour period, never less than 4 ppm, unless acceptable data indicate that the natural background dissolved oxygen is lower than the values established herein.		
Biochemical oxygen demand (mg/l)	Shall not exceed a value which would cause dissolved oxygen to be depressed below values listed under dissolved oxygen and in no case shall be great enough to produce nuisance conditions.		
pH	6.0-8.5 ¹		
Floating solids, settleable solids, sludge deposits	None attributable to sewage, industrial wastes or other wastes.	None attributable to sewage, industrial wastes, or other wastes.	6.0-8.5 ¹
Oil and grease (mg/l)	15 ²	15 ²	15 ²
Odor-producing substances	None attributable to sewage, industrial wastes, or other wastes. Threshold odor number not to exceed 21 at 60°C as a daily average.		
Temperature	Shall cause no environmental damage.		
Sources permitted prior to July 1, 1972	3° above ambient.	(June-September) 2° above ambient. (October-May) 4° above ambient.	
Sources permitted after July 1, 1972			
Turbidity	50, except after heavy rains.		
Ammonia (mg/l)	5 ppm as N	5 ppm as N	5 ppm as N
Chlorides (mg/l)	500 ³	500 ³	500 ³
Chromium (mg/l) total	.05	.05	.06
Copper (mg/l)	0.4	0.4	0.4
Cyanides (mg/l)	None detectable	None detectable	None detectable
Detergents (mg/l)	0.5	Insufficient to cause foaming	0.5

Chemical, Physical or Biological Characteristic	Fresh Water (water containing less than 500 ppm chlorides)	Tidal Salt Water (water containing more than 500 ppm chlorides)	Groundwater
Fluoride (mg/l)	1.4 as F	10 as F	1.4 as F
Lead (mg/l)	0.95	0.35	0.05
Phenol (mg/l)	0.001	0.005	0.001
Zinc (mg/l)	1.0	1.0	1.0
Sulfides (mg/l)	0.2	1.0	0.2
Coliform organisms (MPN/100 ml)	1,000 ⁴	1,000 ⁵	50
Mercury	None detectable	None detectable	None detectable
Iron	0.3 mg/l	0.3 mg/l	0.3 mg/l
Arsenic	0.05 mg/l	0.05 mg/l	0.05 mg/l
Specific conductance	500 micromhos per cm (fresh water). Not more than 100% above background, in waters other than fresh.		
Dissolved solids	Not to exceed 500 mg/l for monthly average or 1000 mg/l at any time.		
Radioactive substances	Gross beta activity (in known absence of strontium 90 and alpha emitters), not to exceed 1000 micro-microcuries at any time.		
Other compounds	Other toxic or undesirable compounds than those listed above may occur in individual waste streams. Limits for these components may be specified by the pollution control officer based on the latest scientific knowledge concerning toxicity and adverse effects of the intended water use.		
Synergistic action	Whenever scientific evidence indicates that a combination of pollutants exert a greater effect than the individual pollutants, the pollution control officer may, on the basis of these findings, lower the herein established limits to the level necessary to prevent damage to the waters of the county.		

1 Shall not cause the pH of the receiving waters to vary more than 1.0 unit. When the natural background pH lies outside the limits established, the introduction of a waste shall not displace the pH of the receiving waters more than 0.5 pH units from these standards.
 2 Waste shall not be visible, defined as iridescence, or cause taste or odors.
 3 Waste shall not increase natural background more than 10 percent.
 4 Maximum MPN/100 ml in a surface water used as a drinking water supply shall be 100.
 5 Maximum MPN/100 ml in a tidal water from which shellfish are harvested for human consumption shall be 70.

- (5) COMPLIANCE TESTS. Sampling points to determine compliance with section 24-11 shall be selected as follows:
- (a) *Effluents.* For compliance with the effluent standards in 24-11 (2) the samples shall be taken at the point past which no further treatment is given by the facility to the waste. An outfall line shall not be considered as further treatment. In facilities which have sand filter beds where the effluent percolates directly into the soil and no approved sampling points are provided, the samples will be taken before the sand filter and a five per cent (5%) overall reduction of the effluent sewage will be allowed.
 - (b) *Sampling stations* may be required to be installed if reasonable access is not available, as determined by the director, environmental resources management.
 - (c) *Surface water and tidal salt water.* The sample for compliance with the water quality standards of 24-11 (4) should normally be taken at a point at least fifty (50) feet from the point of discharge of the waste stream, where possible the samples should be taken upstream and downstream from the point of discharge.
 - (d) *Groundwater.* For compliance with section 24-11(4) samples shall be taken from wells nearest to and encircling the point of entry of a waste stream into the ground water table. Test wells may be required to be installed and maintained if existing sampling points are found to be inadequate in the judgment of the director, environmental resources management.
 - (e) *Methods.* All samplings and analysis shall be conducted in accordance with the procedures set forth in the latest edition of Standard Methods for the Examination of Water and Wastewater including Pattern Sediments and Sludges published jointly by American Public Health Association, American Water Works Association, and Water Pollution Control Federation or accepted sanitary engineering practices. Determination of plant efficiency and per cent removal of BOD and suspended solids shall be based on the average of three

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- (d) Coliform bacteria. Total coliform bacteria (MPN) shall not exceed one thousand (1,000) per one hundred (100) milliliters of sample.
- (e) Other deleterious material. The removal of all other deleterious material shall be not less than ninety per cent (90%) thereof.

(7) TERTIARY TREATMENT REQUIREMENTS. All new sewage treatment plants and industrial waste treatment facilities, except those discharging to approved ocean outfalls or deep disposal wells, shall provide for nutrient removal and at least ninety-five per cent (95%) removal of BOD and suspended solids.

In no case, however, shall the following effluent standards be breached:

- (a) BOD—15 mg/l maximum
- (b) Suspended solids—15 mg/l maximum
- (c) LAS—3.0 mg/l maximum
- (d) Phosphorus—1.0 mg/l maximum as (P)
- (e) All other applicable standards in section 24-11(2) shall be met.

(8) BY-PASSING UNLAWFUL. Where a waste treatment facility has been provided, it shall be unlawful to by-pass the facility or any portion thereof and to discharge untreated or inadequately treated wastes to the waters the facility was designed to protect. In the event of an emergency, the user may temporarily utilize a by-pass. It shall be his responsibility to immediately notify the pollution control officer. Such notification shall not relieve him from civil liability under this chapter.

(9) WASTES SHALL NOT BE DISCHARGED INTO SEWERS.

- (a) No sewage, industrial waste, or other waste shall be discharged into any sewer designed to carry storm water, nor shall storm water be discharged into a sewer designed to carry sewage;

- (b) No cooling water shall be discharged into any sewer designed to carry storm water without written approval of the DERM;
- (c) The provision of this section shall not be construed as precluding the installation of a combined system which has been approved by the director, environmental resources management, and the appropriate state agency, and any such installation shall be subject to all applicable state and county regulations; and
- (d) No person shall discharge or cause to be discharged into any sanitary sewer any of the following substances:
 1. Any liquid having a temperature higher than one hundred fifty (150) degrees Fahrenheit.
 2. Any water or waste containing more than one hundred (100) p.p.m. or exceed a daily average of twenty-five (25) p.p.m. of any grease or oil or any oily substance.
 3. Any gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas.
 4. Any waters or wastes containing a toxic or poisonous substance in sufficient quantity to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, or create any hazard in the receiving waters of the sewage treatment plant.
 5. Any garbage that has not been properly shredded, which shall mean the wastes from the preparation, cooking and dispensing of food that have been shredded to such degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle size greater than one-half (1/2) inch in any dimension.
 6. Any waters or wastes having a pH lower than five and five-tenths (5.5) or higher than nine and five-tenths (9.5) or having any other corrosive

property capable of causing damage or hazard to structures, equipment or personnel of the sewage works.

- 7. Any water or waste containing toxic substances in quantities in excess of the following limits and measured at the point of discharge into the sewer system:

Cyanides	0.01 p.p.m.
Copper, total	0.5 p.p.m.
Chromium, hexavalent	0.5 p.p.m.
Chromium, total	1.0 p.p.m.
Cadmium	0.5 p.p.m.
Zinc, total	1.0 p.p.m.

Or any substance that will pass through the sewage treatment plant and exceed the state requirements for the receiving stream.

- 8. Any water or waste containing phenols in excess of 0.605 p.p.m.
- 9. Any water or waste containing suspended solids or color of such character and quantity that unusual attention or expense is required to handle such materials at the sewage treatment plant, without a special permit.
- 10. Any toxic radioactive isotopes, without a special permit. (Ord. No. 67-95, § 1, 12-19-67; Ord. No. 70-44, § 33, 6-20-70; Ord. No. 72-76, § 3, 10-31-72; Ord. No. 73-1, § 1, 1-9-73; Ord. No. 75-27, § 7, 6-7-75)

Sec. 24-12. Potable water standards.

(1) GENERAL PROHIBITIONS. It shall be unlawful for any person, firm, corporation, private or public utility, to cause, permit or otherwise allow any potable water supply to breach the values set forth in section 24-12(2).

APPENDIX 8
CYANIDE TOXICITY AND ANALYSIS
(EXCERPTS)

**CYANIDE: AN OVERVIEW AND ANALYSIS
OF THE LITERATURE ON CHEMISTRY, FATE,
TOXICITY, AND DETECTION
IN SURFACE WATERS**

Prepared for:

The Inter-Industry Cyanide Group

Prepared by:

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June 1979

Baltimore New York Chicago Houston San Francisco

EXECUTIVE SUMMARY

This report, prepared by Ecological Analysts, Inc. (EA) for the Inter-Industry Cyanide Group, provides a critical overview of the literature on the chemistry, fate, toxicity, and detection of cyanide in surface waters. It also presents an independent assessment of how such information might be applied to the development of sound water quality criteria and standards for protecting aquatic life.

The results of this effort illustrate that there is sound scientific evidence that free cyanide and complex cyanides should be considered separately for the purposes of setting water quality criteria and standards, and for regulating cyanide discharges. Because it has been demonstrated that the principal toxic form of cyanide is molecular HCN, water quality criteria should be developed to limit the presence of HCN in surface waters, for the protection of aquatic life. Because there is no clear relationship between the toxic effects of cyanide and the levels of total cyanide in various cyanide-bearing wastes, criteria limiting total cyanide would be toxicologically meaningless. Cyanide criteria for protecting aquatic life must, therefore, be specific to the toxic form expressed either as molecular HCN alone or as "free cyanide."

Water quality standards and effluent limitations, on the other hand, may also involve additional site-specific concerns for the protection of a specified water use. For example, the physical/chemical properties of the receiving water, the composition of complexed cyanides in the effluent, the probability of sensitive life stages of aquatic life occurring concurrently with low river flow conditions, and a balancing of costs and benefits (including environmental) associated with different levels of protection (risk) for specific water uses, including aquatic life and human health, should be considered. The analytical methods used to establish compliance with standards should also be effluent-specific, because of the variability of the cyanide compounds measured by each analytical method and the variability of effluents.

The following paragraphs present a synopsis of the pertinent background information assembled to provide the bases for sound approaches to the management of cyanide wastes in surface waters.

Cyanide and cyanide compounds are found throughout the environment. Although, historically, cyanide in the environment has been associated with industrial point sources, cyanide and its derivatives are also found in the environment because of natural origins. Many plants--such as cabbages, almonds, and lima beans--contain cyanogenic glycosides in the intact plant cell. When they are hydrolyzed, they release hydrogen cyanide. The extent to which the decay of plants containing cyanide contributes to the cyanide levels in natural waters is unknown.

Cyanide exists in water in several forms, depending on a variety of physical and chemical factors. Free cyanides, molecular HCN plus CN^- , are in an equilibrium condition, with HCN being the predominant species at the pH of most natural waters. Complex cyanides also may exist in an equilibrium condition, with the CN^- ion. "Total cyanide" refers to the summation of the forms of cyanide, including free and complex cyanides.

Free cyanide is removed from surface waters through a combination of physical, chemical, and biological mechanisms. A variety of fungi, bacteria, and other microorganisms are capable of metabolizing cyanide. This has been shown primarily through studies of biological wastewater treatment systems. The extent of microbial degradation occurring under environmental conditions is not well-documented. Complex cyanide compounds dissociate in water to release a mixture of free cyanide and complex ions. Dissociation constants vary widely, but the complex iron cyanides are extremely stable. However, under certain conditions, the complex iron cyanides may undergo photolytic decomposition, and may serve as a delayed source of free cyanide. This factor is a water quality concern, because of the demonstrated toxicity of free cyanide to aquatic life. There are daily and seasonal changes in photolysis rate at any given latitude, as well as waterbody-specific variations relating to the presence of naturally occurring organic compounds, water depth, and climatological conditions. If photodecomposition proceeded rapidly, with no removal of the free cyanides produced, there is a concern that iron cyanides could pose potential toxicological problems. However, a number of factors which enhance photolysis also enhance removal. For example, water turbulence will both dilute the decomposition product, HCN, as well as promote its volatilization. Thus, the free cyanide released by photodecomposition is subject to various natural removal mechanisms. The influence of photodecomposition in terms of free cyanide concentration will depend on the relative rates of production and removal.

Since sources of cyanides in surface waters and rates of complexation, degradation, and volatilization of cyanide are governed by factors that vary from site to site, these factors should be considered on a case-by-case basis. The acute toxicity of simple and complex cyanide solutions to fish, under most surface water conditions tested in the laboratory, has been shown to be directly related to the concentration of molecular HCN generated from dissociation of the cyanide salts. The observed toxicity bears no clear or consistent relationship to the total cyanide content of different solutions containing metalocyanide complexes because of the variable stabilities of the complex anions within the pH ranges of natural waters. The cyanide ion (CN^-), existing in equilibrium with molecular HCN in aqueous solution, is only present in appreciable amounts in highly alkaline waters, and is therefore of little or no importance as a toxicant under most situations.

The major emphasis in recent research, therefore, has been to determine safe levels of free cyanide, primarily as HCN, in the aquatic environment. Data are available from laboratory bioassays with aquatic organisms tested at continuous exposure levels of molecular HCN as low as 0.0052 mg/l (5.2 μ g/l). Several factors have been reported to influence the acute toxicity of free cyanide to fish. These factors include pH, temperature, and dissolved oxygen. Low temperature has been shown to reduce the tolerance of warmwater and coldwater species to molecular HCN.

Standard analytical methodologies for determination of cyanide in water have been demonstrated by both inter- and intra-industry studies to be both inappropriate and imprecise. They are inappropriate because they do not distinguish between free and complexed cyanide, thus leading to potential overestimates of the potential for free cyanide in water. They are imprecise because they do not give statistically reliable free cyanide estimates in the low μ g/l range. A number of promising alternative methodologies have

been developed by industry, some of which are currently used on a limited site-specific basis. However, no single analytical method will be sufficient to answer all regulatory needs at this time, because of the variable specificities of the different techniques and because of the diversity of effluent-specific compounds that can contribute to the measurement of the desired forms of cyanide.



6. ANALYTICAL TECHNIQUES FOR DETERMINING CYANIDES

6.1 INTRODUCTION

In 1973, EPA issued "Proposed Effluent Limitation Guidelines" which restrict the levels of "total cyanide" and "cyanide amenable to chlorination" (Cyanide A) which can be present in industrial effluents. EPA has defined "cyanide" as molecular hydrogen cyanide or the cyanide ion (Gonter 1975b). The proposed toxicant effluent standards listed methods for determining "total cyanide" and Cyanide A. However, these methods have been demonstrated as incapable of distinguishing between free and complex cyanide, and are highly susceptible to interfering substances.

Several investigators have modified older methods and developed new techniques in search of a procedure that will accurately estimate free cyanide in the $\mu\text{g/l}$ range.

This chapter reviews and evaluates these procedures, and assesses their applicability for use in determining free cyanide at levels proposed in federal criteria and state standards.

6.2 DESCRIPTION OF ANALYTICAL TECHNIQUES

The following information, when available, was obtained and noted in Table 6-1 for each method described: (1) source of method; (2) final method of determination including range and lower detection limit; (3) interferences including removal techniques; (4) relative error (accuracy); (5) precision for given mean or range of values and standard deviation; (6) coefficient of variation; and (7) specificity of method, i.e., total cyanide, free cyanide, molecular HCN, etc.

6.2.1 Total Cyanide

As discussed in Section 5.2, free cyanide is the predominant toxic form of cyanide, although some relatively high concentrations of certain complex cyanide ions exhibit a certain degree of toxicity in the absence of free cyanide. However, at the present time, a number of state water quality standards and federal water quality criteria are derived for total cyanide. Therefore, a brief description of the analytical techniques used to measure total cyanide is presented.

A determination of total cyanide encompasses free cyanide, simple alkali cyanides, and metalocyanide complexes. A number of methods have been used to determine total cyanide in aqueous solutions (Table 6-1). These methods are found primarily in Standard Methods (1971 and 1976). In the interest of brevity, only 1976 Standard Methods are presented in Table 6-1. The basic process common to most of the methods consists of the reflux distillation of the sample using heat, mineral acid, and low vacuum. Distillation for approximately 2 hours is sufficient to hydrolyze most of the metalocyanides except perhaps those containing cobalt. Lengthy distillations for periods as long as 24 hours do not even decompose these cobaltcyanide complexes. The reflux procedure also serves to eliminate many classes of interfering substances which may hinder the final determination of the cyanide concentration.

detector and a polyaromatic polymer-packed column. In the analyses of aqueous solutions the authors obtained HCN peaks without any interference from other substances. The authors also reported their ability to determine HCN levels at 0.001 mg/l and to identify HCN concentrations as low as 15 ng when a 0.0025 mg/l (HCN) standard was injected directly onto the column.

Broderius (1973) modified the procedure developed by Schneider and Freund (1962) by constructing a new type of concentration column and using a colorimetric method for the determination of the CN concentration rather than gas chromatography. Using his technique, Broderius reported that in test solutions containing 0.005 mg/l to 0.972 mg/l HCN the accuracy was very good. Linear correlation coefficients of 0.9980 were obtained when the average HCN mg/l in the test solution was compared with the average HCN ($\mu\text{g/l}$ in dispersed air) collected in the concentration column. Thus determination of the concentrations of molecular HCN in the test solution by inference from the calibration curves could be an accurate estimate of molecular HCN concentrations.

Montgomery et al. (1969) developed a procedure whereby molecular hydrogen cyanide is extracted from the aqueous solution with 1, 1, 1 trichloroethane, transferred into sodium pyrophosphate and determined using colorimetry. The authors suggest that the method can be used to determine hydrogen cyanide up to 2.0 mg/l with a lower detection limit of < 0.01 mg/l. The authors report that the method has been successfully used on biologically treated sewage effluent as well as in treated industrial effluent. However, no data were provided in the report on the results of these studies.

6.3 COMPARISON OF ANALYTICAL METHODS

As mentioned in Section 6.1 the EPA proposed regulations in 1973, whereby substances which produced the free cyanides, i.e., molecular hydrogen cyanide and cyanide ion, were to be eliminated from the effluents of industrial plants (Kunz et al. 1978). However, the analytical techniques available did not adequately distinguish between the free and complex cyanides. Even among those which measure total cyanide, application of precision estimates resulted in very high coefficients of variation (see Table 6-1). When these same precision estimates were used at the 0.005 mg/l level, at which many of the proposed standards are being set, the inadequacy of the tests became even more apparent. For example, Caruso (1979) calculated the relative standard deviation (coefficient of variation) for cyanide at a level of 0.005 mg/l to be 640 percent when he used the precision statement derived for the colorimetric procedure (Standard Methods 1976) and applied it to cyanide amenable to chlorination. With this magnitude of coefficient of variation in mind, the following sections compare results of efforts by industry to determine the applicability of available methods to analyze industrial effluents for free and total cyanides.

6.3.1 Total Cyanide and Cyanide A in Steel Industry Effluents

In 1975, Gonter (1975a) presented results on the performance of three methods: Standard Methods, 13th Edition; ASTM Part 23, 1972; and EPA Methods, 1971, each used to determine total cyanide. These methods are essentially the same since each employs the addition of mineral acids to promote hydrolysis, reflux distillation to release the HCN, and absorption of released HCN by NaOH.

The recovery for each of the methods was: EPA (1971), 85-90 percent; Standard Methods, 20-85 percent; and ASTM 100 - >10,000 percent (Gonter 1975a). In a round robin test for the determination of Cyanide A the results for total cyanide were higher than theoretical and cyanide after chlorination values were higher than total. This resulted in negative Cyanide A values (Gonter 1975b). Thus the Cyanide A method could not be relied upon and alternative methods were tested.

6.3.2 Free Cyanide: A Comparison of Modified Roberts/Jackson Procedure With Other Methods

One of the alternate methods tested for use in estimating microgram quantities of free cyanide is the Modified Roberts/Jackson Procedure. This method has been used by Shell Oil as well as other members of the Illinois Petroleum Council. The precision and accuracy of the method are shown in Table 6-1. The calculated standard deviation was ± 0.001 mg/l for replicate determination of Shell's Wood River Refinery final effluent spiked with 0.026 mg/l cyanide. The accuracy of the method using Shell's known concentration was ± 0.009 mg/l, using EPA Method Study 12 Cyanide Concentrates was ± 0.008 mg/l, and using EPA concentrates and the ASTM method for total cyanide was ± 0.018 mg/l (Saner 1975). As mentioned previously, this method is being considered by ASTM for use in determining free cyanides and will be designated as ASTM Method F.

DuPont has been equally successful for over 10 years in using a method similar to the Modified Roberts/Jackson Procedure for determining free cyanide (Ott and McNutt 1977). A precision of ± 0.01 mg/l at 0.020 mg/l free cyanide has been observed and the method is applicable at levels of 0.01 mg/l. The method has been approved (with modifications) by EPA Regions IV and VI.

Another method which has been suggested as an alternative to the Cyanide A method is the American Iron and Steel Institute (AISI) method developed by S. Caruso (AISI 1974). This method was compared to the Wood River modification and ASTM Method B ($MgCl_2$) for Cyanide Amenable to Chlorination by Gonter (1975b). The accuracy for each method was: Wood River (113 percent), AISI (114 percent), and ASTM ($MgCl_2$) (104 percent). Thus both the Wood River and AISI methods are equally capable of replacing ASTM ($MgCl_2$) for the estimation of the free cyanide. In addition, data obtained from a round-robin study (AISI 1977) involving 14 laboratories indicate that the AISI method is a reliable method for determining free cyanide potential in coke plant effluents at the 0.100 mg/l level. For example, at 0.105 mg/l (true value), the sample mean was 0.096 mg/l and standard deviation was ± 0.022 mg/l. The relative standard deviation was 22.92 percent and relative error 8.57 percent. When these data were subjected to further statistical treatment it was determined that the method was acceptable*, that is, 95 percent of the results from the 14 laboratories lie within 50 percent of the true value (9 June 1977).

6.3.3 Other Round-Robin Studies

Dannis et al. (1975) conducted a review on round robin studies of cyanide methods for the American Iron and Steel Industry. Their findings indicated

* Data from Laboratory #2 was determined to be statistically unacceptable and not used for this estimate.

that (a) for the determination of free cyanides the AISI method was a reliable procedure, and (b) high erroneous values will be obtained when the cuprous chloride catalyst is used to remove thiocyanate with the Serfass distillation technique for determining total cyanides as per ASTM-Method 2036-72 and EPA (1974). ASTM is presently evaluating the Conway cell method. The results of that evaluation, as well as the work presently being conducted by Kaiser Aluminum and Chemical Corporation (see Section 6.2.3), should provide insight into the potential usefulness of this technique.

6.4 CONCLUDING REMARKS

The following conclusions can be drawn from the above discussion:

1. The present methods (ASTM 1976; Standard Methods 1976) used for the determination of total cyanides and the estimation of free cyanide potential in industrial effluents are highly susceptible to interfering substances.
2. The accuracy and precision of these standard methods are poor below 1.0 mg/l.
3. Based on the specificity of the analytical methods with regard to the different forms of cyanide and on the varying composition of the effluents, several methods, each specific for individuals, may be needed.
4. Alternatives to the standard methods for estimating free cyanide potential in the effluents, such as the AISI or Modified Roberts/Jackson Procedures should be used, where appropriate.
5. The Conway cell diffuser method is presently being evaluated by Kaiser Aluminum and Chemical Corporation and ASTM to determine its applicability in the low microgram range for estimating free cyanide. If the results of these studies are encouraging with regard to accuracy and precision, it should be considered for potential use in assessing compliance to cyanide limits.

KEY!

7. capability of the analytical methods to detect, with precision and accuracy, the different forms and concentrations of cyanide in the receiving waters and in the effluent.

In addition, other site-specific considerations, such as the cyanide composition in the effluent, the flow characteristics of receiving water and effluent waste stream, and the nature of the indigenous aquatic community must be included in the overall examination of potential site-specific effects of cyanide. Moreover, social, economical, and technological considerations must be evaluated in any application of a cyanide criterion.

7.4.1 Form of Cyanide

One of the most critical aspects of the information presented in this report is that the form of cyanide in water has a marked effect on its toxicity to the aquatic organisms (see Section 5.2). Studies have demonstrated that the toxicity of cyanide is independent of the total cyanide concentration; it is primarily due to the concentration of molecular hydrogen cyanide (HCN) in solution. The unbound cyanide ion (CN⁻), a minute portion of the free cyanide content of dilute wastes, may also contribute slightly to toxicity under some extreme alkaline conditions. Since criteria are scientific-based limits, independent of economic, social, and technological considerations, it seems logical to conclude that a Section 304(a) cyanide criteria should be for free cyanide (HCN + CN⁻) or molecular hydrogen cyanide (HCN) alone. The justification for a criterion for molecular HCN alone, as opposed to free cyanide, is that the molecular component predominates at pH values found in most natural waters, with less than 4 percent of free cyanide occurring in the ionic form below pH 8 (at 25 C). Limits of total cyanide, as criteria, would be meaningless in light of the toxicological data.

Noted scientific experts have stated that criteria developed for cyanide should be for free cyanide or molecular hydrogen cyanide, not for total cyanide (Doudoroff 1976, 1977; Doudoroff et al. 1978; Hartung 1978). Further, the International Joint Commission (1978) has proposed that the cyanide water quality objective should be for free cyanide and not total cyanide.

7.4.2 Site-Specific Water Quality Parameters

Several water quality factors, including temperature, pH, and dissolved oxygen, significantly influence the toxicity of free cyanide (see Section 5.5). Since each of these have been shown to influence cyanide toxicity, water quality standards developed for cyanide should reflect the site-specific conditions relating to these water quality factors.

As discussed in Chapter 4, water quality factors also affect the occurrence and dissociation of cyanides in water. The extent to which molecular hydrogen cyanide remains soluble, and therefore available to the aquatic organisms, depends greatly upon temperature. The vapor pressure of HCN vapor increases to 1 atmosphere at 25.7 C, the boiling point. As water temperature increases, molecular hydrogen cyanide in water has an increasing tendency to be released into the atmosphere. Therefore, during warmer periods, the free cyanide concentration near the surface of the receiving water would be decreased because of volatilization. The rate and extent of removal would depend in part on the temperature and the degree of water mixing near the surface. For example,

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REVIEWS OF THE ENVIRONMENTAL EFFECTS OF POLLUTANTS: V. CYANIDE

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corresponding bicarbonate. Some physical properties of these salts are shown in Table 2.5. Sodium and potassium cyanates, when compared to cyanide are relatively nontoxic to humans and animals (Arena, 1974, p. 164). However, the use of cyanate in the treatment of sickle cell anemia (Cerami, 1974) did induce various toxic lesions such as cataracts (Nicholson et al., 1976) and polyneuropathy (Peterson et al., 1974). Details of metabolism are unknown, but it is presumed that the toxic effect is caused by the cyanate ion per se and not by breakdown products (Fassett, 1963, p. 2034). Because of their relative instability and low toxicity, inorganic cyanates probably pose few environmental problems. Alkyl cyanates can be prepared by the action of sodium alkoxide on a cyanogen halide, but these esters usually trimerize immediately to form the cyanurate (Sidgwick, 1966, p. 462). Cyanates are encountered chiefly in manufacturing operations, especially the preparation of organic compounds (Zuzik, 1972).

TABLE 2.5. PHYSICAL PROPERTIES OF SOME CYANATES

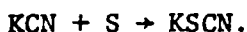
Cyanate	Formula	Melting point (°C)	Specific gravity	Solubility		
				Water	Ether	Benzene
Ammonium	NH ₄ OCN	Decomposes, 60	1.34	Very soluble	Slightly soluble	
Lead	PbOCN	Decomposes		Slightly soluble		
Potassium	KOCN	315	2.0	Decomposes (hot)	Soluble	
Silver	AgOCN	Decomposes	4.00	Soluble (hot)		
Sodium	NaOCN	550	1.94	Soluble	Slightly soluble	Slightly soluble

Source: Adapted from Zuzik, 1972, pp. 937-940.

Potassium cyanate reacts with dialkyl sulfate to form alkyl isocyanates which have the general formula RNCO. These volatile liquids are very reactive, have a pungent odor, are insoluble in water, but are soluble in acetone, ethyl acetate, toluene, and kerosene. Alkyl isocyanates are widely used in the production of polyurethane plastics, foams, fibers, and surface coatings. Two of these compounds, toluene diisocyanate and diisocyanatodiphenyl methane, are known to cause asthmatic reactions in sensitized subjects (Morgan and Seaton, 1975). The mechanism of interaction is unclear, but isocyanates are known to react with free amino groups in proteins; they should thus be capable of forming antigens (Fassett, 1963, p. 2033).

2.2.4 Thiocyanates

Compounds containing the radical SCN are known as thiocyanates; they are formed by treating cyanides with sulfur or sulfur-containing reagents (Latimer and Hildebrand, 1951, p. 298):



7.5 WASTE MANAGEMENT

Due to the great toxicity of most cyanide compounds, the elimination of cyanide from wastewaters is standard practice. The three main categories of removal techniques are (1) complete destruction of the cyanide ion, (2) conversion of the cyanide ion to the cyanate ion, and (3) conversion of the cyanide ion to some other less toxic form such as ferrocyanide (Reed et al., 1971).

The most frequently used method of cyanide destruction is alkaline chlorination. Wastewaters are treated with chlorine gas in an alkaline solution to oxidize cyanide usually to carbon dioxide (carbonate ion) and nitrogen (Section 2.2.1.4). If desired, the reaction may be controlled to oxidize cyanide only to cyanate (Lawes, 1972; Watson, 1973).

Hypochlorites may also be used to destroy cyanides (Section 2.2.1.4). This method involves essentially the same reactions as alkaline chlorination. The active ingredient may be supplied as sodium hypochlorite, calcium hypochlorite, or bleaching powder (Green and Smith, 1972; Watson, 1973). Other possible methods of destruction include acidification, reaction with aldehydes, electrolytic decomposition, ionizing radiation, and heating (Lawes, 1972; Ottinger et al., 1973b; Watson, 1973).

The acute toxicity of cyanate ion is about a thousand times less toxic than the cyanide ion, and hence, may be discharged to the environment in low concentrations in some areas. The conversion uses chlorine gas in a reaction similar to alkaline chlorination. Hypochlorites are also used. Other oxidants proposed for the conversion of cyanide to cyanate include ozone, kastone (peroxygen), and permanganate (Green and Smith, 1972; Lawes, 1972; Ottinger et al., 1973b; Watson, 1973).

Another method for converting cyanide to other less toxic forms is the use of iron salts. The salt, usually ferrous sulfate, complexes with free cyanide in aqueous solution and causes it to precipitate. This method is commonly used in Europe but not in the United States (Ottinger et al., 1973b; Watson, 1973).

Other methods described in the literature for cyanide waste treatment include complexation by polysulfides or nickel salts, ion exchange, evaporation, incineration, dilution, lagooning, and biological destruction (Avery and Fries, 1975; Cousins and Mindler, 1972; Green and Smith, 1972; Lutin, 1970; Murphy and Nesbitt, 1964; Muzzarelli and Spalla, 1972; Ottinger et al., 1973b; Reed et al., 1971).

Improper management of cyanide wastes can result in damage to plant and animal life. Contamination may occur as a result of improper storage, handling, or disposal of cyanides. A landfill near Denver, Colorado, has leaked cyanides to the surrounding area. Tests of surface drainage have indicated the presence of cyanide in ponded water downstream from the site. According to the site operator, significant amounts of cyanide were discharged into pits at the disposal site (U.S. Environmental Protection Agency, 1974).

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VI. SPECIFICATIONS - WASTEWATER EQUIPMENT

A. Owner Furnished Equipment and Structures

1. Wastewater collection sump tanks.
2. Corrosion resistant coatings for concrete emergency containment areas - N61 treme epoxy liner.
3. Influent piping system.
4. Backflow preventer, Febco Model 805 by Johns-Manville.
5. Safety shower.
6. Flow measuring device and sampler, BIF.
7. Effluent gravity line.
8. Services:
 - a. 208/220/440V - 3 phase, 60 Hz (less than 10 HP requirement).
 - b. Tap water.
 - c. Compressed air supply.

B. DMP Furnished Equipment

1. Three (3) sump pumps - Corcoran 2000. (Chrome, Chromate and CN/Cd)
2. Two (2) sump pumps - Vanton Flex-i-liner. (Alkaline Chrome Stripper)
3. One (1) metering pump - Knight (0-15 gph). (Cd/Cd metering pump)
4. One (1) Cd/CN storage tank, 1,250 gallons, polyethylene, 87" high, 69" I.D.
5. Five (5) sump strainers of DMP design.
6. All support scaffolding with stairway.

7. Four (4) polyethylene treatment reactors OVG 350 with 4 inch inlets and outlets.
8. Four (4) mixers with 316SS shaft and blades.
9. One (1) flash flocculator of polyethylene construction. Flocculator has a design capacity of approximately three (3) minutes retention with agitation rate of 30-400 RPM and a prop of 316SS.
10. Two (2) DMP clarifier 5-1000 of P.E. construction.
11. One (1) chemical feed module. Mounting for five (5) reagents: acid, alkali, floc, chrome reducer and bleach. Module consists of five (5) mixing tanks, 55 gallon polyethylene construction. Module is further fitted with five (5) mixers of 110V/10/60/TEFC with stainless shaft and blade.
12. One (1) DMP E Controller III Instrument Control Center. The control circuits include:
 - a. Level system for sump pumps.
 - b. Hand/off/auto for sump pumps.
 - c. Off/on switches for all functions.
 - d. Alarm system with auto shutdown for incorrect treatment alarm.
 - e. Final pH recorder.
 - f. Two (2) ORP Controllers.
 - g. Four (4) pH Controllers.
13. One (1) DMP CompacSludge II System for sludge. Maximum capacity: thirty-five (35) gallons of ten (10%) percent solids in eight (8) hours; thirty-five (35) gallons of