USAFOEHL REPORT

88-076EQ0040FHH

HAZARDOUS WASTE AND WASTEWATER CHARACTERIZATION SURVEY, COLUMBUS AFB MS

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June 1988

Final Report

USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS N/A
2a. SECURITY CLASSIFICATION AUTHORITY NA	3. DISTRIBUTION / AVAILABILITY OF REPORT Distribution is unlimited: Approved for public release
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE NA	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFOEHL Report 88-076EQ0040FHH	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION USAF Occupational and Environmental Health Laboratory 6b. OFFICE SYMBOL (If applicable) ECQ	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Brooks AFB TX 78235-5501	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Same as 6a 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) Columbus AFB Hazardous Waste/Wastewater Survey	
12. PERSONAL AUTHOR(S) Slavich, Francis E., 1Lt, USAF and Zimmer, Anthony T., 2Lt, USAF, BSC	
13a. TYPE OF REPORT Final 13b. TIME COVERED 30 Nov - 16 Dec 87 14. DATE OF REPORT (Year, Month, Day) Jun 1988 15. PAGE COUNT 97	
16. SUPPLEMENTARY NOTATION	
17. COSATI CODES FIELD / GROUP / SUB-GROUP	18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

A wastewater characterization and hazardous waste survey was conducted at Columbus AFB by USAFOEHL personnel to address problems concerning the discharge of industrial wastes to the sanitary sewer system and subsequently to the base wastewater treatment plant. The treatment plant is authorized to discharge to the Tombigbee waterway under the state of Mississippi National Pollutant Discharge Elimination System (NPDES) Permit Program. The results of the hazardous waste survey indicate that the shops wastes are being properly contained, labeled and transported. However, waste oils, solvents and fuels are sent to underground storage tanks that have not been properly leak tested. Most of the oil/water sludge waste is being pumped into an underground holding tank, bldg 1944, for disposal by contractor every three years. This practice is unacceptable. The results of the wastewater survey indicate that both the parts Cleaning Shop, bldg 218, and the Corrosion Control Shop, bldg 262, are discharging substantial amounts of priority pollutants into the sanitary system which are still (Cont. on reverse)

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL FRANCIS E. SLAVICH, 1Lt, USAF, BSC	22b. TELEPHONE (Include Area Code) (512) 536-3305 22c. OFFICE SYMBOL ECQ

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted. All other editions are obsolete.

Cont. Blk 19

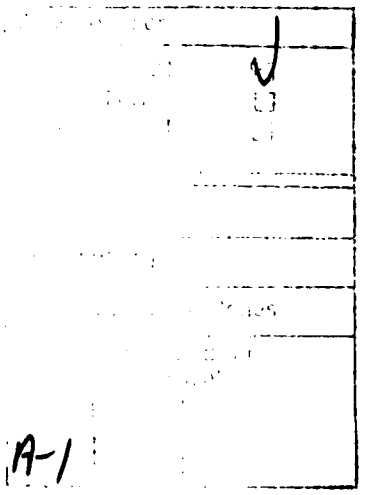
being found in the treatment plant effluent. High levels of chromium and cadmium were also discharging to the sanitary sewer. The lenient parameters of the State of Mississippi NPDES permit do not cover the priority pollutants that discharge directly into the Tombigbee waterway.

Recommendations: (1) Leak test all underground storage tanks including Corrosion Control. (2) Remove the tanks if leaking according to an EPA approved closure plan. (3) Discontinue discharge to the sanitary sewer from both the Corrosion Control Shop and the Parts Cleaning Shop or submit an application for a new NPDES permit to encompass the industrial nature of the wastewater. (4) Take three additional days of volatile halocarbon and aromatic samples from the treatment plant effluent.

ACKNOWLEDGEMENTS

The authors greatly appreciate the technical expertise and hard work provided by the other members of our survey team, 1Lt Robert Tetla, 2Lt Charles W. Attebery, TSgt Benjamin Hernandez, SSgt Mary Fields, Sgt Roberto Rolon, and Sgt Harold D. Casey, without whose valuable assistance this survey could never have been accomplished.

We also acknowledge the help provided by 2Lt Susan Carter, MSgt David Fedderolf, and the rest of the staff of the Bioenvironmental Engineering Section during the survey. Finally, we would like to thank all of the various shop personnel at Columbus AFB for their excellent cooperation and extra effort in assuring the success of the survey. Their performance and conduct throughout were noteworthy.



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I. INTRODUCTION

On 13 July 87, USAF Hospital Columbus/SGPB, Columbus AFB MS, requested through HQ ATC/SGPB that the USAF Occupational and Environmental Health Laboratory (USAFOEHL) perform a wastewater and hazardous waste characterization survey. Base Bioenvironmental Engineering personnel were particularly concerned with discharges from the installation's Corrosion Control and Jet Engine Parts Cleaning shops.

The wastewater survey was conducted from 30 Nov to 16 Dec 87 by 1Lt Francis E. Slavich, 2Lt Charles W. Attebery, TSgt Benjamin Hernandez, SSgt Mary M. Fields, Sgt Roberto Rolon, and SrA Harold D. Casey. The hazardous waste survey was conducted during the same time period by 1Lt Robert A. Tetla and 2Lt Anthony T. Zimmer. Points of contact at Columbus AFB were 2Lt Susan M. Carter and MSgt David Fedderolf.

The scope of the wastewater survey included characterization of the wastewater from the influent and effluent to the sewage treatment plant, building 528 lift station, effluents from Corrosion Control and Jet Engine Parts Cleaning shops, three sewer system manholes, the aircraft washrack, and 12 oil/water separators. Flow was determined at the influent to the sewage treatment plant, the Bldg 528 lift station and the discharge from the Corrosion Control shop.

II. BACKGROUND

A. Base Description

Columbus AFB, home of the 14th Flying Training Wing, is located in Lowndes County, ten minutes north of Columbus MS. The primary mission of the base is to conduct Undergraduate Pilot Training (UPT) as prescribed by course training standards and supporting training directives. The base lies in the Tombigbee and Tennessee River Hills district of the Gulf Coastal Plain; and this area is characterized by gently rolling hills. The base wastewater treatment plant is authorized to discharge into the Tombigbee waterway under the State of Mississippi National Pollutant Discharge Elimination System (NPDES) Permit Program.

B. Sewerage System

Sanitary and industrial sewage from Columbus AFB is collected and transported by gravity and pressure lines to the base sewage treatment plant. The plant consists of two primary clarifiers, two trickling filters, and two secondary clarifiers. The sewer system is divided into three main sewers serving two housing areas and the main base complex; and these combine at a manhole just prior to entering the plant. Almost all industrial operations are served by the main base network. Each of the three sections gravity feed into a lift station which pumps the wastewater to the sewage treatment plant. The main base complex is served by the building 528 lift station. The major industrial operations on base involve aircraft and vehicle maintenance.

C. Discharge Limitations

Wastewater discharge limitations and monitoring requirements for Columbus AFB are established by the State of Mississippi Water Pollution Control Permit MS0040258 issued to Columbus AFB on 23 Aug 1985, and expiring on 30 April 1990. The permit is authorized under the National Pollutant Discharge Elimination System (NPDES) Program, and the effluent limitations and monitoring requirements established by this permit are shown in Table 1.

TABLE 1
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Parameter	1-day Max	Monthly Avg.	Measurement Frequency	Sample Type	Sampling Point
Flow (MGD)	N/A	0.75	2 days/week	I	STP Effluent
Biochemical Oxygen Demand (5-day)	45 mg/l	30 mg/l	1 day/week	C	STP Effluent
Suspended Solids	45 mg/l	30 mg/l	1 day/week	C	STP Effluent
Fecal Coliform Geometric Mean (No./100 ml)	400	200	1 day/week	G	STP Effluent

1. The pH shall not be less than 6.0 standard units nor greater than 8.5 standard units.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

3. The effluent shall not cause a visible sheen on the receiving water.

4. The total residual chlorine shall not be less than 0.1 mg/l nor greater than 1.0 mg/l and shall monitored 2 days/week with a grab sample of the effluent.

Note: I = Instantaneous, C = 24-hour composite sample, G = Grab sample

The following standards, Pretreatment Standards for Existing Sources, Metal Finishing Point Source Category, are contained in the Code of Federal Regulations, Section 40, Part 433. These standards are not legally binding at Columbus AFB since the base does not discharge to a Publicly Owned Treatment Works (POTW). However, they are relevant in that they serve as a guideline for industrial discharges.

TABLE 2
PRETREATMENT STANDARDS FOR EXISTING SOURCES, METAL FINISHING POINT SOURCE CATEGORY

Parameter	Max 1-Day Concentration	Monthly Average
	mg/l	
Cadmium (T)	0.69	0.26
Chromium (T)	2.77	1.71
Copper (T)	3.38	2.07
Lead (T)	0.69	0.43
Nickel (T)	3.98	2.38
Silver (T)	0.43	0.24
Zinc (T)	2.61	1.48
Cyanide (T)	1.20	0.65
TTO (Total Toxic Organics)	2.13	----

** Note ** TTO is the summation of the individual concentrations of chemicals listed in Atch 1 on any one day.

III. PROCEDURES

A. Wastewater Characterization Survey

1. Sampling

a. Site numbers and locations. A list of site numbers and locations are presented in Table 3.

TABLE 3
SAMPLE SITE IDENTIFICATION

7-Day, 24-hour Composite Sample Sites:

Site	Description
1	Sewage Treatment Plant Influent (After Chlorination)
2	Sewage Treatment Plant Effluent (Before Chlorination)
3	Bldg 528 Lift Station
4	Corrosion Control Paint Waste Separation Tank
5	Jet Engine Parts Cleaning Oil/Water Separator

2-Day, 24-hour Composite Sample Sites:

6	Sewer Manhole 140
7	Sewer Manhole 128
8	Sewer Manhole 125

Table 3 continued

Grab Sample Sites:

Site	Description
9	Discharge from Bldg 228 washrack
10	Oil/water separator at Bldg 375 washrack (CE complex)
11	Auto Hobby Shop oil/water separator
12	T-38 Maintenance Hangar oil/water separator (New Hangar)
13	Oil/water separator at AGE washrack
14	Hangar 452 oil/water separator
15	Hangar 454 oil/water separator
16	Hangar 246 oil/water separator (Fuel System Repair)
17	BX Service Station oil/water separator
18	Entomology Shop oil/water separator
19	Refueling Maintenance oil/water separator (Bldg 306)
20	Oil/water separator at the Jet Engine Test Cell
21	Hangar 450 oil/water separator

b. Sampling Frequency

Daily collection of equiproportional 24-hour composite samples was accomplished at sites 1-8. Sites 1-5 were sampled for seven consecutive days, and sites 6-8 were sampled for 2 consecutive days. The sampling was accomplished using the ISCO Model 2700 Automatic Wastewater Samplers. One-day grab samples were taken at sites 9-21. Additionally, grab samples for EPA methods 601 and 602 were collected for three days at sites 1, 2, 4, and 5, and for one day at sites 3 and 9. Table 4 presents the analyses and sample preservation methods.

TABLE 4
ANALYSES AND PRESERVATION METHODS FOR SITES

Analysis	Preservation	Method	Where	Who
pH	none	A423	on-site	USAFOEHL
Temperature	none	E170.1	on-site	USAFOEHL
Alkalinity	none	E310.1	on-site	USAFOEHL
COD	none	A410.4	on-site	USAFOEHL
BOD-5	none	A405.1	on-site	USAFOEHL
Nonfilterable Residue	none	A160.2	Brooks AFB	USAFOEHL
Filterable Residue	none	A160.1	Brooks AFB	USAFOEHL
Volatile Residue, Filterable	none	A160.3	Brooks AFB	USAFOEHL

(TABLE 4 Continued)

Analysis	Preservation	Method	Where	Who
Oils and Grease, Total Recoverable	H_2SO_4	E413.1	Brooks AFB	USAFOEHL
Nitrates	H_2SO_4	E353.2	Brooks AFB	USAFOEHL
Total Kjeldahl Nitrogen	H_2SO_4	E351.2	Brooks AFB	USAFOEHL
Total Organic Carbon	H_2SO_4	E415.2	Brooks AFB	USAFOEHL
Cyanide	NaOH	E335.3	Brooks AFB	USAFOEHL
Sulfate	none	E375.2	Brooks AFB	USAFOEHL
ICP Metals Screen As, Cd, Ba, Ca, Cr, Co, Fe, Mg, Mn, Ni, Zn, Al, Mo, Be, Cu, V	HNO_3	E200.7	Brooks AFB	USAFOEHL
Mercury	HNO_3	E245.1	Brooks AFB	USAFOEHL
MBAS (Methylene Blue Active Substances)	none	E425.1	Brooks AFB	USAFOEHL
Phosphorus	H_2SO_4	E365.4	Brooks AFB	USAFOEHL
Total Hardness	HNO_3	A314	Brooks AFB	USAFOEHL
Petroleum Hydrocarbons, Total Recoverable	HCl	E418.1	Brooks AFB	USAFOEHL
Volatile Halocarbons	HCl	E601	Brooks AFB	USAFOEHL
Volatile Aromatics	HCl	E602	Brooks AFB	USAFOEHL
Phenols	none	E604	Contract Lab	Datachem

Notes: A - indicates Standard Methods for the Evaluation of Water and Wastewater.
E - indicates EPA Methods for Chemical Analysis of Water and Wastes.

2. Flow

Measurements of flow rates were made at three locations; the influent to the Sewage Treatment Plant, the Bldg 528 Lift Station, and the discharge from the Corrosion Control Shop. Flow was measured at the sewage treatment plant using the Plant's Parshall flume and ultrasonic flowmeter. A pump hour meter was used at the lift station to measure the daily flow; and the amount of discharge from the Corrosion Control shop was estimated by measuring the time taken to fill a 55-gal drum with one of the shop hoses. As will be discussed in the hazardous waste section of this report, the great majority of industrial operations at this base have intermittent discharges. Estimating the flow generated by each of these shops was beyond the scope of this survey.

B. Hazardous Waste Survey

The first step of the survey was to review the base's hazardous waste management plan, and the Bioenvironmental Engineer's industrial shop folders. From our review, we established eleven categories of waste generated on Columbus AFB and developed a chemical waste disposal survey form (Atch 2) to inventory waste disposal practices on base. After this preliminary waste assessment, the survey team visited all major industrial shops observing industrial activities, discussing chemical waste disposal practices with laboratory/shop personnel, and handing out chemical waste disposal survey forms. The following individuals were contacted to discuss their respective areas of responsibility in the hazardous waste management program:

2Lt Sue Carter, Chief, Bioenvironmental Engineering Section, AUTOVON 742-2284/5

Mr Cruthirds, Environmental Coordinator, AUTOVON 742-7958

Mr Steward, Property Disposal Specialist, DRMO, AUTOVON 742-7463

Information from our chemical waste disposal survey forms is summarized in Table 5. This summary shows the forecasted wastes generated annually at Columbus AFB by category (See Atchs 3 and 4 for calculations). From Table 5, Column 5, waste oils, waste fluids, waste fuels and waste PD-680 comprise 74% of all drummed wastes generated at CAFB. The drums are segregated, then emptied into the underground storage tanks located behind bldg 322 (Liquid Fuels Maintenance Branch). These wastes are then picked up by a waste oil contractor.

All other drummed wastes are disposed of by the Defense Reutilization and Marketing Office. Wastes not drummed, i.e., some waste paints and thinners, waste fuels, waste PD-680, photo wastes (from NDI) and waste strippers are disposed of down drains connected to oil/water separators which are connected to the sanitary sewer.

TABLE 5
CATEGORIES OF WASTE AT COLUMBUS AFB (CAFB)

CATEGROY	PRODUCT	TOTAL (Gal/yr)	TOTAL CATEGORIES DRUMMED (Gal)	%TOTAL CATEGORIES DRUMMED
1	Waste Oils	8567	8567	32.91
2	Fuels	4870	4820	18.52
3	PD-680	4126	3326	12.78
4	Stripping Waste	3050	400	1.54
5	Misc. Chemicals	2600	2600	9.99
6	Waste Fluids	2520	2520	9.68
7	Solvents	1680	1680	6.45
8	NDI Wastes	1080	640	2.46
9	Waste Acids	720	720	2.77
10	Waste Paints & Thinners	634	610	2.34
11	Used Antifreeze	146	146	0.56
	Totals:	29,993	26,029	100.00

IV. RESULTS AND DISCUSSION

A. Wastewater Characterization Survey

1. Introduction

Contaminant concentrations and physical and chemical parameter values, along with flow data, are presented in the following section to characterize the various wastewater streams sampled during the survey. Some of the concentrations reported illuminate potential problems with disposal methods. Others simply contribute to the identifying characteristics of the wastewater that reflect the types of materials being disposed of through the sanitary sewer system.

2. Flow: The results of seven days of flow measurements at the sewage treatment plant and the bldg. 528 lift station data are presented in Table 6.

TABLE 6
RESULTS OF FLOW MEASUREMENTS

Date	Influent to WTP (Gals/day)	L.S. Bldg 528 (Gals/day)	Percentage of Total Flow
2 Dec 87	418,000	91,200	21.8 %
3 Dec 87	383,100	91,200	23.8 %
4 Dec 87	402,300	93,600	23.3 %
5 Dec 87	352,800	64,800	18.4 %
6 Dec 87	364,700	69,600	19.1 %
7 Dec 87	384,800	91,200	23.7 %
8 Dec 87	413,100	96,000	23.2 %
	Avg. = 388,400	85,371	22.0 %

** Note ** Maximum flow rate at the Corrosion Control Shop was 24.8 gal/min assuming operation of four hoses.

The daily average flow of 388,400 gallons at the sewage treatment plant is well below the maximum average permitted flow of 750,000 gal/day. The main base complex average daily flow of 85,371 gallons constitutes about 22% of the total flow entering the sewage treatment plant, thus, the two housing areas provide almost 80% of the average daily flow to the sewage treatment plant. An estimate of the maximum daily flow from the Corrosion Control shop is 3000 gallons based on a two hour rinsing operation using four hoses simultaneously (see Table 6, note). This is less than 1% of the daily average total flow to the sewage treatment plant.

3. Sanitary Sewer System

a. Seven-day Composite Sampling Sites: The following is a description of the sites and significant findings at each site. Results reported are 7-day average concentrations, unless otherwise noted. Seven days of BOD_5 samples were analyzed from sites 1-5, however, only the results for 5 Dec 87 can be supported by the method's quality control checks. The complete results of analyses are included in attachment 5.

(1) Site 1: Seven days of 24-hr composite samples were taken from the chlorinated influent to the sewage treatment plant, and grab samples for EPA Methods 601 and 602 were collected on three of the seven days. Sampling results for BOD_5, TOC, COD, TSS, and TKN indicate the wastestream is domestic in nature. The BOD_5 value for 5 Dec 87 was 127.6 mg/l. Toxic metals results did not warrant concern; however, significant concentrations of

volatile organic and aromatic compounds were detected on each of the three days that grab samples were collected. Methylene chloride was detected at a concentration of 12.0 mg/l on 4 Dec 87. Also, chloroform and o-chlorotoluene were found at concentrations greater than 1.0 mg/l, and dichlorobenzenes, ethylbenzene, and m-xylene were detected at concentrations greater than 0.50 mg/l. In all, twenty different priority pollutant compounds were detected on at least one of the three sampling days.

Using the 5 Dec 87 BOD_5 value of 127.6 mg/l and the average daily flow result of 388,400 gallons, the BOD_5 load on the sewage treatment plant was calculated to be 412 pounds of BOD_5 per day.

(2) Site 2: Seven days of 24-hr composite samples were collected from the pre-chlorinated effluent of the sewage treatment plant. Generally, sampling results were indicative of a domestic wastestream effluent. The 5 Dec 87 BOD_5 concentration of 19.3 mg/l and the three day average value of 24.6 mg/l, which was recorded by sewage treatment plant personnel, did not exceed the NPDES permit standards of 45 mg/l as a 1-day maximum and 30 mg/l as a monthly average concentration. The average concentration for TSS of 59 mg/l exceeded both the 1-day maximum value of 45 mg/l and the 30-day average concentration of 30 mg/l allowed by the State NPDES permit. It should be noted that one of the plant's two primary clarifiers had been bypassed for two consecutive days of the seven day sampling period. The effluent had a COD average result of 73.7 mg/l, and a BOD_5/COD ratio of 0.26, possibly indicating the presence of a significant amount of non-biodegradeable compounds.

Grab samples for EPA Methods 601 and 602 were also collected for three days at the pre-chlorinated effluent. Total Toxic Organic (TTO) results for two of the three days were greater than 0.20 mg/l. Compounds detected in the greatest concentrations were methylene chloride (205 µg/l), xylene (144 µg/l), and 1,3-dichlorobenzene (77 µg/l). Carbon tetrachloride, 1,2-dichloropropane o-chlorotoluene, and 1,2-dibromomethane were detected at concentrations less than 10 µg/l.

(3) Site 3: Seven days of 24-hr composite sampling along with a one-day grab sample for EPA methods 601 and 602 were collected from the combined influent to the Bldg 528 lift station. This lift station services the main base complex which includes almost all industrial operations on Columbus AFB. The BOD_5/COD ratio was 0.35, confirming that the wastestre :m is industrial in nature. Toxic metal results, with the exception of chromium, did not warrant concern. Chromium was detected at a maximum concentration of 1.3 mg/l and an average value of 0.57 mg/l. MBAS was detected at an average value of 2.80 mg/l, which is not unexpected due to the amount of aircraft and equipment washing normally performed on an Air Force base.

Results for the one-day grab samples for volatile organic and aromatic compounds were alarming. 1,1,1-Trichloroethane was detected at 42.0 mg/l; chloroform (1.39 mg/l), 1,1-dichloroethane (2.32 mg/l), and toluene (1.56 mg/l), were all found at values greater than 1.3 mg/l. Other compounds such as methylene chloride (46 µg/l), 1,1-dichloroethene (31 µg/l), phenol (39 µg/l), and 1,2-dichloropropane (101 µg/l), were found in lesser amounts.

(4) Site 4: Three days of grab samples for EPA methods 601 and 602 and seven days of 24-hr composite samples were collected from the discharge chamber of the Corrosion Control paint waste separation tank. Additionally, a sludge sample was collected from the sedimentation chamber and analyzed for characteristic hazardous waste. The COD and BOD_5 results for this site were 5252 mg/l and 2950 mg/l, respectively. The BOD_5/COD ratio value of 0.56 indicates that the wastestream is amenable to biological treatment, however this is misleading. The biodegradeable portion of this wastestream is largely composed of alkaline soaps used to wash the aircraft prior to stripping. This is evidenced by the MBAS concentration of 226 mg/l and a pH value of 9.24, characteristics which if not diluted would cause operational problems at the sewage treatment plant.

In fact, this wastestream is highly industrial in nature. An average concentration of 30.50 mg/l with a maximum concentration of 37.2 mg/l of total chromium was found in the wastewater from this shop. The PSES standards (Table 2) for chromium are 2.77 mg/l and 1.71 mg/l as a 1-day maximum and monthly average concentration, respectively. Additionally, the sludge from the separation tank was characterized as an EP Toxic hazardous waste because of a chromium concentration of 10 mg/l. The average cadmium concentration found in the wastewater was 0.20 mg/l. Total suspended solids (TSS) average concentration was 2852 mg/l. The TSS results indicate that significant amounts of paint chips are passing through the sedimentation chamber of the separation tank and subsequently being pumped into the sewer system. A large amount of paint residue was observed in the manhole directly downgrade of the separation tank.

Gross amounts of volatile organic and aromatic compounds are being discharged to the sanitary sewer. Methylene chloride was found at concentrations of 2 to 3 grams per liter, or approximately 1000 times greater than the PSES TTO standard of 2.13 mg/l (Table 2). Furthermore, the wastestream entering the separation tank could be classified as hazardous.

According to 40 CFR 261.3, (1) Definition of a Hazardous Waste, a wastestream is considered hazardous if the average weekly usage of the following solvents, methylene chloride, 1,1,1-trichloroethane, chlorobenzene, o-dichlorobenzene, cresols, cresylic acid, nitrobenzene, toluene, methyl ethyl ketone, carbon disulfide, isobutane, pyridine, and spent chlorofluorocarbon solvents, divided by the average weekly flow into the headworks of the facility's wastewater treatment or pretreatment system is more than 25 ppm. Normally an industrial wastestream is excluded from this provision, however, since the wastewater is either collected, stored or treated prior to discharge to the sanitary sewer system the exclusion is not applicable. Additional priority pollutants detected in amounts greater than 1.0 mg/l were chloroform (1.16 mg/l), 1,4-dichlorobenzene (2.58 mg/l), toluene (6.9 mg/l), 1,3-dichlorobenzene (3.16 mg/l), m-xylene (15 mg/l), and phenol (1.6 mg/l). A total of 16 volatile organic or aromatic compounds were detected on at least one of the three sampling days.

(5) Site 5: Seven days of 24-hr composite samples and three days of EPA method 601 and 602 grab samples were collected from the outfall of the Jet Engine Parts Cleaning shop oil/water separator. The BOD_5 was 506 mg/l while the COD was 2044 mg/l. This gives a BOD_5/COD ratio of 0.25, indicating that the wastestream is industrial in nature, and more amenable to degradation by strong acids than biodegradation. The elevated TDS result of 1253 mg/l as a 7-day average is more than likely due to significant amounts of anions and

cations put into solution during the parts cleaning process. The pH of the wastestream was approximately 8.0. This value is not surprising since drag-out from the alkaline rust remover tank is discharged to the separator. Oil and grease was detected at an average concentration of 230 mg/l; a value which is higher than the acceptable range of 100 mg/l.

Several toxic metals were discharged in significant concentrations. The average concentration of samples for arsenic was 1.77 mg/l. Average concentrations of nickel and aluminum were 1.33 mg/l and .71 mg/l, respectively. Arsenic is used in the metallurgy industry to harden lead, copper, and alloys, and as a component in pesticides. The metal of most concern, however, is cadmium. The average concentration was 1.72 mg/l, with a maximum and mimimum 1-day concentration of 2.1 mg/l and 1.40 mg/l, respectively. The limits allowed for cadmium by the PSES standards are 0.26 mg/l as a monthly average and 0.69 mg/l as a 1-day maximum value; thus, this shop exceeded this criteria on each day of the survey period.

Like the Corrosion Control shop, large concentrations of volatile organic and aromatic compounds were detected in the wastestream. TTO concentrations greater than 45 mg/l were found on two of the three sampling days. This was largely attributable to levels of 1,1,1-trichloroethane which exceeded 40 mg/l. This concentration is almost twice the limit needed to classify the wastestream as hazardous according to 40 CFR 261.3. Additionally, the TTO values are approximately 20 times greater than the 2.13 mg/l PSES standard. A wide variety of other pollutants also detected in significant amounts were chloroform (1.5 mg/l), trichloroethylene (487 µg/l), ethylbenzene, (23 mg/l), methylene chloride (270 µg/l), 1,2-dichloropropane (1.3 mg/l) and 1,1-dichloroethane (2.4 mg/l). Bromobenzene was detected at concentrations of 181 mg/l and 16 mg/l on successive days, however, this pollutant is not included as part of the TTO list in 40 CFR Part 233, Metal Finishing Point Source Category. In all, a total of 25 different priority pollutants were detected on at least one of the three sampling days.

b. Two-day Composite Sample Sites: Results given for sites 6-8 are 2-day averages unless otherwise noted. Samples were analyzed for pH, temperature, COD, oil and grease, total extractable hydrocarbons, metals, total hardness, MBAS, and volatile, dissolved and suspended solids.

(6) Site 6: Two days of 24-hr composite samples were collected from sewer system manhole 140. This site is the intersection of two service connections which connect to drains on the east side of the maintenance hangar complex, the corrosion control shop, the jet engine parts cleaning shop, and the Bldg 288 washrack. This site had a 2-day COD average concentration of 430 mg/l. Chromium, nickel and aluminum were found at average concentrations of 0.724 mg/l, 0.30 mg/l, and 0.31 mg/l, respectively. The concentration of oil and grease averaged was 15.4 mg/l, and TSS were detected at a 2-day average value of 50 mg/l.

(7) Site 7: 24-hr composite samples were collected for two days from sewer system manhole 128. This site is the intersection of two laterals which connect the entire maintenance hangar complex, the AGE washrack, the corrosion control shop, the jet engine parts cleaning shop, and the Bldg 228 washrack. The COD concentration measured at this site was 300 mg/l. Nickel and aluminum averaged at concentrations of 0.31 mg/l and 0.32 mg/l, respectively. Chromium was not detected in either sample. The value of oil and grease was

19.7 mg/l, and TSS averaged at 11.0 mg/l. The pH was measuredas 7.9 units in both composites, and this was probably caused by alkaline soaps since the MBAS value was 8.7 mg/l.

(8) Site 8: 24-hr composite samples were also collected at this site for two days. Manhole 125 is the intersection of two laterals servicing the Civil Engineering and Transportation complexes, and the discharge from manhole 128. The COD average results for this site was 580 mg/l, while the oil and grease results averaged 11.6 mg/l. Chromium, nickel and aluminum were detected at average concentrations of 0.24 mg/l, 0.46 mg/l, and 0.31 mg/l, respectively. TSS results were quite low with a 2-day average concentration of 11.0 mg/l. TDS results were significantly higher at 276 mg/l.

c. Bldg 228 washrack: A 1-day grab sample was collected at this site. The sample was analyzed for EPA methods 601 and 602, and characteristic hazardous waste.

(9) Site 9: Grab samples for volatile organic and aromatic compounds, and characteristic hazardous waste were collected from the drain receiving the Bldg 228 washrack rinsewater. Aircraft washing was being conducted during the sampling. The sample collected from this site was found to be ignitable at 135°F and thus characterized as hazardous. PD-680 is used at this site for aircraft washing and this was reflected in the COD and volatile organic and aromatic results. The COD result was 11,500 mg/l. Nine different priority pollutant compounds which gave a TTO value of 2.49 mg/l were detected. Of these nine, four were found in amounts greater than 0.30 mg/l, chlorobenzene (962 µg/l), 1,3-dichlorobenzene (664 µg/l), m-xylene (312 µg/l), and o-chlorotoluene (398 µg/l).

4. Oil/Water Separators

One-day grab samples were collected from the discharge pipe of the oil/water separator at each of the following sites. Samples were analyzed for pH, temperature, COD, oil and grease, total extractable hydrocarbons, MBAS, and characteristic hazardous waste, i.e., ignitability, corrosivity, reactivity, and EP toxicity. The separator from the auto hobby shop connects to the storm drainage system, and all other separators connect to the sanitary sewer system.

(10) Site 10: Samples were collected from the separator at the Civil Engineering complex washrack. The wastestream was non-hazardous and no significant results were found.

(11) Site 11: This sample was collected from the separator at the Auto Hobby shop. The pH of the wastewater was 5.70 and the COD was 250 mg/l. The oil and grease concentration was only 12.7 mg/l, and the wastewater was not characterized as hazardous.

(12) Site 12: The wastewater from the separator at the T-38 maintenance hangar (New Hangar) was essentially water. No significant results were recorded.

(13) Site 13: The COD concentration at the Bldg 411 (AGE) washrack separator was 3750 mg/l, and the oil and grease concentration was 384 mg/l. PD-680 is used at this site for washing, so these results were not unexpected. The wastewater was not characterized as hazardous.

(14) Site 14: The pH and COD values from the hangar 452 oil/water separator were 5.23 units and 200 mg/l, respectively. Oil and grease was found to be 36.0 mg/l and the wastewater had a surfactant concentration of 14.0 mg/l. The wastewater was nonhazardous.

(15) Site 15: This sample was collected from the hangar 454 oil/water separator. The COD and pH values were 620 mg/l and 6.5 units, respectively. However, the oil and grease concentration was only 16.2 mg/l. The wastewater was nonhazardous.

(16) Site 16: The wastewater from the Fuel System Repair oil/water separator had a high MBAS value of 18.0 mg/l. All other results were within expected ranges. The wastewater was nonhazardous.

(17) Site 17: The pH value of the wastewater from the BX Service Station oil/water separator was 4.55, and the COD concentration was 620 mg/l. The pH value is indicative of improper disposal practices for spent battery acid. Oil and grease was found to be 7.4 mg/l. The wastewater was characterized as nonhazardous.

(18) Site 18: Small amounts of phenolic compounds were detected at the discharge from the entomology shop oil/water separator; 2,4,6-trichlorophenol (11 µg/l), 2,4-dichlorophenol (3.4 µg/l), 2,4-dimethylphenol (3.4 µg/l), 4-chloro-3-methylphenol (16 µg/l), 4-nitrophenol (150 µg/l), pentachlorophenol (120 µg/l), and 2,4,6-trichlorophenol (3.1 µg/l). No other significant results were found.

(19) Site 19: The COD and oil and grease concentrations at the Refueling Maintenance oil/water separator were 340 mg/l and 110 mg/l, respectively. The wastewater was characterized as nonhazardous. The low MBAS concentration of 0.70 mg/l was reflected in the pH value of 6.4 units.

(20) Site 20: Results from the Jet Engine Test Cell were predictable. The oil and grease concentration was 206 mg/l and the COD value was 660 mg/l. Both of these results are within expected ranges for this shop. The wastewater was characterized as nonhazardous.

(21) Site 21: The COD result of 3500 mg/l at the hangar 450 oil/water separator was quite high. The pH of 10.4 units along with the low MBAS concentration of 0.48 mg/l indicates that caustic soda may have been discharged down the drain. The oil and grease value was found to be 570 mg/l The wastewater was characterized as nonhazardous.

5. Corrosion Control Oil/Water Separator Design Check

Appendix A shows the calculations for the design of an oil/water separator based on a flow rate of 24.8 gallons per minute. This flow rate was considered as the maximum flow from the Corrosion Control shop assuming simultaneous operation of four rinsing hoses during the paint stripping process. According to the calculations, the oil/water separator at the Corrosion Control shop is adequately designed to handle the maximum flow from the stripping operation. Normally though, the API gravity separator is designed to separate spherical particles with a specific gravity greater than water. It does not work well with irregularly shaped particles such as paint chips, which through surface tension or low specific gravity may remain floating, and soluble priority pollutants such as methylene chloride.

B. Hazardous Waste Program

The Hazardous Waste Program at Columbus AFB is effective. The Environmental Coordinator (DEEV) has the responsibility of all environmental programs on Columbus AFB. DEEV is not involved with the specific day-to-day details of waste disposal. The program is primarily managed by the Defense Reutilization and Marketing Office (DRMO) and operated by personnel from the shops generating the wastes. Shop personnel are responsible to log the quantity of waste placed into storage containers, maintain records of wastes stored at satellite accumulation sites, segregate, handle, and package the waste. With guidance from DRMO, the shop is also responsible to identify and label the waste and fill out a DD Form 1348-1 (Figure 1).

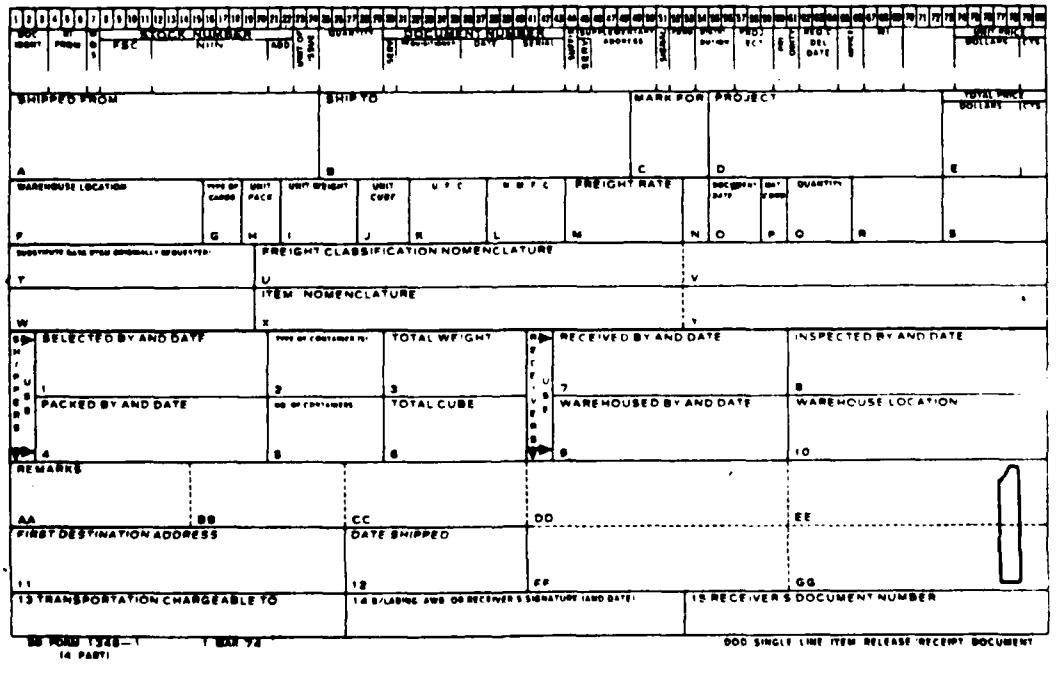


Figure 1: DD Form 1348

When a waste is ready to be transported, DRMO is contacted and the waste is transported by the generator to one of three places based on the type of waste. Waste solvents, oils and fuels are sent to storage tanks located behind bldg 322 (Liquid Fuels Maintenance Branch). All other wastes are sent to a civil engineering (CE) storage site located behind bldg 379. DRMO, bldg 153, is directly responsible for handling spent batteries and the overflow from the CE accumulation site. DRMO is responsible for custody of the waste until a contractor (currently, Chemical Waste Management) comes to pick up the waste. Prior to disposal, Chemical Waste Management samples the waste, fills out the United States Environmental Protection Agency (EPA) uniform manifest and signs the transporter signature block. When the waste gets to the disposal site, the manifest is completed and returned to DEEV for their records. Unknown waste drums and other waste streams are analyzed by the Bioenvironmental Engineer on an as needed basis.

1. Description of Industrial Activities and Waste Disposal Practices

This section contains a brief summary of our findings by organization while visiting the industrial activities. A listing of disposal practices by shop is included in attachment 6.

14 CIVIL ENGINEERING SHOP (CES)

Shop: Entomology — Building: 1809
Shop Supervisor: MSgt Estel — AUTOVON: 742-7292

Entomology Shop personnel are responsible for pest control throughout the base. This includes chemical insecticide spraying of trees, homes, etc. The chemicals are used up in the process. Any leftover chemicals are drained and stored in containers for use at a later time. All empty containers are triple rinsed and disposed of as municipal waste. No hazardous waste is generated by this shop.

Shop: Liquid Fuels Maintenance — Building: 322
Shop Supervisor: TSgt Heitmann — AUTOVON: 742-7396

Liquid Fuels personnel maintain stationary fuel systems, and clean two aboveground (187,000 and 385,000 gallon capacity) and 16 underground (50,000 gallon capacity) fuel tanks. The main waste is JP-4 contaminated with a small amount of sludge from tank cleaning operations. Approximately 5 gallons of waste is generated per tank during periodic cleanings which occur every five years. The waste JP-4 and sludge mixture is placed in an underground waste fuel tank located behind the facility. Waste oils, fuels (JP-4), and solvents (PD-680) from the base are stored in three of four 16,000 gallon underground tanks located behind the facility. Four underground tanks are located behind the facility; one tank is inactive, one tank is used for waste fuels, one tank is used for waste solvents, and one tank is used for waste oils. There is also an aboveground tank used for collecting waste 7808 oil. (See Figure 2)

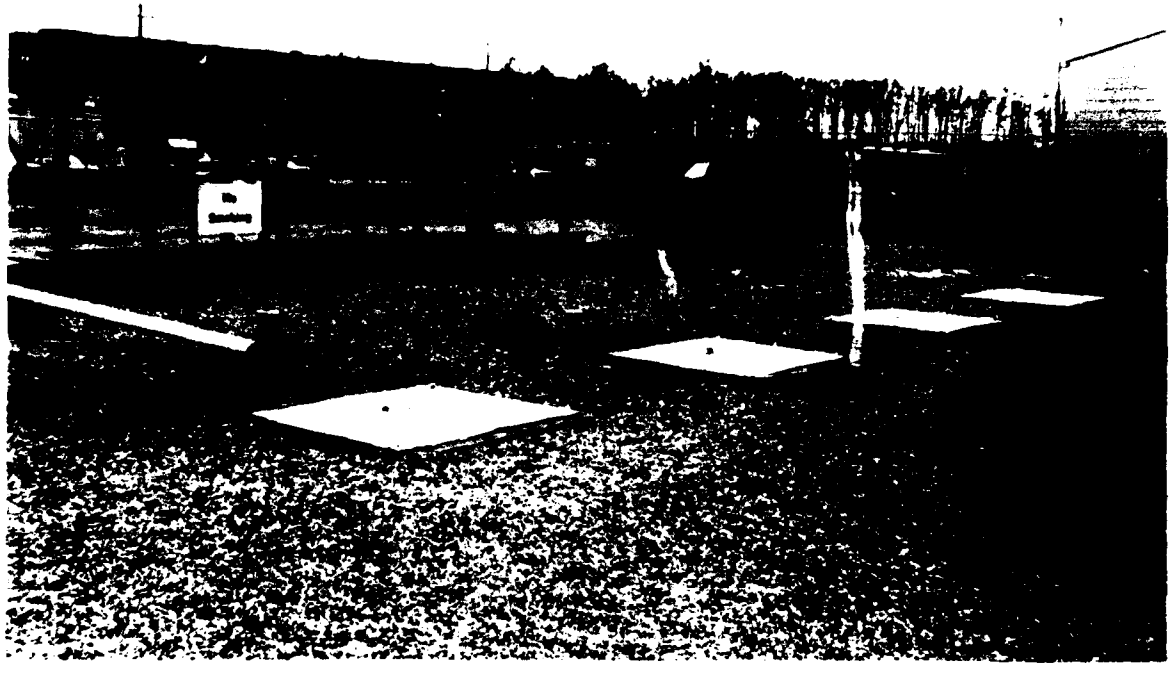


Figure 2. Underground Storage Tanks for Waste Solvents Oils, and Fuels

Shop: Paint Shop — Building: 379
Shop Supervisor: Mr Hass — AUTOVON: 742-7349

Shop personnel paint the interior and exterior of buildings, structures, and signs on Columbus AFB. Approximately 15 gallons of paint waste and 20 gallons of waste thinners are generated per month. Paints that can no longer be used (old, frozen or dirty) are palletized and disposed of as municipal waste. Thinner waste (generated by cleaning paint brushes and rollers) is drummed as hazardous waste and sent to the Civil Engineering accumulation site and disposed of through DRMO. Both paint and thinner waste are placed at the shop's satellite accumulation site located adjacent to the facility. The site is on a gravel area, undiked, uncovered, and unsecured.

Shop: Power Production — Building: 1816
Shop Supervisor: TSgt Hyatt — AUTOVON: 742-7394

Power Production personnel operate and maintain four MA-1A aircraft arresting barriers, 46 emergency powered generator sets and associated equipment including 24 automatic start and transfer panels. The shop generates about 25 gallons of waste oil and approximately four gallons of waste fuel per month. The shop also has a 15-gallon PD-680 tank used for cleaning paint brushes and equipment that is changed out and drummed every three months. The wastes are placed into 55 gallon drums (fuels and oils are drummed together) and

sent to centralized underground collection tanks for waste oils and solvents located behind bldg 322 (Liquid Fuels Maintenance Branch) for eventual disposal through DRMO. Eight gallons per month of waste antifreeze is generated and placed into 55 gallon drums. The waste acids are left in the battery case and placed on pallets. Waste antifreeze and spent batteries are disposed of through DRMO. The drums are located behind the facilty at an accumulation site. The site located on an asphalt area is undiked, uncovered, and unsecured.

14 FIELD MAINTENANCE SQUADRON (FMS)

Shop: AGE (Aerospace Ground Equipment) Building: 411
Shop Supervisor: SMSgt Fuchs AUTOVON: 742-7862

Personnel in the AGE shop are responsible for the inspection and repair of all AGE support equipment. This shop generates about 46 gallons of waste oil, 10 gallons of waste 7808 oil, 2 gallons of waste fuel and 10 gallons of waste hydraulic fluid per month. The waste 7808 oil, waste fuels and waste PD-680 are drummed separately. The shop also has a 30-gallon vat of PD-680 that is changed out and drummed every 6 months. Drummed wastes are sent to centralized collection tanks for oils, solvents and fuels located behind bldg 322 (Liquid Fuels Maintenance Branch) for eventual disposal through DRMO. The shop uses aircraft soap (5 gallons/month) and steam cleaning soap (15 gallons/month) diluted 10:1 at their washrack. Small amounts of PD-680 (6 gallons/month) is used to help clean heaviliy soiled equipment at the washrack. The waste antifreeze (5 gallons/month), soaps and PD-680 are drained to an oil/water separator that is periodically cleaned out by the CE Plumbing Shop personnel. All drummed wastes are located behind the facility next to the washrack at an accumulation site. The accumulation site located on a gravel bed is undiked, uncovered and unsecured.

Shop: Corrosion Control Building: 220/262
Shop Supervisor: Mr Myers AUTOVON: 742-7817

Corrosion Control is divided into two major sections. Aircraft stripping, corrosion prevention and painting is performed in bldg 262. Aircraft parts cleaning, corrosion prevention and painting is performed in bldg 260. The hazardous waste accumulation point for both sections is located behind bldg 262. The waste acids and waste paints and thinners are placed into separate 55-gallon drums as hazardous waste and sent to a CE accumulation site for eventual disposal through DRMO. The accumulation site located on an asphalt area is undiked, covered and unsecured.

Personnel for bldg 262 are responsible for stripping, corrosion prevention and painting T-37 and T-38 aircraft. Aircraft are brought into the hanger where non-phenolic stripper (B&B 4411, a methylene chloride based stripper) sprayed on to remove the paint. The stripper is allowed to set; then scraped and washed off. The process is often repeated. Approximately 200 gallons of stripper are used per month. The paint chips and stripping waste are flushed into an oil/water separator that is connected to the sanitary sewer. Sludge from the oil/water separator is pumped out by a contractor about every four months. About 60 gallons/month of thinner waste (50 gallons/month of MEK and 10 gallons/month of aliphatic thinner) is generated per month. Ten gallons of waste acid (used for corrosion treatment) is generated per month. The waste thinners and waste acids are drummed separately and stored at an accumulation site located behind bldg 262. Personnel from bldg 220 are responsible for cleaning, corrosion

prevention and painting aircraft parts. The shop has two waterfall paint booths that contain soap and water mixtures. The booths are cleaned and changed out on a weekly basis. The contaminated water is released to the sanitary sewer. Any paint chips left in the waterfall are thrown into the trash. All paint waste and thinners (40 gallons/month of MEK, 3 gallons/month of aliphatic thinner, and 3 gallons/month lacquer thinner) are collected in 55-gallon drums and sent to the accumulation site located behind bldg 262. Most of the paint used is polyurethane, but some enamel paints and solaramic coatings are also used. About 10 gallons of waste acid is generated per month. Wastes are drummed and sent to the hazardous waste accumulation site located behind bldg 262.

Shop: Fuel System Repair — Building: 246
Shop Supervisor: TSgt Jones — AUTOVON: 742-7786

Aircraft Fuel System Repair personnel remove and replace aircraft system components such as pumps, valves and fuel bladders. The fuel system repair hangar is capable of holding three aircraft at a time. The hangar has two trenches to remove JP-4 vapors and catch spills from leaking aircraft. The spilled fuel goes to a fuel/water separator connected to the sanitary sewer. The fuel/oil separator is periodically pumped out by the CE Plumbing Shop personnel. A pneumatic vacuum is used to depuddle the aircraft after its fuel tanks have been drained. Approximately 20 gallons/month of JP-4 is collected from the depuddling operation. When full, the pneumatic vacuum is emptied into a bowser brought in from flight line support. The waste fuel is sent to a centralized collection tank located behind bldg 322 (Liquid Fuels Maintenance Branch) for eventual disposal through DRMO.

Shop: Jet Engine Test Cell — Building: 224
Shop Supervisor: MSgt Kistner — AUTOVON: 742-7565

Jet Engine Test Cell personnel troubleshoot engines, perform field tests and conduct engine rev-up procedures on the J-69 and J-85 jet engines. Aircraft soap (16 gallon/month) is used to clean equipment and the interior of the run bay. The soap is rinsed down the drain which discharges to an oil/ water separator. The separator is pumped out annually by CE Plumbing Shop personnel. Waste jet fuel (4 gallons/month) and waste 7808 oil (13 gallons/ month) are drummed separately and stored at an accumulation site located adjacent to the facility. The 7808 oil and fuel wastes are sent to the centralized collection tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. The accumulation site located on an asphalt area is undiked, uncovered and unsecure.

Shop: Machine Shop — Building: 220
Shop Supervisor: TSgt Cormier — AUTOVON: 742-7545

Personnel of the Machine Shop repair and manufacture aircraft and engine component parts through the use of milling machines, lathes, drill presses and grinding machines. Approximately 165 gallons of waste oil (from maintenance of equipment) and 25 gallons of PD-680 (from degreasing operations) are generated per year. The waste oil and solvents are placed into 55-gallon drums at a collection site located behind the facility. Waste oils and solvents are sent to centralized underground collection tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for eventual disposal through DRMO. The accumulation site (also shared by the Wheel and Tire Shop) located on an asphalt area is undiked, uncovered and unsecure.

Shop: NDI Building: 246
Shop Supervisor: MSgt Spalding AUTOVON: 742-7644

Personnel of the NDI shop perform four nondestructive tests to inspect T-37 and T-38 aircraft and their components. NDI personnel are responsible for x-ray inspection, magnetic particle inspection, dye penetrant inspection, and spectographic analysis of engine oil to determine engine wear. Chemicals used for the x-ray inspection (50 gallons of developer and fixer) are sent down the drain to the sanitary sewer (fixer goes first to a silver recovery unit). Chemicals used for the magnetic particle inspection (20 gallons/quarter of Magnetic Particle Inspection Bath) are drummed and sent to DRMO for salvage. Chemicals used in the penetrant inspection (220 gallons/ year of penetrant and 220 gallons/year of emulsifier) are changed out and placed into 55 gallon containers for disposal through DRMO. There is no accumulation site for NDI wastes. The chemicals are changed out, drummed and picked up by DRMO for disposal.

Shop: Plating and Cleaning Shop Building: 218
Shop Supervisor: TSgt Sanders AUTOVON: 742-7425

Personnel of the Plating and Cleaning Shop are responsible for processing of aircraft and non-aircraft metal parts. The shop consists of 13 cleaning tanks (see figure 3 for contents, quantities and change out frequencies of individual tanks). All tanks (except rinse tanks) are changed out and drummed for disposal by DRMO. The hot and cold rinse tanks (500 gallon capacity) are drained to the sanitary sewer daily.

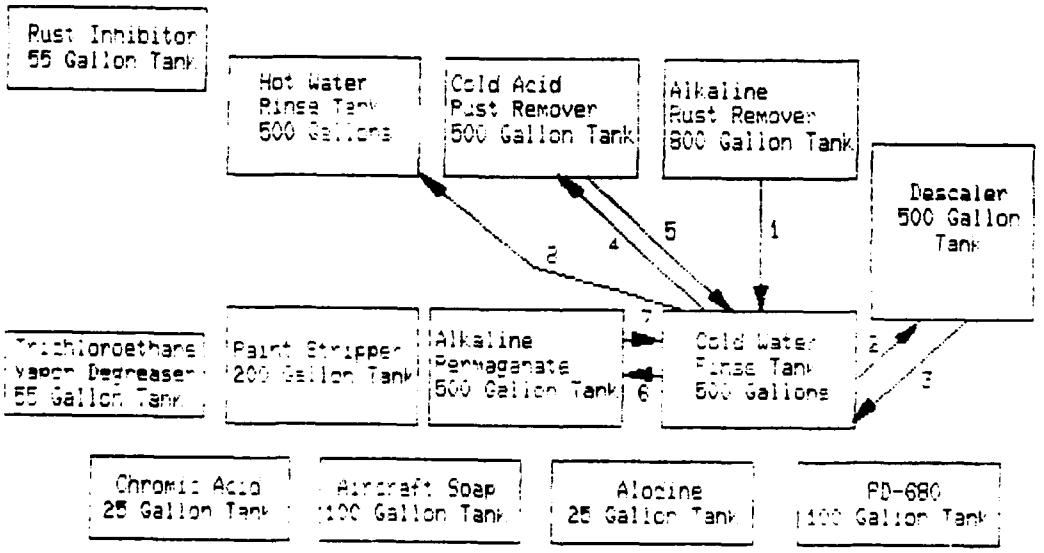


Figure 3. Parts Cleaning Room

Shop: Pneudraulics — Building: 630
Shop Supervisor: MSgt Stam — AUTOVON: 742-2468

Pneudraulics Shop personnel maintain in-shop repair for all pneudraulic components for the T-37 and T-38 aircraft. Parts are cleaned in two vats (110 and 30 gallon capacities) both containing PD-680. About 35 gallons/month of waste solvent is drummed and sent directly to a centralized underground collection tank located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. About 20 gallons/month of waste hydraulic fluid is pumped into a flight line bowser behind the shop. When the bowser is full the waste is sent to an underground waste oils tank behind bldg 322 for disposal by DRMO.

Shop: Propulsion Shop — Building: 218
Shop Supervisor: CMSgt Johnson — AUTOVON: 742-7483

The Propulsion Shop is divided into three major parts; Engine Repair Shop, Balance Room and Fuel Flow Shop. All wastes generated from the Propulsion Shop are drummed and placed at an accumulation site located behind the facility. The site located on an asphalt area is undiked, uncovered, and unsecure.

Engine Repair Shop personnel perform scheduled and unscheduled maintenance on J-69 and J-85 engines. The major wastes generated by this shop are waste oils (30 gallon/month of 7808 oil and 10 gallons/month of 1010 oil). Waste oils are drummed up (7808 and 1010 oil drummed separately) and placed at the waste accumulation site located behind the building. Wastes are sent to centralized collection tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal by DRMO.

The Balance Room personnel balance and rebuild compressor and turbine rotors. The shop has five tanks used for cleaning and lubricating engine components. There is one PD-680 tank (5 gallon), 1 carbon remover tank (5 gallon), 1 PD 680/7808 oil mixture (10 gallon) and two drain tanks (5 gallon) that are all changed out every three months. The waste from this shop is drummed and sent to DRMO for disposal.

The Fuel Flow Shop personnel are responsible for disassembling and reassembling gearboxes and checking spray patterns of fuel nozzles and combustion lines. A 30 gallon tank of WD-40 is used as a soaking agent. It is changed out every six months. A 25 gallon tank of PD-680 is used as a cleaner. It is also changed out every month. Calibration fluid (5 gallons/ month), is used to check the flow pattern of fuel nozzles. The waste from this shop is drummed and sent to DRMO for disposal. The shop also has an ultrasonic cleaner with soap solution. It is changed out every three months and the waste is drained into the sanitary sewer.

Shop: Washrack — Building: 228
Shop Supervisor: SSgt Buck — AUTOVON: 742-2750

Personnel of the Washrack Shop are responsible for cleaning and lubricating T-37 and T-38 aircraft. Approximately 90 aircraft per month are cleaned. Aircraft soap (200 gallons/month, diluted 4:1) is used to clean the aircraft. PD-680 (75 gallons/month) is used as a cleaner and degreaser for landing bays and other heavily greased areas. Both the aircraft soap and PD-680 are drained to the sanitary sewer.

Shop: Wheel and Tire Shop — Building: 220
Shop Supervisor: SSgt Towne — AUTOVON: 742-7209

Wheel and Tire Shop personnel tear down, clean and rebuild wheels for T-37 and T-38 aircraft. This shop generates about 40 gallons of waste PD-680 per month which is drummed and placed at a waste accumulation site located behind the building. The waste is sent to the centralized waste solvent underground collection tank located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. The satellite accumulation site (also shared by the Machine Shop) is located on an asphalt area that is undiked, uncovered, and not secure.

MORAL WELFARE AND RECREATION (MWR)

Shop: Auto Hobby Shop — Building: 338
Shop Supervisor: Mr Weathers — AUTOVON: 434-7842

Auto Hobby Shop personnel are responsible for checking out equipment and tools to patrons to use for maintenance of personal vehicles. Shop personnel also perform occasional maintenance on MWR vehicles. About 10 gallons/month of PD-680 is used for degreasing and 15 gallons/month of PD-680 is used for cleaning equipment. About 4 gallons/month of aircraft soap is used to clean the floors. The PD-680, aircraft soap, and waste antifreeze goes down the drain into an oil/water separator that is connected to the sanitary sewer. The oil/water separator is periodically pumped out by the CE Plumbing Shop personnel. About 200 gallons of waste oil are generated per month. Waste oil is poured into a funnel located in one of the bays connected to a 500-gallon underground tank. The tank is pumped out by a waste oil contractor.

14 ORGANIZATIONAL MAINTENANCE SQUADRON (OMS)

Shop: Scheduled Maintenance (T-37 and T-38) — Building: 440
Shop Supervisor: Mr Butler — AUTOVON: 742-7901

Personnel of the Scheduled Maintenance Shop perform periodic 500 hour inspections on T-37 and T-38 aircraft. Shop personnel use aircraft soap (15 gallons/month, diluted 16:1) and PD-680 (3 gallons/month) for cleaning operations. Both the aircraft soap and PD-680 are washed into the sanitary sewer. Shop personnel generate 15 gallons/month of waste 7808 oil, 3 gallons/month of hydraulic fluid and 1 gallon/month of waste fuels. The waste fuel, 7808 oil and hydraulic fluid are placed into separate flight line bowsers located at a waste accumulation site adjacent to bldg 440. Waste oils and fuels are sent to centralized collection tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. The accumulation site, located on an asphalt area, is undiked, uncovered, and unsecured.

Shop: Unscheduled Maintenance (T-37 and T-38) — Building: 450
Shop Supervisor: MSgt Putnam — AUTOVON: 742-7876

Personnel of the Unscheduled Maintenance (Aero Repair) Shop perform unscheduled maintenance on T-37 and T-38 aircraft. Shop personnel use aircraft soap (8 gallons/month, diluted 16:1) for cleaning operations. The soap is flushed to the sanitary sewer. Shop personal also generate 5 gallons/ month of waste 7808 oil, 20 gallons/month of waste

hydralic fluid and 25 gallon/month of waste JP-4. The shop has a 15-gallon vat of PD-680 that is changed out and drummed yearly. All wastes are drummed separately and placed at a waste accumulation site located behind the building. Wastes are sent to collection tanks for waste oils, fuels, and solvents located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. The collection site located on an asphalt area is undiked, uncovered, and unsecured.

TRANS

Shop: Motor Vehicle Maintenance Shop — Building: 304
Shop Supervisor: Mr McCarthy — AUTOVON: 742-7445

Vehicle Maintenance Shop personnel repair, maintain and paint military vehicles. Waste battery acid is left in the battery cases. The spent batteries are palletized and sent to DRMO for eventual disposal. Waste antifreeze (30 gallons/month), waste paint and thinners (2 gallons/month) and aircraft soap (55 gallons/month) are drained to the sanitary sewer. A PD-680 vat (30 gallon capacity) is changed out every 3 months. Waste oil (82 gallons/ month), waste hydraulic fluid (4 gallons/month) and waste PD-680 are placed into 55 gallon drums at an accumulation site located behind the facility. Waste oils and solvents are sent to centralized underground collection tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. The collection site located on a gravel bed is undiked, uncovered, and unsecure.

Shop: Refueling Maintenance — Building: 306
Shop Supervisor: Mr McCarthy — AUTOVON: 742-7445

Refueling Maintenance Shop personnel maintain refueling tankers for aircraft. Waste fuels (about 30 gallons/month) generated by leaking tankers goes down the drain to an underground waste fuel tank. The tank (500 gallon capacity) is pumped out by Liquid Fuels Maintenance Branch and the waste is sent to the underground collection tank for waste fuels located behind bldg 322 for disposal through DRMO.

2. Summary Of General Waste Disposal Practices At Columbus AFB

a. Waste solvents (including PD-680), oils, and fuels from the entire base are taken to centralized storage tanks located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. Oils from Auto Hobby Shop are removed by a local contractor.

b. All other liquid wastes (thinner waste, battery acid waste, ect.) are drummed and taken to either the CE accumulation site or the DRMO accumulation site until they are disposed of by DRMO. Stripping and paint waste from the Corrosion Control Shop are sent down the drain to an oil/water separator. The contents of the separator are removed by a hazardous waste contractor.

c. Spent batteries are palletized and sent to DRMO for disposal. Battery acid is left unneutralized in the cases.

d. Waste fixers are sent through a silver recovery unit before being discharged to the sewer system.

e. Waste antifreeze from most of the shops on base is drained to the sanitary sewer.

f. Empty paint spray cans are thrown in the trash.

V. OBSERVATIONS AND CONCLUSIONS

A. Wastewater Characterization Survey

1. The State of Mississippi NPDES Permit discharge limitations for Columbus AFB are extremely lenient and the parameters do not represent the industrial nature of the wastewater found by this survey. The wastewater from the main base complex flowing into the bldg 528 lift station is industrial in nature. Although it only constitutes approximately one fourth of the total average daily flow into the treatment plant, priority pollutants discharged from industrial shops are being found in the plant's effluent. Two operations of particular concern are the corrosion control and jet engine parts cleaning shops.

2. The separation tank for the corrosion control facility is designed for oil/water separation, and not for paint stripping wastes. The tank is not being hydraulically overloaded; however, significant amounts of solid matter (i.e., paint chips) are being pumped into the sanitary sewer system. Separation tanks are designed to settle out well-shaped particles with high specific gravities, but paint chips are non-homogeneously-shaped, heavier particles; thus, a large amount tend to float to the top and pass through the sedimentation tank to be discharged into the sewer system. This is evidenced by the large amount of paint chips observed in the manhole directly downgrade from the separation tank. Additionally, the tank is ineffective in removing chromium, volatile organic, and volatile aromatic compounds from the shop's wastestream. These pollutants are being pumped directly into the sanitary sewer system. The oil/water separator at the Jet Engine Parts Cleaning shop has similar problems. Extremely high levels of cadmium, volatile organic, and volatile aromatic compounds were found in the discharge to this separator.

3. According to 40 CFR 261.3, Definition of a Hazardous Waste, the corrosion control and jet engine parts cleaning shops are discharging hazardous waste to the separation tanks by discharging greater than 25 parts per million of methylene chloride and 1,1,1-trichloroethane, respectively. Additionally, the sludge in the corrosion control tank is hazardous, and unless the sludge is removed within a 90 day time period the tank would be considered as an underground hazardous waste storage unit, and would have to be permitted as one.

4. Pollutants discharged from the Corrosion Control and Jet Engine Parts Cleaning shops are being detected in significant quantities at downgradient manholes and at the influent and effluent to the sewage treatment plant. Even though the corrosion control shop constitutes less than one percent of the total daily average flow to the treatment plant, 12.0 mg/l of methylene chloride was detected at the influent. Chromium concentrations up to 1.0 mg/l were detected at the bldg 528 lift station and the manhole sampling sites. Priority pollutants are also being discharged in the treatment plant effluent. Chlorination of the effluent prior to discharge to the Tombigbee Waterway adds to the chlorinated hydrocarbon problem. Chlorine reacts with precursor compounds to form other priority pollutants. Grab samples collected to detect priority

pollutant contamination represents only one moment in time. The actual amount of priority pollutants discharged to the Tombigbee Waterway on a daily basis may be greater than the 0.225 mg/l detected during this survey.

5. U.S. Air Force Technical Order (T.O.) 1-1-8 governs the selection, application, and removal of paint strippers for aircraft, missiles, and associated material or equipment. T.O. 1-1-8 instructs personnel in the proper method of applying strippers, but does not give any indication as to the amount of stripper generally needed to remove polyurethane paint from a particular area on the plane. Personnel at the Corrosion Control shop at Columbus AFB are using an average of 110 gals of methylene chloride stripper per airplane. This amount appears to be excessive. Shop personnel stated that the stripper is sprayed onto the plane and then simply rinsed off after a period of time, and then reapplied if needed. T.O. 1-1-8, Section 2-20, instructs personnel to agitate the surface with a brush after allowing sufficient time for the stripper to act on the paint. Less stripper is required to remove the paint when the brush and compound are used in conjunction, as opposed to spraying the stripper on.

6. The effluent from the Jet Engine Parts Cleaning shop oil/water separator contains a wide variety of priority pollutant compounds. Most of these originate as drag-out from the sequential, tank-dipping, cleaning process, however, several appear to be reaction products formed in the oil/water separator. The action of strong acids such as phosphoric or chromic acids can liberate chlorine from the chlorinated compounds such as methyl chloroform. These ions can then react with precursors in fuels, for example, to form additional chlorinated halocarbons and aromatics, i.e., chlorotoluene, and dichloroethanes. The large amount of bromobenzene found in the separator did not orginate from the Parts Cleaning shop. Bromobenzene is an additive in lubricating oils, and it would appear that personnel from another shop dumped waste lube oil into the Parts Cleaning oil/water separator.

The discharge from the oil/water separator also contained large amounts of cadmium, which most likely originated from the electroplating shop. Personnel perform cadmium plating approximately twice per month. The rinse tank is supposedly drummed as hazardous waste and turned into DRMO, however, it is likely that the tank is periodically discharged down the drain. Another possible source could be drag-out from the plating tank itself.

7. The Sewage Treatment Plant at Columbus AFB appears to be operating fairly efficiently. The NPDES permit exceedance for total suspended solids was probably due to the fact that one of the two primary clarifiers was out of operation for two days during the sampling period. Past historical data indicate that the plant has had little trouble meeting the lenient standards in the State of Mississippi Permit. The BOD_5 loading on the plant is not excessive, and the BOD_5 to COD ratio at the influent to the plant indicates the wastewater is primarily domestic in nature.

8. Low pH results at the BX Service Station and the Auto Hobby shops possibly indicate improper disposal of waste battery acid down the drain. This is of particular importance at the Auto Hobby shop since their oil/water separator is connected to the storm drain.

9. The PD-680/rinsewater discharge from the bldg 228 aircraft washrack was ignitable at 135°F, and thus characterized as a hazardous waste. Discharge of this waste to the sanitary sewer system is allowed by the exclusion in the Clean Water Act (2) for industrial wastestreams, and the base's NPDES permit does not cover point source discharges into the sanitary sewer system. However, several biodegradable solvents are available that can be substituted for the PD-680 mandated by Technical Order 1-1-1 with no loss of cleaning effectiveness. This wastestream would be more amenable to treatment and less of a hazard to the environment.

10. All aircraft maintenance functions at Columbus AFB, including Corrosion Control, are going to be performed by a contractor in April of 1988. Additionally, all Air Training Command (ATC) installations are slated to convert to Bead Blasting for stripping of aircraft in calendar year 1989. Wastes and wastestreams generated by the contractor will still be the responsibility of Columbus AFB.

B. Hazardous Waste Survey

1. Columbus AFB has some baseline chemical analysis to characterize waste streams. Shops are responsible to keep a log of the amount and type of waste placed into each waste container, label the waste, and when the 55 gallon drums are full transport the waste to DRMO for waste disposal. This has been working well. To date, DRMO has not refused a waste drum from a shop for improper labeling or analysis.

2. The Maintenance Training Office (AV 742-2816) is responsible for training accumulation site managers and all shop personnel. Shop personnel are trained annually. The training program consists of an overview of waste management (i.e., waste handling, storage and turn-in procedures) and shop specific waste management practices. Accumulation site managers for the most part knew proper turn-in procedures and waste management practices.

3. In general, shop personnel harbor gross misconceptions concerning the abilities and limitations of oil/water separators. Personnel believe that oil/water and fuel/water separators can effectively treat wastestreams containing large quantities of oils, fuels and chemicals (i.e., Trans Refueling Maintenance drains approximately 40 gallons of JP-4 from the refueling trucks during maintenance). Personnel do not realize that fuel/water or oil/water separators are there to separate out small quantities of fuels and oils that may enter the sanitary system from small spills.

4. Most of the accumulation sites on base are located on impermeable floors that are undiked, uncovered and unsecure. Diking and covering the accumulation sites would contain any accidental spillage of waste. Securing the accumulation sites would discourage intentional or unintentional cross- contamination of wastes. Currently most of the accumulation sites on base do not meet RCRA Standards.

5. The base uses a large quantity of PD-680 for degreasing operations (tank type degreasing operations). Currently, waste PD-680 is placed in 55-gallon drums and taken to the underground storage tanks at liquid fuels maintenance and sold to a waste oil contractor through DRMO. As long as there is a contractor for PD-680 it is probably more cost effective to use it as a degreaser than going to a contractor such as Safety Kleen. Safety Kleen will come to a base, service their degreasing units, and replace the used degreasant with new degreasant.

6. In April 1988 all maintenance facilities on Columbus AFB will be contracted to the Northrup Corporation. All waste will still go through DRMO for disposal. This may cause problems if the contractor is not responsible for his wastes, since there may be a tendency to discharge chemicals to the sanitary sewer system instead of following proper disposal practices. In addition, a new baseline survey will have to be done to identify any changes in process or chemical usage implemented by the contractor.

7. All oil/water separators on base are pumped out by the CE Plumbing Shop (except Corrosion Control Shop and Plating Shop) on an as needed basis. The waste sludge is sent to a SAC area, bldg 1944, holding tank (15,000 gallon capacity) without being analyzed, and is disposed of by a contractor about every three years. This is an ineffective way to dispose of the sludge since the base might be increasing the amount of hazardous waste by mixing sludges that are hazardous with sludges that are potentially nonhazardous.

8. Long-term storage of waste sludge in an underground tank without baseline analytical information to prove that the waste is nonhazardous is unacceptable. If the sludge proves to be hazardous, then the tank would have to be permitted under RCRA as an underground hazardous waste storage tank.

9. By the end of January 1988 the base will have all underground tanks tested by Idaho National Engineering Laboratories. This will enable the base to identify and repair or remove any leaking underground storage tanks. If the tanks are found to be leaking, the tank should be removed according to 40 CFR, part 264, subpart J.

10. The Power Production Shop (bldg 1816) personnel palletize spent batteries and turn them in to DRMO. Shop personnel are saved the trouble of neutralizing and sampling the batteries for lead concentrations before discharge into the sanitary sewer. This is a good idea, and other shops that handle lead acid batteries could investigate the possibility of implementing this disposal practice.

11. The CE Paint Shop (bldg 379) personnel clean their paint brushes and rollers by using a two container system (a 55-gallon drum cut in half). The first container is used as an initial wash and contains dirty thinner while the second container is used as a final rinse and contains clean thinner. When the thinner in the first container is no longer effective the dirty thinner is drummed as hazardous waste. The clean thinner becomes the dirty thinner and new thinner is poured into the empty drum. By doing this the shop has effectively reduced the amount of waste thinner.

12. The Fire Department is installing a new fire training pit that is lined, connected to an oil/water separator. The discharge from the oil/water separator will enter a lined evaporation pond. The new fire training pit, if maintained properly, should prevent groundwater and surrounding soil contamination. (Figure 4)

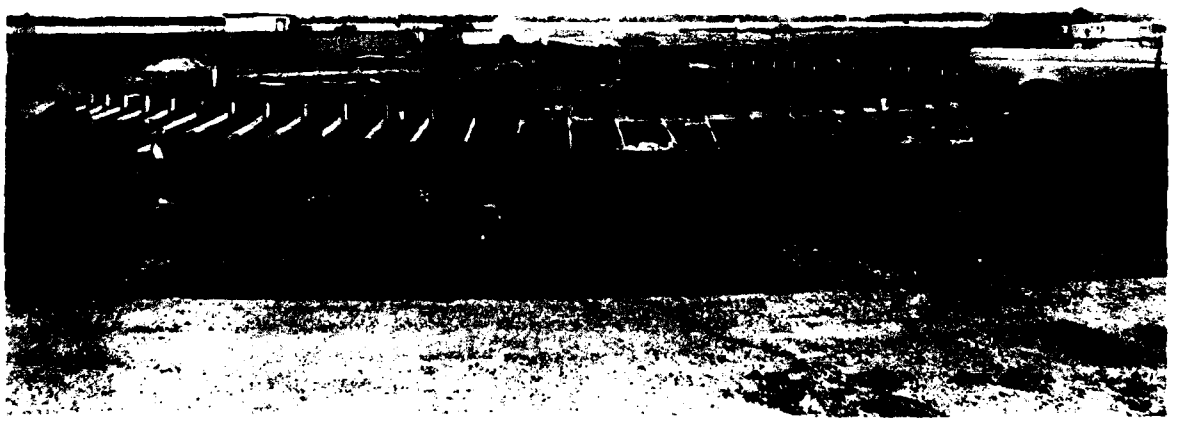


Figure 4, New Fire Training Pit

13. The Corrosion Control Shop (bldg 220) has two waterfall paint booths. When the system is cleaned, the sludge is skimmed off and the wastewater is drained into the sewer. The waste sludge is placed in 55-gallon drums and disposed of as hazardous waste. The water from the paint booth has never been tested to determine if it is a hazardous or nonhazardous waste.

14. The FMS Plating and Cleaning Shop (bldg 218) personnel change out two 500 gallon rinse water tanks daily. The rinsewater is drained directly to the sanitary sewer. The rinsewater can be discharged to the sanitary sewer as long as there is enough baseline results to show that the rinsewater is nonhazardous.

15. Transportation Shop (bldg 304) personnel dispose of their waste paints and thinners by discharging them to the sanitary sewer system. This is an unsatisfactory waste disposal practice since waste paint and thinners are considered a hazardous waste due to ignitability.

16. Refueling Maintenance (bldg 306) personnel drain fuel (approximately 30 gallons/month) from fuel trucks into a fuel/water separator. Fuel in the separator enters a 500-gallon underground tank. When the tank is full, the fuel is pumped out by Liquid Fuels Branch and taken to the 16,000 gallon underground tank located behind bldg 322 (Liquid Fuels Maintenance Branch) for disposal through DRMO. Fuel is wasted because it is not tested to determine whether or not it can be returned to the system.

VI. RECOMMENDATIONS

A. Wastewater Characterization Survey

1. Unless all discharge to the sanitary sewer system from the Corrosion Control and Jet Engine Parts Cleaning shops is discontinued, Columbus AFB should submit a new NPDES permit application as a consequence of the volatile organic and aromatic compounds detected at the Treatment Plant effluent. These results indicate a significant portion of the Columbus AFB wastewater is industrial in nature, and the discharge parameters in the State of Mississippi Permit should reflect the findings of this survey.

2. Clean out the separation tank at the Corrosion Control shop and dispose of the sludge as hazardous waste. Subsequently pressure test the tank to insure its integrity. If the tank is leaking it should be sealed to prevent acceptance of further discharge, and an EPA approved closure plan should be formulated to govern the removal of the tank from the ground.

3. Current discharge practices for paint stripping waste from the Corrosion Control shop cannot be continued. The following are possible treatment or process change alternatives to be implemented until the base converts to bead blasting for stripping of paint:

a. Collect all paint stripping waste in drums and dispose of as hazardous waste.

b. Convert to a wet sanding process for paint stripping.

c. Design a pretreatment system to include chemical coagulation, physical separation (i.e., gravity sedimentation, filtration, or screening) and volatile organic removal (i.e., packed towers, packed activated charcoal). Such a system might consist of interception of paint chips, i.e., a slotted discharge pipe with a series of screens of decreasing mesh to collect the paint chips, filters, etc. The wastewater could then be passed through a packed tower aeration column to remove the methylene chloride before discharge to the sanitary sewer. The paint chips should then be drummed and disposed of as hazardous waste. Air sampling might have to be performed to insure that workers are not being overexposed to methylene chloride vapors, and regional air pollution control agencies notified.

Chromium removal or recovery should also be considered. Removal could be included by precipitating the chromium out of solution and disposing of the sludge as hazardous waste. For example, sedimentation with chemical addition (alum) has been reported to remove >98% of the chromium in a full scale operation at a paint manufacturing plant. Recovery of the chromium could be facilitated by an ion exchange bed. The recovered metals might have commercial value.

Another alternative might include sequentially passing the wastewater through the slotted pipe with screens mentioned above, and then through an activated carbon column prior to discharge to the sanitary sewer system. This would at least partially remove the chromium and methylene chloride present in the discharge, however, the spent carbon bed would eventually have to be regenerated or disposed of as hazardous waste.

4. When using the paint stripper conforming to military specification MIL-R-25134, the paint and stripper should be agitated with a brush before rinsing, and after allowing sufficient time for the stripper to act on the surface as specified in T.O. 1-1-8. This should reduce the amount of stripper needed to strip the paint and thus reduce the amount requiring disposal.

5. Wastewater from the Jet Engine Parts Cleaning shop should be treated with a process such as packed tower aeration before discharge to the oil/water separator. This process will strip away the volatile organic compounds such as 1,1,1-trichloroethane, and prevent the wastestream from exceeding the 25 ppm criterion for various organic solvents entering a treatment or pretreatment system under 40 CFR 261.3, Definition of a Hazardous Waste.

6. Personnel in the Electroplating shop should discontinue discharging the cadmium plating rinse water to the drain. The rinse water should be drummed, tested for characteristic hazardous waste, and disposed of accordingly. Also, newly plated parts should be positioned over the plating tank and allowed to dry completely to prevent any drag-out from being discharged down the drain.

7. The wastewater from the bldg 228 washrack should be resampled and tested for characteristic hazardous waste and volatile organic and aromatic compounds to confirm this survey's findings. If similar results are obtained, Columbus AFB personnel should discontinue the use of PD-680 for aircraft washing. Biodegradable, limonene-based solvents (e.g., Citrikleen, Safe-T-Solv, etc.) that perform as well as PD-680, are available but are not as potentially harmful to the environment.

8. Three consecutive days of volatile halocarbon and aromatic samples (EPA Methods 601 and 602) should be collected from the Treatment Plant effluent after chlorination. This should provide additional information to determine if any other harmful priority pollutants are being formed by the reaction of chlorine with organic compounds already present in the wastestream.

9. Bioenvironmental engineering personnel should insure that waste battery acid is not being disposed of down the drain at the BX Service Station and the Auto Hobby shop. Shop personnel at the Auto Hobby shop should insure that patrons are aware of and implement proper disposal practices for hazardous wastes generated from maintenance activities.

10. Clean out the sewer system manhole directly downgrade from the Corrosion Control separation tank. The waste should be drummed, tested for characteristic hazardous waste, and disposed of accordingly.

B. Hazardous Waste Survey

1. Columbus AFB needs to update their waste analysis plan. This plan should include: a complete listing of all known waste streams with a brief description of the process or operation generating the waste; the results of a baseline chemical analysis (to fully characterize the waste); the required analysis frequency; the sampling technique; and the parameters of analysis (see Appendix B, Table 1).

Since the base does not have a large number of wastestreams, this type of sampling program will allow the base to establish, within a reasonable time, documented rationale for classifying each wastestream as either hazardous or nonhazardous. For example, the hot rinsewater tank at the parts cleaning shop is disposed of as a nonhazardous waste (down the drain), yet one of the results indicated a chromium concentration (7.86 mg/l) which classifies the waste as hazardous.

2. Entry to the accumulation sites should be restricted to prevent or discourage any intentional or unintentional mixing of wastes. Each accumulation site should be upgraded with fencing and an impermeable floor, such as a concrete pad, curbing, and a cover (see Appendix C for accumulation site descriptions). Another option is to replace all existing sites with a chemical storage facility (Figure 5 and Atch 9), which may be more cost- effective than upgrading each accumulation site.

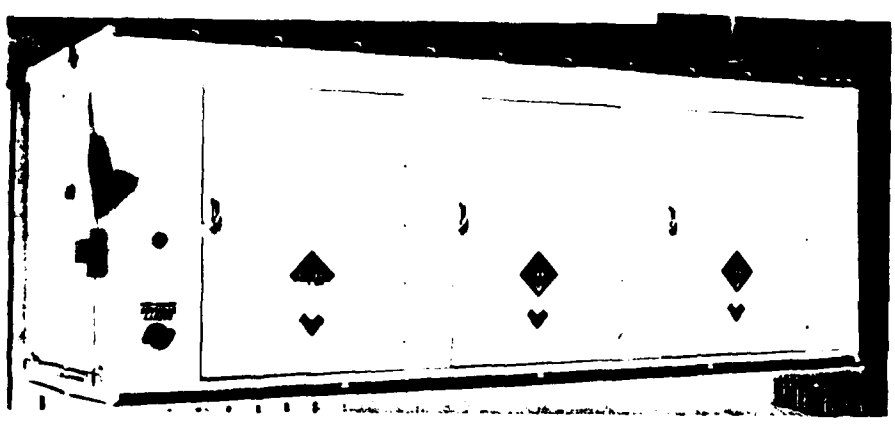


Figure 5. Self-Contained Hazardous Waste Unit

3. A comprehensive hazardous waste training and education program, tailored specifically for the base, is necessary. The course can be taught jointly by the Environmental Coordinator, Bioenvironmental Engineer, Fire Department and DRMO. The Environmental Coordinator can provide instruction on the hazardous waste management plan; the Bioenvironmental Engineer can instruct shop personnel on chemical hazards and the capabilities of oil/water separators; Fire Department personnel can cover spill response; and a DRMO representative can lecture on waste turn-in procedures and how to fill out DD Form 1348-1.

4. The personnel in Refueling Maintenance should use fiberglass pans to catch minor jet fuel spills during truck maintenance. The caught fuel can be placed in a bowser, taken to POL, retested, and if good placed back into the POL bulk storage tanks.

5. The Safety Kleen corporation has recently marketed a unit to clean painting equipment such as spray guns. Such a unit (or a comparable substitute) should be used in the Corrosion Control Shop and the Transportaton Shop to reduce the amount of paint wastes.

6. The wastewater from the rinse tanks at the waterfall paint booths at Corrosion Control Shop should be tested to determine if the wastewater is a characteristic hazardous waste. If the analysis indicates that the wastewater is not hazardous, the testing will provide documented rational for discharging this waste to the sewer system. If the analysis indicates that the wastewater is hazardous, then it should be disposed of accordingly.

7. Auto Hobby Shop personnel should drum the waste PD-680 and dispose of it through DRMO instead of sending 25 gallons/month to an oil/water separator connected to the storm drainage system. The waste solvent could then be sold for reclamation.

8. Transportation Shop personnel should not dispose of paint waste and thinners down the floor drains. These wastes should be drummed and disposed of as hazardous waste due to high metals and low flash point. One option is to take the waste to the CE Paint Shop and pour it into the appropriate drum for paint wastes and thinners.

9. During the survey it was apparent that a large percentage of shops on base used PD-680 for degreasing and cleaning operations. PD-680 usage in these shops can be eliminated by converting to limonene-based solvents now available. These are less irritating and may prove to be environmentally safer than PD-680.

10. Columbus AFB should discontinue the current practice of using the underground tanks located behind building 322 to temporarily store waste solvents, oils, and fuels. Additionall, these tanks need to be leak tested for integrity. If the tank is leaking, an approved EPA closure plan should be formultaed to govern the removal of the tank(s) from the ground.

11. The current practice of using an underground storage tank (Bldg 1944) for the storage of oil/water separator wastes is unacceptable. The waste that is currently being stored should be tested as a characteristic hazardous waste. If the waste is found to be hazardous, it should be disposed of accordingly.

REFERENCES

1. Code of Federal Regulations Title 40, Part 433 - Metal Finishing Point Source Category, Office of the Federal Register, Washington DC (1987).

2. Code of Federal Regulations Title 40, Part 261.3 - Definition of a Hazardous Waste, Office of the Federal Register, Washington DC (1987).

3. Code of Federal Regulations Title 40, Part 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Office of the Federal Register, Washington DC (1987).

4. Code of Federal Regulations Title 40, Part 270 - EPA Administered Permit Program: Hazardous Waste Permit Program, Office of the Federal Register, Washington DC (1987).

5. Code of Federal Regulations Title 40, Part 280 - Underground Storage Tanks, Office of the Federal Register, Washington DC (1987).

6. APHA, Standard Methods for the Examination of Water and Wastewater, 16th Ed., American Public Health Association, Washington DC (1987).

7. USEPA, Methods for Chemical Analysis of Water and Wastewater, EPA-600/4-79-020, March 1983.

8. State of Mississippi Water Pollution Control Permit for Columbus AFB, Mississippi Department of Natural Resources, Bureau of Pollution Control, Aug 23, 1985.

9. US Air Force Technical Order 1-1-8

10. US Air Force Technical Order 1-1-1

11. Department of Defense, Document MIL-R-25134, Military Specification for Paint Strippers, Republican Press, Hamilton OH.

ATTACHMENT 1

LIST OF COMPOUNDS COMPRISING TOTAL TOXIC ORGANICS (TTO)

bromodichloromethane
bromomethane
carbon tetrachloride
chlorobenzene
chloroethane
2-chloroethylvinyl ether
chloroform
chloromethane
dibromochloromethane
1,1-dichloroethane
1,2-dichloroethane
trans 1,2-dichloroethene
1,2-dichloropropene
cis 1,3-dichloropropene
trans 1,3-dichloropropene
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
Trichloroethylene
Vinyl Chloride
Bis, (2-Chloroethoxy) Methane
Bis, (2-Chloroisopropyl) ether
2-Chlorophenol
2-Nitrophenol
2,4-Dimethylphenol
2,4-Dichlorophenol
2,4,6-Trichlorophenol
2,4-Dinitrophenol
4-Nitrophenol
Pentachlorophenol
Aldrin
DDD
DDE
Dieldrin
Endrin
Heptachlor
Heptachlor Epoxide
p,p1-DDT
Endosulfan I
Endosulfan II
Endosulfan Sulfate
Endrin Aldehyde

benzene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
toluene
ethylbenzene
acenaphthene
acrolein
acrylonitrile
benzidine
1,2,4-trichlorobenzene
hexachlorobenzene
hexachloroethane
Bis (2-chloroethyl) ether
2-chloronaphthalene
parachlorometa cresol
3,3-dichlorobenzidene
1,1-dichloroethene
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
fluoranthene
4-chlorophenyl phenyl ether
4-bromophenyl phenyl ether
hexachlorobutadiene
hexachlorocyclopentadiene
isophorone
naphthalene
nitrobenzene
4,6-dinitro-o-cresol
N-nitrosodimethylamine
N-nitrosodiphenylamine
N-nitrosodi-n-propylamine
Bis (2-ethylhexyl) phthalate
Butyl benzyl phthalate
Di-n-butyl phthalate
Di-n-octyl-phthalate
diethyl phthalate
dimethyl phthalate
1,2-benzanthracene
benzopyrene
3,4-benzofluoranthene
11,12-benzofluoroanthene
chrysene

LIST OF COMPOUNDS COMPRISING TOTAL TOXIC ORGANICS (TTO) (Con't)

Chlordane
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Toxaphene
TCDD
PCB-1242
PCB-1254
PCB-1221
PCB-1232

acenaphthylene
anthracene
1,12-benzoperylene
fluorene
phenanthrene
1,2,5,6-dibenzanthracene
Indeno (1,2,3-cd) pyrene
pyrene
PCB-1016
PCB-1260
PCB-1248

ATTACHMENT 2

Waste Disposal Survey Form

Shop: Building Number:
Shop Supervisor: Autovon: X-
Shop Duties:_____

CATAGORIES OF WASTE AND DISPOSAL METHODS

TYPE OF WASTE	DISPOSAL METHOD	AMOUNT GENERATED (per month)	COMMENTS
1. * PAINT WASTE AND THINNERS	XXXXXXXXX		
2. * STRIPPING WASTE	XXXXXXXXX		
3. * WASTE ACIDS	XXXXXXXXX		
4. * SOAPS/CLEANERS			
5. * WASTE OIL			
6. * WASTE FLUIDS			
7. * WASTE FUELS			
8. USED ANTIFREEZE			
9. * WASTE SOLVENTS OTHER THAN PD-680	XXXXXXXXX		
10. * PD-680			
a. USED IN A TANK/VAT (NORMALLY DRUMMED)	D		
b. USED FOR WASHING (NORMALLY RINSED DD)	RDD		
11. * PHOTO WASTES	XXXXXXXXX		
12. *			

* specify the types used on next page

Examples of disposal Practices:

D-DRUMMED RTT-RETURNED TO FUEL TANKS DD-DOWN DRAIN PIT-PLACED IN TANK
NDD-NEUTRALIZED FIRST THEN PLACED DOWN DRAIN NA-NOT APPLICABLE

SPECIFIC CHEMICALS USED

PAINT WASTE AND THINNERS

Specific Waste Types	Waste Disposal Method	Amount of Waste Generated per month
Paints		
Latex		
Polyurathane		
Enamel		
Thinners (list)		

DOES THE SHOP USE ANY SAFETY KLEEN UNITS TO CLEAN PAINTING EQUIPMENT?
(YES / NO) CIRCLE ONE
IF SO HOW MANY UNITS? _____
CAPACITY OF EACH UNIT: _____

STRIPPERS

Name of Stripper	Manufacturer	National Stock Number	Amt used/month or Tank Cap.	Change out Freq.	Disposal METHOD

ACIDS

Name of Acid	Manufacturer	Amt used/mo	Disposal Method
Battery Acid	XXXXXXXXXX		

SOAPS/CLEANERS

Name of Soap	Manufacturer	Amt used/mo	National Stock Number

Chemical listing (cont.)

OILS/FLUIDS

Type of oil/fluid	Amt used/month	Disposal Method (if waste goes to a Tank give Capacity and location)
Brake Fluid		
Transmission Fluid		
Hydraulic Fluid		
7808 Oil		

SOLVENTS/DEGREASANTS

Name of Chemical	Manufacturer	NSN	Amt used/month or Tank Cap.	Change out Freq.	Disposal METHOD
Carbon Remover PD-680 used in a tank/vat		XXXXXXXXXX			
PD-680 used on the Washrack		XXXXXXXXXX			

DOES THE SHOP USE ANY SAFETY KLEEN DEGREASING UNITS (Y/N)? IF SO HOW MANY: ___
CAPACITY OF EACH UNIT: _____

PHOTO CHEMICALS

Name of Chemical	Manufacturer	Amt/month or Tank Cap.	Change out Freq.	Disposal Method

Chemical listing (cont.)

NDI CHEMICALS

Name of Chemical	Manufacturer	National Stock Number	Amt/month or Tank Cap.	Change out Freq.	DISPOSAL METHOD
Emulsifier					
Dye Penetrant					
Developer					

Other Chemicals Not Listed

Name of Chemical	Manufacturer	NSN	Amt/month or Tank Cap.	Change out Freq.	DISPOSAL METHOD

SIGNATURE OF PERSON FILLING OUT THE FORM: _____

ATTACHMENT 3

WASTES GENERATED AND DRUMMED AT COLUMBUS AFB

WASTE OILS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Test Cell	224	7808 Oil	250.000
Vehicle Maintenance	304	Motor Oil	1100.000
AGE	411	30 WT Oil	330.000
NDI	246	7808 Oil	50.000
AGE	411	Air Compresser Oil	110.000
AGE	411	Motor Oil	5.000
Auto Hobby Shop	338	Waste Oil	2400.000
Power Production	1816	Waste Oil	300.000
AGE	411	Compresser Oil	110.000
Liquid Fuels Maintenance	322	Waste Oil	2900.000
AGE	411	7808 Oil	120.000
Propulsion Support Branch	218	7808 Oil	360.000
Machine Shop	220	Machine Oil	160.000
Propulsion Support Branch	218	1010 Oil	60.000
Aero Repair	450	Waste Oils	60.000
Periodic Maintenance	440	7808 Oil	180.000
		TOTAL:	8495

WASTE FUELS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Liquid Fuels Maintenance	322	JP-4	3000.000
Power Production	1816	JP-4	48.000
Aero Repair	450	Waste Fuels	1500.000
AGE	411	JP-4	20.000
Periodic Maintenance	440	JP-4	12.000
Fuel Systems	246	JP-4	240.000
		TOTAL:	4820

WASTES GENERATED AND DRUMMED AT COLUMBUS AFB (Con't)

USED PD-680

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	PD-680	100.000
Machine Shop	220	PD-680	25.000
Propulsion Support Branch	218	PD-680	400.000
Pneudralics	630	PD-680	420.000
Wheel and Tire Shop	220	PD-680	400.000
AGE	411	PD-680	60.000
Liquid Fuels Maintenance	322	PD-680	1800.000
Power Production	1816	PD-680	75.000
Aero Repair	450	PD-680	10.000
Periodic Maintenance	440	PD-680	36.000
		TOTAL:	3326

WASTE STRIPPERS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Paint Stripper	400.000
		TOTAL:	400

MISCELLANEOUS CHEMICALS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Rust Inhibitor	200.000
Plating and Cleaning	218	Alkaline Permaganate	500.000
Plating and Cleaning	218	Alkali Rust Remover	800.000
Plating and Cleaning	218	Descaler	500.000
Plating and Cleaning	218	Aircraft Soap	600.000
		TOTAL:	2600

WASTES GENERATED AND DRUMMED AT COLUMBUS AFB (Con't)

WASTE FLUIDS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Aero Repair	450	Waste Fluids	360.000
Pneudralics	630	Hydraulic Fluids	250.000
AGE	411	Hydraulic Fluid	110.000
Liquid Fuels Maintenance	322	Hydraulic Fluid	1800.000
Vehicle Maintenance	304	Brake Fluid	6.000
Vehicle Maintenance	304	Transmission Fluid	6.000
Propulsion Support Branch	218	Calibration Fluid	60.000
		TOTAL:	2592

SOLVENTS OTHER THAN PD-680

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Trichloroethane	600.000
Propulsion Support Branch	218	Carbon Remover	360.000
Corrosion Control	220	Waste MEK	720.000
		TOTAL:	1680

NDI CHEMICALS

SHOP	BLDG	PRODUCT	QTY/GALLONS
NDI	246	Magnaflo	120.000
NDI	246	Dye Penetrant	110.000
NDI	246	Emulsifier	110.000
NDI	246	Developer	150.000
NDI	246	Fixer	150.000
		TOTAL:	640

WASTES GENERATED AND DRUMMED AT COLUMBUS AFB (Con't)

WASTE ACIDS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Acid Rust Remover	500.000
Corrosion Control	220	Waste Acids	120.000
Plating and Cleaning	218	Chromic Acid	50.000
Plating and Cleaning	218	Alodine	50.000
		TOTAL:	720

WASTE PAINTS AND THINNERS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Paint Shop	379	Waste Paint/Thinner	240.000
Corrosion Control	220	Waste Paint/Thinner	120.000
Liquid Fuels Maintenance	322	Waste Paint/Thinner	250.000
		TOTAL:	610

Type of Waste: ANTIFREEZE

SHOP	BLDG	PRODUCT	QTY/GALLONS
AGE	411	Antifreeze	50.000
Power Production	1816	Antifreeze	96.000
		TOTAL:	146

ATTACHMENT 4

WASTES GENERATED ON COLUMBUS AFB

WASTE OILS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Test Cell	224	7808 Oil	250.000
Liquid Fuels Maintenance	322	Waste Oil	2900.000
AGE	411	Compresser Oil	110.000
Aero Repair	450	Waste Oils	60.000
AGE	411	7808 Oil	120.000
Power Production	1816	Waste Oil	300.000
Vehicle Maintenance	304	Motor Oil	1100.000
Propulsion Support Branch	218	7808 Oil	360.000
NDI	246	7808 Oil	50.000
AGE	411	30 WT Oil	330.000
AGE	411	Air Compresser Oil	110.000
Machine Shop	220	Machine Oil	160.000
AGE	411	Motor Oil	5.000
Periodic Maintenance	440	7808 Oil	180.000
Auto Hobby Shop	338	Waste Oil	2400.000
Propulsion Support Branch	218	1010 Oil	60.000
		TOTAL:	8495

WASTE FUELS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Test Cell	224	Waste JP-4	50.000
Fuel Systems	246	JP-4	240.000
Aero Repair	450	Waste Fuels	1500.000
Power Production	1816	JP-4	48.000
Liquid Fuels Maintenance	322	JP-4	3000.000
AGE	411	JP-4	20.000
Periodic Maintenance	440	JP-4	12.000
		TOTAL:	4870

WASTES GENERATED ON COLUMBUS AFB (Con't)

USED PD-680

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	PD-680	100.000
Auto Hobby Shop	338	PD-680	360.000
Wheel and Tire Shop	220	PD-680	400.000
Periodic Maintenance	440	PD-680	36.000
Liquid Fuels Maintenance	322	PD-680	1800.000
Machine Shop	220	PD-680	25.000
Aero Repair	450	PD-680	10.000
Power Production	1816	PD-680	75.000
Propulsion Support Branch	218	PD-680	400.000
Pneudralics	630	PD-680	420.000
AGE	411	PD-680	60.000
		TOTAL:	3686

WASTE STRIPPERS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Corrosion Control	220	Waste Stripper	2650.000
Plating and Cleaning	218	Paint Stripper	400.000
		TOTAL:	3050

MISCELLANEOUS CHEMICALS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Alkali Rust Remover	800.000
Plating and Cleaning	218	Descaler	500.000
Plating and Cleaning	218	Rust Inhibitor	200.000
Plating and Cleaning	218	Alkaline Permaganate	500.000
Plating and Cleaning	218	Aircraft Soap	600.000
		TOTAL:	2600

WASTES GENERATED ON COLUMBUS AFB (Con't)

WASTE FLUIDS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Liquid Fuels Maintenance	322	Hydraulic Fluid	800.000
Pneudralics	630	Hydraulic Fluids	250.000
Aero Repair	450	Waste Fluids*	360.000
AGE	411	Hydraulic Fluid	110.000
Vehicle Maintenance	304	Transmission Fluid	6.000
Vehicle Maintenance	304	Brake Fluid	6.000
Propulsion Support Branch	218	Calibration Fluid	60.000
		TOTAL:	2592

SOLVENTS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Trichloroethane	600.000
Corrosion Control	220	Waste MEK	720.000
Propulsion Support Branch	218	Carbon Remover	360.000
		TOTAL:	1680

NDI WASTES

SHOP	BLDG	PRODUCT	QTY/GALLONS
NDI	246	Dye Penetrant	110.000
NDI	246	Emulsifier	110.000
NDI	246	Developer	150.000
NDI	246	Magnaflo	120.000
NDI	246	Fixer	150.000
NDI	246	Inspt. Developer	440.000
		TOTAL:	1080

WASTES GENERATED ON COLUMBUS AFB (Con't)

WASTE ACIDS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Plating and Cleaning	218	Chromic Acid	50.000
Plating and Cleaning	218	Acid Rust Remover	500.000
Plating and Cleaning	218	Alodine	50.000
Corrosion Control	220	Waste Acids	120.000
		TOTAL:	720

WASTE PAINTS AND THINNERS

SHOP	BLDG	PRODUCT	QTY/GALLONS
Paint Shop	379	Waste Paint/Thinner	240.000
Vehicle Maintenance	304	Waste Paint/Thinners	24.000
Liquid Fuels Maintenance	322	Waste Paint/Thinner	250.000
Corrosion Control	220	Waste Paint/Thinner	120.000
		TOTAL:	634

ANTIFREEZE

SHOP	BLDG	PRODUCT	QTY/GALLONS
Power Production	1816	Antifreeze	96.000
AGE	411	Antifreeze	50.000
		TOTAL:	146

ATTACHMENT 5

ANALYTICAL RESULTS FOR ALL SAMPLE SITES

TEMPERATURE, pH, CHEMICAL OXYGEN DEMAND (COD), AND SUSPENDED, VOLATILE, AND DISSOLVED SOLIDS RESULTS FOR 7-DAY SAMPLE SITES

Parameter	Site	No. Days Detected	High	Low	Avg
Temperature	Corrosion Control (CC)	7	18° C	8.2	12.1
	Jet Engine Parts Cleaning (PC)	7	17	8.2	12.6
	Bldg 528 Lift Station (LS)	7	18.5	8.1	12.87
	STP Influent (INF)	7	18.0	8.0	13.20
	STP Effluent (EFF)	7	17.5	8.0	11.36
pH	CC	7	9.42	8.82	9.24
	PC	7	8.08	7.68	7.96
	LS	7	7.57	6.82	7.09
	INF	7	7.50	6.64	6.87
	EFF	7	7.40	6.94	7.13
COD (mg/l)	CC	7	6563	3500	5252
	PC	7	3500	1200	2044
	LS	7	800	350	571
	INF	7	400	200	304
	EFF	7	100	50	73.7
Filterable Residue (TDS)	CC	7	252	176	223
	PC	7	1330	1172	1253
	LS	7	453	224	313
	INF	7	445	198	297
	EFF	7	512	248	307
Volatile Residue (VSS)	CC	7	135	7	49.4
	PC	7	44	18	24.1
	LS	7	25	1	16.1
	INF	7	15	6	10.0
	EFF	4	8	1	4.25
Non-Filterable Residue (TSS)	CC	7	15854	592	2852
	PC	7	4105	760	1760
	LS	7	122	57	89
	INF	7	319	25	89
	EFF	7	86	40	59

TOXIC METAL RESULTS FOR THE 7-DAY COMPOSITE SAMPLING SITES

Parameter	Site	No. Days Detected	High	Low	Avg
Arsenic	Corrosion Control (CC)	7	0.284	0.132	0.207
	Jet Engine Parts Cleaning (PC)	7	2.17	1.41	1.77
	L.S. Bldg 528 (LS)	0	---	---	---
	STP Influent (INF)	0	---	---	---
	STP Effluent (EFF)	0	---	---	---
Barium	CC	0	---	---	---
	PC	1	---	---	0.112
	LS	6	0.80	0.123	0.352
	INF	1	---	---	0.131
	EFF	1	---	---	0.177
Cadmium	CC	7	0.275	0.126	0.201
	PC	7	2.09	1.40	1.72
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	0	---	---	---
Total Chromium	CC	7	37.17	17.10	30.50
	PC	7	0.341	0.106	0.179
	LS	3	1.304	0.112	0.570
	INF	0	---	---	---
	EFF	0	---	---	---
Copper	CC	1	---	---	0.104
	PC	7	0.854	0.458	0.627
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	0	---	---	---
Iron	CC	7	1.659	1.203	1.381
	PC	7	6.494	1.782	2.973
	LS	7	2.548	0.749	1.252
	INF	7	0.676	0.483	0.591
	EFF	7	0.874	0.351	0.505
Manganese	CC	0	---	---	---
	PC	7	0.752	0.186	0.381
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	0	---	---	---

TOXIC METAL RESULTS FOR THE 7 DAY COMPOSIT SAMPLING SITES (Con't)

Parameter	Site	No. Days Detected	High	Low	Avg
Nickel	CC	7	0.654	0.443	0.582
	PC	7	1.991	0.883	1.325
	LS	7	0.755	0.299	0.581
	INF	7	0.841	0.479	0.644
	EFF	7	0.870	0.411	0.733
Zinc	CC	6	1.148	0.503	0.878
	PC	7	1.212	0.495	0.743
	LS	6	0.324	0.110	0.164
	INF	0	---	---	---
	EFF	0	---	---	---
Magnesium	CC	7	3.20	2.10	2.36
	PC	7	2.70	1.50	1.96
	LS	7	4.10	3.10	3.73
	INF	7	3.70	2.40	3.20
	EFF	7	3.90	2.90	3.56
Aluminum	CC	7	1.285	0.323	0.893
	PC	7	1.959	0.307	0.712
	LS	7	0.541	0.248	0.355
	INF	7	0.280	0.144	0.207
	EFF	7	0.297	0.108	0.165
Calcium	CC	7	22.40	16.80	18.40
	PC	7	17.30	8.80	12.30
	LS	7	32.30	25.30	29.10
	INF	7	28.90	17.40	24.10
	EFF	7	32.70	22.20	28.00
Cobalt	CC	0	---	---	---
	PC	7	1.076	0.525	0.749
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	0	---	---	---
Molybdenum	CC	0	---	---	---
	PC	7	0.296	0.191	0.249
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	0	---	---	---

Mercury ** Not Detected at any of the 7-day sites **

Note - all nondetected samples are below 100 µg/l due to dilution of samples by the analyzing laboratory.

7-DAY SAMPLING SITE RESULTS FOR VARIOUS PARAMETERS (Total Organic Carbon, Oil and Grease, Total Extractable Hydrocarbons, Nitrate, Total Kjeldahl Nitrogen, Phosphorus, Cyanide, Total Hardness, Sulfate, MBAS, Alkalinity)

Parameter	Site	No. Days Detected	High (mg/l)	Low	Avg
Total Organic Carbon (TOC)	CC	7	1600	1280	1420
	PC	7	480	64	376.3
	LS	7	130	48	73.8
	INF	7	72	35	51.6
	EFF	7	33	10	18.8
Oil and Grease	CC	7	860	72	475.1
	PC	7	403	14.4	230.5
	LS	7	115	18.5	51.2
	INF	7	157	9.5	37.8
	EFF	7	3.9	1.0	1.8
Total Extractable Hydrocarbons	CC	7	1800	60	441.4
	PC	7	360	12	214.3
	LS	7	76	18	39.6
	INF	7	156	6.0	35.4
	EFF	6	3.6	1.0	1.7
Nitrates	CC	6	0.26	0.10	0.193
	PC	1	---	---	0.10
	LS	0	---	---	---
	INF	0	---	---	---
	EFF	7	1.0	0.38	0.52
Total Kjeldahl Nitrogen	CC	7	260	27	204.6
	PC	7	54	21.5	28.3
	LS	7	200	32	69.5
	INF	7	39	22.5	31.7
	EFF	7	24.5	14.4	18.9
Phosphorus	CC	7	25	7.6	13.7
	PC	7	9.8	7.0	8.2
	LS	7	10.5	7.6	8.9
	INF	7	10.0	6.2	8.3
	EFF	7	9.5	7.0	8.0
Total Cyanide	CC	7	0.55	0.16	0.33
	PC	7	0.05	0.005	0.043
	LS	7	0.13	0.005	0.042
	INF	7	0.03	0.005	0.013
	EFF	7	0.03	0.005	0.011

7-DAY SAMPLING SITE RESULTS FOR VARIOUS PARAMETERS (Con't)

Parameter	Site	No. Days Detected	High (mg/l)	Low	Avg
Hardness	CC	7	69	51	55.60
	PC	7	54	28	38.70
	LS	7	97	76	89.30
	INF	7	87	53	73.30
	EFF	7	98	67	84.60
Sulfate	CC	7	20	8	14.70
	PC	7	14	10	12.40
	LS	7	26	8	13.60
	INF	6	16	10	12.00
	EFF	7	24	16	20.00
MBAS	CC	7	290	180	225.70
	PC	6	2.0	0.47	1.10
	LS	7	12.1	0.18	2.80
	INF	7	0.44	0.14	0.30
	EFF	7	0.25	0.16	0.20
Alkalinity	CC	4	758	606	708
	PC	4	474	380	425
	LS	4	244	188	218
	INF	4	214	142	163
	EFF	4	162	120	146

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS

Date Collected	Site	Compound	Conc.
1 Dec 87	Corrosion Control	Phenol	1600 µg/l
3 Dec 87	STP Influent	Carbon Tetrachloride	7.8 µg/l
		Chloroform	3.1 µg/l
		1,4-Dichlorobenzene	1.2 µg/l
		Methylene Chloride	3.7 µg/l
		1,1,1-Trichloroethane	1.9 µg/l
		Benzene	TR
		1,3-Dichlorobenzene	4.9 µg/l
		1,4-Dichlorobenzene	10µg/l
		Ethylbenzene	4.7 µg/l
		Toluene	9.1 µg/l
		m-Xylene	7.7 µg/l
		o-Chlorotoluene	10 µg/l

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS (Con't)

Date Collected	Site	Compound	Conc.
3 Dec 87	STP Effluent	Chloroform	TR
		m-Xylene	TR
		o-Chlorotoluene	3.4 µg/l
3 Dec 87	Corrosion Control	Chloroform	1162 µg/l
		Methylene Chloride	2.1 grams/l
		Tetrachloroethylene	131 µg/l
		1,1,1-Trichloroethane	31 µg/l
		Trichloroethylene	39 µg/l
		1,2-Dichlorobenzene	706 µg/l
		1,3-Dichlorobenzene	82 µg/l
		1,4-Dichlorobenzene	2581 µg/l
		Ethylbenzene	398 µg/l
		Toluene	6925 µg/l
		m-Xylene	267 µg/l
		o-Chlorotoluene	540 µg/l
		Phenol	540 µg/l
3 Dec 87	Bldg 528 Lift Station	Phenol	39 µg/l
3 Dec 87	Bldg 228 Washrack	1,1-Dichloroethane	57 µg/l
		1,2-Dichloroethane	31 µg/l
		1,1,1-Trichloroethane	5.0 µg/l
		Trichloroethylene	15 µg/l
		Chlorobenzene	962 µg/l
		1,3-Dichlorobenzene	664 µg/l
		Ethylbenzene	46 µg/l
		m-Xylene	312 µg/l
		o-Chlorotoluene	398 µg/l
3 Dec 87	Parts Cleaning	Phenol	51 µg/l
4 Dec 87	Hangar 452	Phenol	8.2 µg/l
4 Dec 87	STP Influent	Chloroform	1024 µg/l
		1,2-Dichloroethane	113 µg/l
		1,2-Dichloropropane	69 µg/l
		Methylene Chloride	12000 µg/l
		1,1,1-Trichloroethane	26 µg/l
		Trichloroethylene	45 µg/l
		Chlorobenzene	201 µg/l
		1,3-Dichlorobenzene	707 µg/l
		1,4 Dichlorobenzene	633 µg/l
		Ethylbenzene	695 µg/l

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS (Con't)

Date Collected	Site	Compound	Conc.
		m-Xylene	741 µg/l
		o-Chlorotoluene	1104 µg/l
4 Dec 87	STP Effluent	Carbon Tetrachloride	1.4 µg/l
		Chloroform	TR
		Methylene Chloride	205 µg/l
		1,1,1-Trichloroethane	1.4 µg/l
4 Dec 87	Corrosion Control	Bromoform	42 µg/l
		Chloroform	1207 µg/l
		1,2 Dichlorobenzene	24 µg/l
		trans 1,2-Dichloroethene	23 µg/l
		Methylene Chloride	3 grams/l
		Tetrachloroethylene	80 µg/l
		1,1,1-Trichloroethane	18 µg/l
		Trichloroethylene	15 µg/l
		Chlorobenzene	117 µg/l
		1,3-Dichlorobenzene	308 µg/l
		Ethylbenzene	543 µg/l
		Toluene	3396 µg/l
		m-Xylene	476 µg/l
		o-Chlorotoluene	521 µg/l
		Phenol	300 µg/l
4 Dec 87	Parts Cleaning	Bromodichloromethane	1170 µg/l
		Carbon Tetrachloride	894 µg/l
		Chlorobenzene	111 µg/l
		Chloroform	914 µg/l
		Dibromochloromethane	51 µg/l
		1,2-Dichlorobenzene	4.0 µg/l
		1,3-Dichlorobenzene	5.0 µg/l
		1,4-Dichlorobenzene	400 µg/l
		1,1-Dichloroethane	374 µg/l
		1,2-Dichloroethane	84 µg/l
		1,1-Dichloroethene	132 µg/l
		trans 1,2-Dichloroethene	455 µg/l
		1,2-Dichloropropane	87 µg/l
		Methylene Chloride	153 µg/l
		Tetrachloroethylene	36 µg/l
		1,1,1-Trichloroethane	39100 µg/l
		1,2-Dibromoethane	54 µg/l
		Benzene	12 µg/l

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS (Con't)

Date Collected	Site	Compound	Conc.
		Ethylbenzene	38 µg/l
		m-Xylene	292 µg/l
		Bromobenzene	27 µg/l
		o-Chlorotoluene	863 µg/l
5 Dec 87	Corrosion Control	Phenol	280 µg/l
5 Dec 87	Parts Cleaning	Phenol	37 µg/l
6 Dec 87	Corrosion Control	Phenol	370 µg/l
6 Dec 87	Parts Cleaning	Phenol	33 µg/l
7 Dec 87	STP Influent	Chloroform	757 µg/l
		1,1-Dichloroethene	6.6 µg/l
		Methylene Chloride	93 µg/l
		Tetrachloroethylene	2.6 µg/l
		1,1,1-Trichloroethane	9.9 µg/l
		1,2-Dibromomethane	6.7 µg/l
		1,3-Dichlorobenzene	160 µg/l
		m-Xylene	186 µg/l
		Phenol	24 µg/l
7 Dec 87	STP Effluent	Chloroform	TR
		1,1-Dichloroethene	TR
		1,2-Dichloropropane	2.2 µg/l
		Methylene Chloride	0.9 µg/l
		1,2 Dibromomethane	1.0 µg/l
		1,3-Dichlorobenzene	77 µg/l
		m-Xylene	144 µg/l
7 Dec 87	Parts Cleaning	Chloroform	1505 µg/l
		1,2-Dichlorobenzene	98 µg/l
		1,3-Dichlorobenzene	115 µg/l
		1,4-Dichlorobenzene	171 µg/l
		1,1-Dichloroethane	2442 µg/l
		1,2-Dichloroethane	159 µg/l
		1,1-Dichloroethene	72 µg/l
		trans 1,2-Dichloroethene	140 µg/l
		1,2-Dichloropropane	1326 µg/l
		Methylene Chloride	270 µg/l
		Tetrachloroethylene	51 µg/l
		1,1,1-Trichloroethane	41000 µg/l

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS (Con't)

Date Collected	Site	Compound	Conc.
		Trichloroethylene	329 µg/l
		Benzene	107 µg/l
		Ethylbenzene	23000 µg/l
		Bromobenzene	181000 µg/l
		m-Xylene	74000 µg/l
		o-Chlorotoluene	42000 µg/l
		Phenol	32 µg/l
7 Dec 87	Corrosion Control	Chloroform	1863 µg/l
		1,4-Dichlorobenzene	50 µg/l
		Methylene Chloride	166000 µg/l
		Tetrachloroethylene	138 µg/l
		1,1,1-Trichloroethane	23 µg/l
		1,3-Dichlorobenzene	3164 µg/l
		Toluene	46000 µg/l
		m-Xylene	15000 µg/l
		Phenol	510 µg/l
7 Dec 87	Manhole 125	Phenol	14 µg/l
7 Dec 87	Manhole 128	Phenol	5.4 µg/l
7 Dec 87	Manhole 140	Phenol	16 µg/l
8 Dec 87	Bldg 528 Lift Station	Chloroform	1394 µg/l
		1,1-Dichloroethane	2325 µg/l
		1,1-Dichloroethene	31 µg/l
		1,2-Dichloropropane	101 µg/l
		Methylene Chloride	46 µg/l
		1,1,1-Trichloroethane	42000 µg/l
		Toluene	1562 µg/l
		Phenol	11 µg/l
8 Dec 87	Parts Cleaning	Chloroform	1321 µg/l
		1,2-Dichloropropane	768 µg/l
		Methylene Chloride	116 µg/l
		Trichloroethylene	487 µg/l
		Vinyl Chloride	42 µg/l
		Benzene	66 µg/l
		Bromobenzene	16000 µg/l
		Phenol	34 µg/l
		2,4 Dimethylphenol	18 µg/l

SAMPLING RESULTS FOR PHENOLS, VOLATILE ORGANIC, AND AROMATIC COMPOUNDS (Con't)

Date Collected	Site	Compound	Conc.
8 Dec 87	Corrosion Control	Phenol	600 µg/l
		Pentachlorophenol	53 µg/l
8 Dec 87	Hangar 450	Phenol	280 µg/l
8 Dec 87	Jet Engine Test Cell	Phenol	13 µg/l
8 Dec 87	Entomology	2,4,6 Trichlorophenol	11 µg/l
		2,4 Dichlorophenol	3.4 µg/l
		2,4 Dimethylphenol	3.4 µg/l
		4-chloro-3-methylphenol	16 µg/l
		4-Nitrophenol	150 µg/l
		Pentachlorophenol	120 µg/l
		2,4,6 Trichlorophenol	3.1 µg/l
8 Dec 87	Influent	Pentachlorophenol	51 µg/l
8 Dec 87	Manhole 128	Pentachlorophenol	34 µg/l
		Phenol	9.1 µg/l
8 Dec 87	Manhole 140	Pentachlorophenol	39 µg/l
		Phenol	7.4 µg/l

DETECTABLE SAMPLE RESULTS FOR 2-DAY COMPOSITE SITES (Oil and Grease, Total Extractable Hydrocarbons, Detectable Metals, Total Hardness, Suspended Solids, and MBAS)

Parameter (mg/l)	Site	No. Days Detected	2-Day Avg (if applicable)
Temperature	Manhole 125	2	13.40
	Manhole 128	2	13.40
	Manhole 140	2	13.30
pH	Manhole 125	2	7.10
	Manhole 128	2	7.93
	Manhole 140	2	8.02
COD	Manhole 125	2	465.0
	Manhole 128	2	300.0
	Manhole 140	2	440.0
Oil and Grease	Manhole 125	2	11.60
	Manhole 128	2	19.68
	Manhole 140	2	15.44
Total Extractable Hydrocarbons	Manhole 125	2	10.80
	Manhole 128	2	11.80
	Manhole 140	2	14.40
Chromium	Manhole 125	2	0.236
	Manhole 128	0	---
	Manhole 140	2	0.724
Iron	Manhole 125	2	1.140
	Manhole 128	2	0.834
	Manhole 140	2	0.664
Nickel	Manhole 125	2	0.459
	Manhole 128	2	0.310
	Manhole 140	2	0.302
Calcium	Manhole 125	2	26.25
	Manhole 128	2	25.45
	Manhole 140	2	23.50
Magnesium	Manhole 125	2	3.30
	Manhole 128	2	3.15
	Manhole 140	2	3.00
Aluminum	Manhole 125	2	0.305
	Manhole 128	2	0.316
	Manhole 140	2	0.311

DETECTABLE SAMPLE RESULTS FOR 2-DAY COMPOSITE SITES (Oil and Grease, Total Extractable Hydrocarbons, Detectable Metals, Total Hardness, Suspended Solids, and MBAS) (Con't)

Arsenic	** All results were below detection limit **
Barium	** All results were below detection limit **
Cadmium	** All results were below detection limit **
Manganese	** All results were below detection limit **
Mercury	** All results were below detection limit **

Parameter (mg/l)	Site	No. Days Detected	2-Day Avg (if applicalbe)
Total Hardness	Manhole 125	2	79.50
	Manhole 128	2	76.50
	Manhole 140	2	71.00
Filterable Residue (TDS)	Manhole 125	1	276.0
	Manhole 128	1	248.0
	Manhole 140	1	256.0
Volatile Residue (VSS)	Manhole 125	1	13.0
	Manhole 128	1	10.0
	Manhole 140	1	12.0
Nonfilterable Residue (TSS)	Manhole 125	1	11.0
	Manhole 128	1	11.0
	Manhole 140	1	50.0
MBAS	Manhole 125	1	1.20
	Manhole 128	1	8.70
	Manhole 140	1	0.57

** Note: Due to dilution of samples by the analyzing laboratory, the detection limit for metals with the exception of mercury was 100 µg/l. Detection limit for mercury was 1 µg/l **

TEMPERATURE, pH, AND CHEMICAL OXYGEN DEMAND (COD) RESULTS FOR GRAB SAMPLE SITES

Date of Analysis	Site	Temp (C)	pH	COD (mg/l)
3 Dec 87	Bldg 228 Washrack	11.0	7.78	11500
4 Dec 87	CE Washrack (Bldg 375)	12.5	6.85	400
4 Dec 87	Fuel System Repair (Bldg 246)	13.0	7.73	250
4 Dec 87	Auto Hobby Shop	14.0	5.70	250
4 Dec 87	T-38 Maintenance	13.0	6.94	20
4 Dec 87	Hangar 454	11.0	6.50	620
4 Dec 87	Hangar 452	11.0	5.23	200
8 Dec 87	Entomology	14.0	6.7	60
8 Dec 87	Refueling Maintenance (Bldg 306)	21.0	6.38	340
8 Dec 87	BX Service Station	16.0	4.55	620
8 Dec 87	Test Cell	16.0	7.04	660
8 Dec 87	Hangar 450	15.0	10.39	3500
8 Dec 87	Bldg 411 (AGE)	16.5	8.66	3750

DETECTABLE OIL/WATER SEPARATOR SAMPLE SITE RESULTS FOR VARIOUS PARAMETERS (Oil and Grease, Total Extractable Hydrocarbons, MBAS, and Characteristic Hazardous Waste)

Site	Oil and Grease	Total Extractable Hydrocarbons	MBAS	Characteristic Haz Waste (Y or N)
	---------- mg/l ----------			
Hangar 450	570.0	525.0	0.48	N
Jet Engine Test Cell	206.4	176.0	0.29	N
BX Service Station	7.4	7.0	3.8	N
Refueling Maintenance	110.4	100.0	0.70	N
Entomology	1.56	1.0	0.52	N
Bldg 411 (AGE) Washrack	384.0	360.0	1.4	N
Fuel System Repair	18.7	18.0	18.0	N
CE Washrack	21.6	20.8	0.28	N
Auto Hobby	12.7	12.0	5.0	N
Hangar 454	16.2	12.0	3.4	N
Hangar 452	36.0	30.0	14.0	N
T-38 Maintenance	ND	ND	0.27	N
Bldg 228 Washrack	864.0	780.0	100.0	Y
	** Above sample ignitable at 135 degrees Fahrenheit **			
Corrosion Control Sludge	N/A	N/A	N/A	Y
	** Above sample failed EP Toxicity test for Chromium with a concentration of 10.2 mg/l **			
Jet Engine Parts Cleaning Sludge	N/A	N/A	N/A	N

ATTACHMENT 6

WASTE DISPOSAL PRACTICES BY SHOP FOR COLUMBUS AFB

SHOP: AGE	Bldg: 411	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
7808 Oil	120.000	D
Antifreeze	50.000	D
JP-4	20.000	D
PD-680	60.000	D
Hydraulic Fluid	110.000	D
Motor Oil	5.000	D
Air Compresser Oil	110.000	D
30 WT Oil	330.000	D
Compresser Oil	110.000	D
TOTAL:	915	

SHOP: Aero Repair	Bldg: 450	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
PD-680	10.000	D
Waste Oils	60.000	PIB
Waste Fuels	1500.000	PIB
Waste Fluids	360.000	PIB
TOTAL:	1930	

SHOP: Auto Hobby Shop	Bldg: 338	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
PD-680	360.000	DD
Waste Oil	2400	
TOTAL:	2760	

SHOP: Corrosion Control	Bldg: 220	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste Stripper	2650.000	DD
Waste Acids	120.000	D
Waste MEK	720.000	D
Waste Paint/Thinner	120.000	D
TOTAL:	3610	

SHOP: Fuel Systems — Bldg: 246

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
JP-4	240.000	FTP
TOTAL:	240	

SHOP: Liquid Fuels Maintenance — Bldg: 322

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste Paint/Thinner	250.000	D
Waste Oil	2909.000	D
PD-680	1800.000	D
JP-4	3000.000	FTP
Hydraulic Fluid	1800.000	D
TOTAL:	9750	

SHOP: Machine Shop — Bldg: 220

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
PD-680	25.000	D
Machine Oil	160.000	D
TOTAL:	185	

SHOP: NDI — Bldg: 246

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
'mulsifier	110.000	D
Developer	150.000	D
Dye Penetrant	110.000	D
7808 Oil	50.000	D
Fixer	150.000	SRDD
Inspt. Developer	440.000	DD
Magnaflo	120.000	D
TOTAL:	1130	

SHOP: Paint Shop — Bldg: 379

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste Paint/Thinner	240.000	D
TOTAL:	240	

SHOP: Periodic Maintenance	Bldg: 440	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
7808 Oil	180.000	D
PD-680	36.000	D
JP-4	12.000	FTP
TOTAL:	228	

SHOP: Plating and Cleaning	Bldg: 218	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Paint Stripper	400.000	D
Alodine	50.000	D
Alkali Rust Remover	800.000	D
Trichloroethane	600.000	D
Chromic Acid	50.000	D
Rust Inhibitor	200.000	D
Descaler	500.000	D
Acid Rust Remover	500.000	D
Aircraft Soap	600.000	D
Alkaline Permaganate	500.000	D
PD-680	100.000	D
TOTAL:	4300	

SHOP: Pneudralics	Bldg: 630	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
PD-680	420.000	PIT
Hydraulic Fluids	250.000	PIT
TOTAL:	670	

SHOP: Power Production	Bldg: 1816	
WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste Oi	300.000	D
JP-4	48.000	D
PD-680	75.000	D
Antifreeze	96.000	D
TOTAL:	519	

WASTE DISPOSAL PRACTICES BY SHOP FOR COLUMBUS AFB (Con't)

SHOP: Propulsion Support Branch — Bldg: 218

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
1010 Oil	60.000	D
Carbon Remover	360.000	PIT
PD-680	400.000	PIT
7808 Oil	360.000	D
Calibration Fluid	60.000	D
TOTAL:	1240	

SHOP: Test Cell — Bldg: 224

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Waste JP-4	50.000	DD
7808 Oil	250.000	D
TOTAL:	300	

SHOP: Vehicle Maintenance — Bldg: 304

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
Transmission Fluid	6.000	D
Waste Paint/Thinners	24.000	DD
Brake Fluid	6.000	D
Motor Oil	1100.000	D
TOTAL:	1136	

SHOP: Wheel and Tire Shop — Bldg: 220

WASTE PRODUCT	QTY/GALLONS	DISPOSAL
PD-680	400.000	D
TOTAL:	400	

LEGEND:

D - DRUMMED DD - DOWN DRAIN PIB - PLACED IN BOWSER

PIT - PLACED IN UNDERGROUND TANK FTP - SENT TO THE FIRE TRAINING PIT

SRDD - SILVER RECOVERY PROCESS THEN DISCHARGES TO SANITARY SEWER

ATTACHMENT 7

SITE ANALYSIS SUMMARY

Site Number Parameter	1	2	3	4	5	6	7	8	9	10	11	12
pH	X	X	X	X	X	X	X	X	X	X	X	X
Temperature	X	X	X	X	X	X	X	X	X	X	X	X
Alkalinity			X	X	X	X	X					
Chemical Oxygen Demand	X	X	X	X	X	X	X	X	X	X	X	X
Biochemical Oxygen Demand	X	X	X	X	X							
Nonfilterable Residue	X	X	X	X	X	X	X	X				
Filterable Residue	X	X	X	X	X	X	X	X				
Volatile Residue	X	X	X	X	X	X	X	X				
Oils and Grease	X	X	X	X	X	X	X	X	X	X	X	X
Nitrates			X	X	X	X	X					
Total Kjeldahl Nitrogen	X	X	X	X	X							
Total Organic Carbon	X	X	X	X	X							
Cyanide			X	X	X	X	X					
Sulfate			X	X	X	X	X					
ICP Metals Screen	X	X	X	X	X	X	X	X				
Mercury			X	X	X	X	X	X	X	X		
Methylene Blue Active Substances (MBAS)	X	X	X	X	X	X	X	X	X	X	X	X
Phosphorus			X	X	X	X	X					
Total Hardness		X	X	X	X	X	X	X	X			
Petroleum Hydrocarbons, Total Recoverable	X	X	X	X	X	X	X	X	X	X	X	X
Volatile Halocarbons	X	X	X	X	X				X			
Volatile Aromatics	X	X	X	X	X				X			
Phenols	X	X	X	X	X	X	X	X	X	X	X	X
Characteristic Hazardous Waste ***	X	X	X	X	X							

***Characteristic Hazardous Waste includes ignitibility, corrosivity, reactivity, and EP toxicity

SITE ANALYSIS SUMMARY (Cont'd)

Site Number Parameter	13	14	15	16	17	18	19	20	21
pH	X	X	X	X	X	X	X	X	X
Temperature	X	X	X	X	X	X	X	X	X
COD	X	X	X	X	X	X	X	X	X
Oil and Grease	X	X	X	X	X	X	X	X	X
Petroleum Hydrocarbons, Total Recoverable	X	X	X	X	X	X	X	X	X
MBAS	X	X	X	X	X	X	X	X	X
Characteristic Hazardous Waste ***	X	X	X	X	X	X	X	X	X
Phenols	X	X	X	X	X	X	X	X	X

Characteristic Hazardous Waste includes ignitibility, corrosivity, reactivity, and EP toxicity

ATTACHMENT 8

State of Mississippi
Water Pollution Control
PERMIT

TO DISCHARGE WASTEWATER IN ACCORDANCE WITH THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

THIS CERTIFIES THAT
UNITED STATES DEPARTMENT OF THE AIR FORCE
(COLUMBUS AIR FORCE BASE)
LOWNDES COUNTY
has been granted permission to discharge wastewater into

Tombigee River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. This permit is issued in accordance with the provisions of the Mississippi Water Pollution Control Law (Section 49-17-1 et seq., Mississippi Code of 1972), and the regulations and standards adopted and promulgated thereunder, and under authority granted pursuant to Section 402 (b) of the Federal Water Pollution Control Act.

MISSISSIPPI POLLUTION CONTROL PERMIT BOARD

Charles Chamberlain

DIRECTOR, BUREAU OF POLLUTION CONTROL
MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES

Issued August 23, 1985

Expires April 30, 1990 Permit No. MS0040258

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning August 23, 1985 and lasting until April 30, 1990 the permittee is authorized to discharge from outfall(s) serial number(s) 001

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day (lbs/day)		Other Units (Specify)				
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow - M^3/day (MGD)	—	—	2841(0.75)	—	2 days/week	Instantaneous	Effluent
Biochemical Oxygen Demand (5 day)	(187.6)	(281.5)	30 mg/l	45 mg/l	1 day/month	24-hour Composite	Effluent
Suspended Solids	(187.6)	(281.5)	30 mg/l	45 mg/l	1 day/month	24-hour Composite	Effluent
Ammonia Nitrogen	—	—	N/A mg/l	N/A mg/l	—	—	—
Fecal Coliform Bacteria, Geometric Mean (No./100 ml)	—	—	200	400	1 day/month	Grab	Effluent

2. The pH shall not be less than 6.0 standard units nor greater than 8.5 standard units.

3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

4. The effluent shall not cause a visible sheen on the receiving water.

5. The total residual chlorine shall not be less than 0.1 mg/l nor greater than 1.0 mg/l and shall be monitored 2 days/week with a grab sample of the effluent.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharge in accordance with the following schedule:

Final limits have been developed such that the waste treatm system should protect water quality. However, this permit subject to modification if future evidence, monitoring resu or nuisance conditions indicate that a higher degree of treatment is required to maintain water quality.

2. No later than 10 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during the previous 3 months shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on Jan. 28, 1986. Copies of these, and all other reports required herein, shall be signed in accordance with Section 6 and 7 of the Mississippi Wastewater Permit Regulations, and shall be submitted to the Mississippi Pollution Control Permit Board at the following address:

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF POLLUTION CONTROL
P. O. Box 10385
Jackson, Mississippi 39209

3. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(h) of the Federal Water Pollution Control Act, as amended.

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used, and

e. The results of all required analyses.

5. Records Retention

a. All records and information resulting from the monitoring activities required by this permit (including all records of analyses performed; calibration and maintenance of instrumentation; and recording from continuous monitoring instrumentation) shall be retained for a minimum of three (3) years, or longer if requested by the Permit Board.

b. The permittee shall furnish to the Permit Board, upon request, copies of records required to be kept by this permit.

6. Definitions

a. The "monthly average" (applicable to municipal and domestic permits), other than for fecal coliform bacteria, is the arithmetic mean of all samples collected in a one-month period. The monthly average for fecal coliform bacteria is the geometric mean of all samples collected in a one-month period. In computing the geometric mean, one (1) shall be substituted for sample results of zero.

b. The "weekly average" (applicable to municipal permits), other than for fecal coliform bacteria, is the arithmetic mean of all the samples collected during a one-week period. The weekly average for fecal coliform bacteria is the geometric mean of all samples collected during a one-week period. In computing the geometric mean, one (1) shall be substituted for sample results of zero. For self-monitoring purposes the value to be reported is the single highest weekly average computed during a one-month period.

c. The "daily average" (applicable to industrial permits), other than for fecal coliform bacteria, is the arithmetic mean of all samples collected in a one-month period. The daily average for fecal coliform bacteria is the geometric mean of all samples collected in a one-month period. In computing the geometric mean, one (1) shall substituted for samples results of zero.

d. The "daily maximum" (applicable to industrial and domestic permits), is the highest value recorded of any sample collected on any single day of the calendar month.

PART II

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions or treatment modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application. If such changes will not violate the effluent limitations specified in this permit, and upon written notice (in lieu of a new NPDES application) to the Mississippi Pollution Control Permit Board, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any provision specified in this permit, the permittee shall notify the Mississippi Pollution Control Permit Board orally within 24 hours of becoming aware of such conditions. A written report shall also be provided within five (5) days of such time and shall contain the following information:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. Bypassing

Any diversion from or bypass of wastewater collection and treatment facilities is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit.

The permittee shall notify the Mississippi Pollution Control Permit Board orally of each such diversion or bypass within 24 hours of the diversion or bypass, or if the need for the bypass is known in advance, it shall submit prior notice, if possible, at least ten (10) days before the date of the bypass.

6. Removed Substances

Solids, sludges, filter backwash, or other residuals removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent such materials from entering State waters and in a manner consistent with the Mississippi Solid Waste Disposal Act and the Federal Resource Conservation and Recovery Act.

7. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with the Schedule of Compliance contained in Part I, provide an alternate power source sufficient to operate the wastewater collection and treatment facilities, or, if such alternate power source is not in existence, and no date for its implementation appears in Part I;

b. Provide a method whereby the effluent limitations contained in Part I shall be met upon the reduction, loss, or failure of the primary source of power to the wastewater collection and treatment facilities.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Mississippi Pollution Control Permit Board and the Regional Administrator of the U. S. Environmental Protection Agency and/or their authorized representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

This permit is not transferable to any person except after proper notice. In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the Mississippi Pollution Control

Permit Board at least thirty (30) days in advance of the proposed transfer date. The notice should include a written agreement between the existing and new permittees containing a specific date for the transfer of permit responsibility, coverage, and liability.

3. Availability of Records

Except for data determined to be confidential under the Mississippi Water Pollution Control Law, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the office of the Mississippi Department of Natural Resources Bureau of Pollution Control.

4. Permit Modification

a. The permittee shall furnish to the Permit Board within a reasonable time any relevant information which the Permit Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit, or to determine compliance with the permit.

b. Upon sufficient cause this permit may be modified, revoked, reissued, or terminated during its term.

c. The filing of a request by the permittee for a permit modification, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

5. Toxic Pollutants

The permittee shall comply with any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) established under Section 307(a) of the Federal Water Pollution Control Act.

6. Civil and Criminal Liability

a. Any person who violates a term, condition or schedule of compliance contained within this permit or the Mississippi Water Pollution Control Law is subject to the actions defined by law.

b. Except as provided in permit conditions on "Bypassing" (Part II, A-5), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

c. It shall not be the defense of the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties

to which the permittee is or may be subject to under Section 311 of the Federal Water Pollution Control Act and applicable provisions of the Mississippi Water Pollution Control Law pertaining to spills of oil and hazardous materials.

8. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

9. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstance, and the remainder of this permit, shall not be affected thereby.

10. Expiration of Permit

The permittee shall not discharge after the expiration date of this permit unless he has submitted a completed application for reissuance no later than 180 days prior to the expiration date. The Executive Director may grant permission to submit an application later than this, but no later than the expiration date of the permit.

PART III

A. PRETREATMENT REQUIREMENTS

1. This permit shall be modified, or alternately revoked and reissued by a date to be determined to incorporate an approved municipal pretreatment program as required under Section 402(b)(8) of the Federal Water Pollution Control Act and implementing regulations or by the requirements of the approved State pretreatment program, as appropriate.

2. Effluent limitations from this discharge are listed in Part I of this permit. If it becomes apparent that other pollutants attributable to inputs from major contributing industries using the municipal system are also present in the permittee's discharge, this permit may be revised to specify effluent limitations for any or all of such other pollutants in accordance with best practicable technology or water quality standards.

3. Under no circumstances shall the permittee allow introduction of the following wastes or pollutants into the waste treatment system.

   a. Pollutants which create a fire or explosion hazard in the treatment works;

   b. Pollutants which will cause corrosive structural damage to treatment works; but in no case discharges with a pH lower than 5.0, unless the works are specifically designed to accomodate such discharges;

   c. Solid or viscous substances in amounts which cause obstructions to the flow in sewer or interference with the proper operation of the treatment works;

   d. Wastewaters at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so as to cause a loss of treatment efficiency;

   e. Heat in amounts which will inhibit biological activity in the treatment works resulting in interference, but in no case heat in such quantities that the temperature of the influent exceeds 40° C (104° F), unless approval for alternate limits has been granted by the Permit Board

ATTACHMENT 9

MODEL 4 SAFETY STORAGE CONTAINER PRICELIST

(Effective Date: 1/10/86)

A) Model 4 Safety Storage Container..... $2,300.00

* Outside Dimensions (L x W x H): 6' x 6' x 6'
* Internal Chemical Resistant Epoxy Coating
* Internal Spill Containment Capacity: 100 Gallons
* Epoxy Coated Plywood Floor (Thickness: 1¼")
* One Door with Safety Lock
* One D.O.T. Placard (Permanent)
* One NFC 704M Rating Sign (Pressure Sensitive)
* Maximum Storage Capacity: 4,000 lbs.

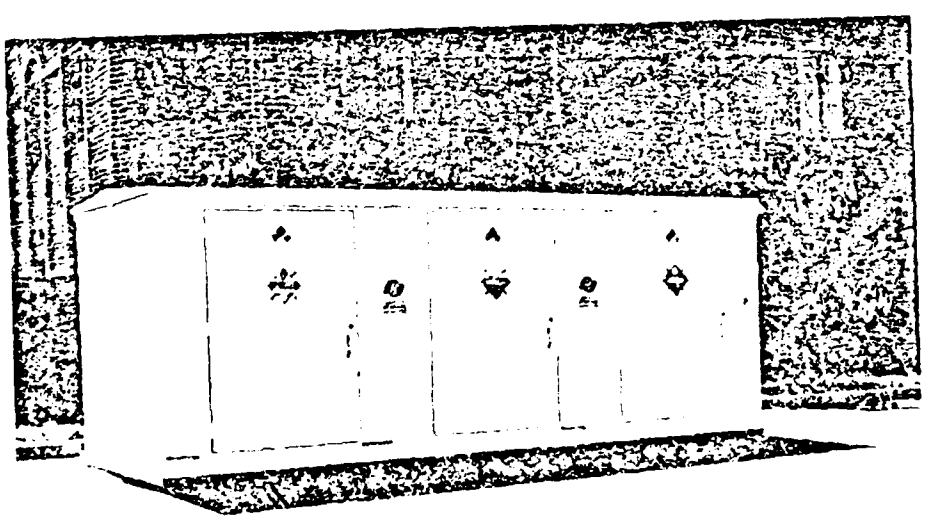
B) Structural Options:

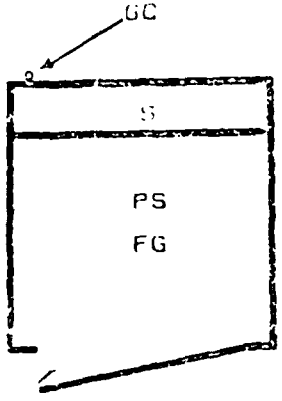
1. Shelving (per lineal foot).....	22.00
2. Fiberglass Floor Grating.....	960.00
3. Polypropylene Sump Liner.....	350.00
4. Holdown Assembly for Seismic Bracing.....	150.00

C) Miscellaneous Options:

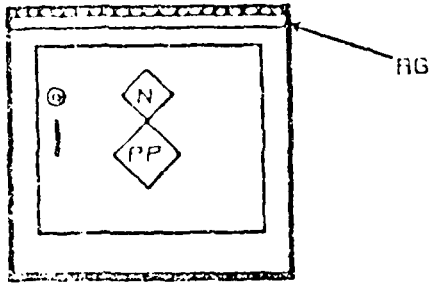
1. Emergency Eye/Face Wash Fixture.....	275.00
2. Portable Eye/Face Wash.....	750.00
3. Access Ramp.....	850.00

PAYMENT TERMS: Safety Storage will invoice the customer in advance for 10%, downpayment due upon receipt of purchase order. Safety Storage will also invoice the balance, which will be due upon delivery of the order.

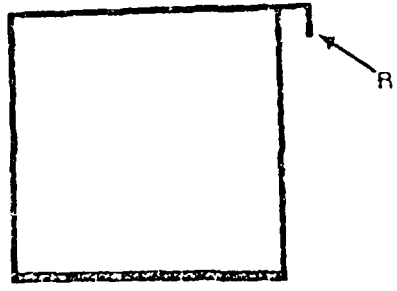




TOP VIEW



FRONT VIEW



SIDE VIEW

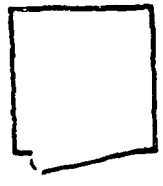
KEY:

FG: Fiberglass Floor Grating
GC: Static Grounding Connection
PP: Permanent Placard
PS: Polypropylene Sump Liner
RG: Rain Guard
N: NFC 704M Rating Sign
S: Shelf

NOTES:

1. Install a polypropylene sump liner
2. Install fiberglass floor grating
3. Equip with a rain guard
4. Install a shelf along the back wall (six feet). The height of the shelf must be 2½ feet (30") above the floor.
5. Affix one NFC 704M Rating above the permanent placard on the door.

Model 4



SAFETY STORAGE

JOB #: _____

FOR: _____

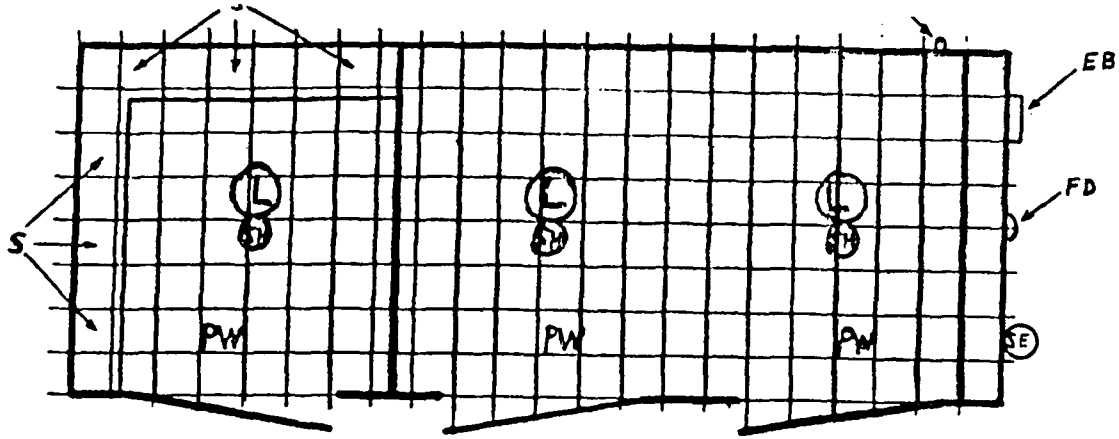
_____

_____

_____

PHONE: _____

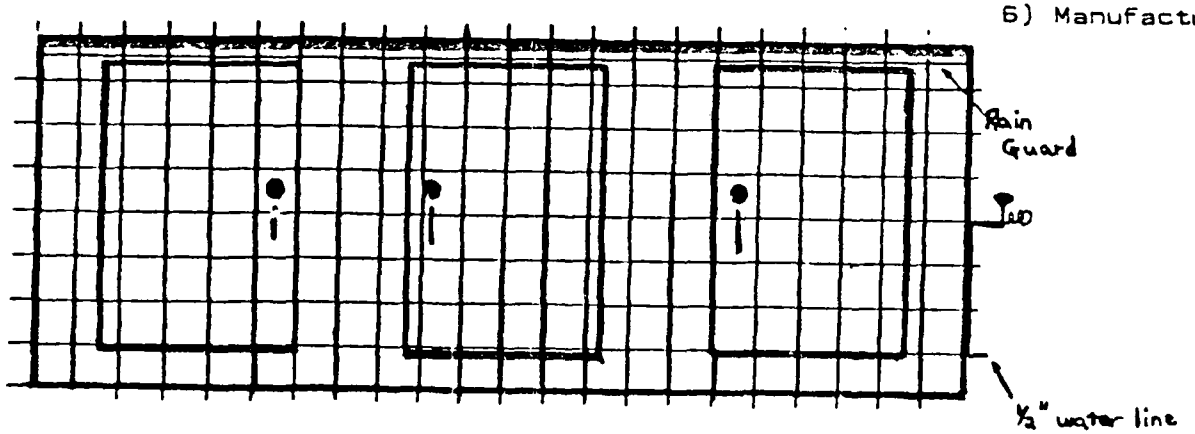
BY: _____



TOP VIEW

DC: Dry Chemical System
EB: Electrical Breaker Box
EF: Exhaust Fan
FD: Fire Department Hookup
FG: Fiberglass Floor Grating
FW: 2-Hour Fire Wall
GC: Static Grounding Connection
H: Halon 1211 System
L: Explosion-Proof Light
M: Metal Wall
PP: Permanent Placard
PW: Plywood Floor (1½")
S: Shelf
SE: Shower/Eyewash Fixture
SH: Sprinkler Head
S: Switch
V: Vent

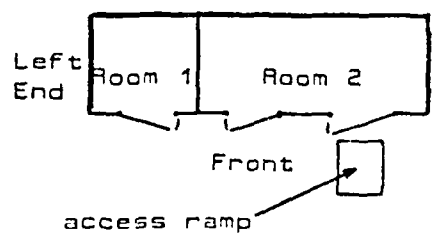
Notes:
1) Use treated steel & stainless steel hinge
2) Equip with a rain guard
3) Plywood Floor (1½")
4) Install a shelf in room 1 (left & back walls)
5) Install one metal chemical separation wal
6) Manufacture and provide one access ramp



FRONT VIEW

#1

Model 22



SAFETY STORAGE

FOR: _____

_____

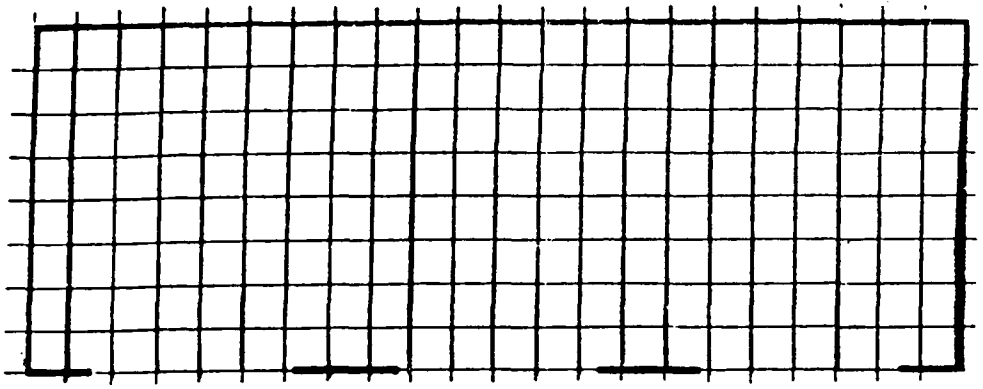
PHONE: _____

_____

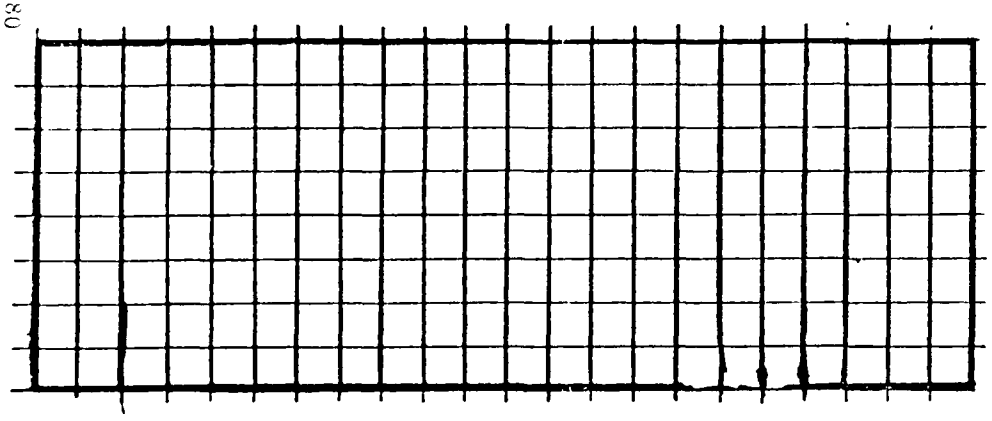
_____

BY: _____

_____



TOP VIEW



FRONT VIEW

KEY

DC: Dry Chemical System
EB: Electrical Breaker Box
EF: Exhaust Fan
FD: Fire Department Hookup
FG: Fiberglass Floor Grating
FW: 2-Hour Fire Wall
GC: Static Grounding Connection
H: Halon 1211 System
L: Explosion-Proof Light
M: Metal Wall
PP: Permanent Placard
PW: Plywood Floor (1¾")
S: Shelf
SE: Shower/Eyewash Fixture
SH: Sprinkler Head
$: Switch
V: Vent

SAFETY STORAGE

FOR: _____

_____

_____

PHONE: _____

_____

_____

BY: _____

_____

MODEL 22 SAFETY STORAGE CONTAINER PRICELIST

(Effective Date 10/1/85)

A) Model 22 Safety Storage Container..... $12,000.00

* Outside Dimensions (L x W x H): 22' x 8'6" x 8'3"
* Internal Chemical Resistant Epoxy Coating
* Internal Spill Containment Capacity: 500 Gallons
* Epoxy Coated Plywood Floor (Thickness: 1½")
* Three Doors with Safety Locks
* Pressure Relief Roof
* Static Grounding Connection
* Fire Sprinkler System with Three Sprinkler Heads
* Fire Department Hookup (2½" NPT Fitting)
* Three D.O.T. Placards (Permanent)
* Three NFC 704M Rating Signs (Pressure Sensitive)
* Maximum Storage Capacity: 20,000 lbs.

B) Electrical Options:

1. Explosion-Proof Wiring System.....	1,500.00
2. Explosion-Proof Ventilation System.....	850.00
3. Explosion-Proof Light (Interior).....	250.00
4. Explosion-Proof Light (Exterior).....	500.00
5. Liquid Level with Alarm.....	750.00
6. Temperature Control System.....	*

C) Fire Protection Option:

1. Dry Chemical Fire Suppression System.....	2,950.00

D) Structural Options:

1. Shelving (per lineal foot).....	22.00
2. Chemical Separation Wall, Metal.....	650.00
3. Chemical Separation Wall, 2-Hour Fire Rated.....	1,000.00
4. Fiberglass Floor Grating (per container).....	4,533.00
5. Fiberglass Floor Grating (per compartment).....	1,511.00
6. Polypropylene Sump Liner (per container).....	1,200.00
7. Polypropylene Sump Liner (per compartment).....	400.00
8. Doors on Back (each additional).....	1,000.00
9. Permanent D.O.T. Placard (each additional).....	50.00

E) Miscellaneous Options:

1. Emergency Eye/Face Wash Fixture.....	275.00
2. Portable Eye/Face Wash.....	750.00
3. Access Ramp.....	850.00

Safety Storage requires a 35% deposit with each order. The balance is due upon delivery. Our present delivery time is approximately three weeks from receipt of a purchase order and deposit.

* The price for a temperature control system is available upon request

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APPENDIX A
Design of Corrosion Control Shop
Oil/Water Separator at Columbus AFB

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DESIGN OF CORROSION CONTROL SHOP OIL/WATER SEPARATOR AT COLUMBUS AFB

Variables and Definitions:

L = Separator length (ft)

B = Separator width (ft)

d = Separator depth (ft)

Vh = Horizontal velocity of spherical particle

Vs = Rise velocity of spherical particle

F = Design factor (Fs = short circuiting, and Ft = turbulence)

Q = Flow in CFM

Ah = Minimum horizontal area (L x B)

Ac = Minimum cross-sectional area (Q/Vh)

Sw = Specific gravity of water

Sp = Specific gravity of polyurethane paint

u = Absolute viscosity of water (poises)

Assumptions and Equations:

$L = F(Vh/Vs)d$ $\quad$ $Vh(max) = 3.0$ ft/min or $15Vs$ (lesser of the two)

$(d/B)min = 0.3$ $\quad$ $F = Ft \times Fs$

$Vs = 0.0241(Sw - Sp)/u$ $\quad$ $Ac = (Q/Vh)$

$Q = 24.8$ gal/min $= 3.32$ CFM , $Sw = 1.0$, $Sp = 1.13$, $u = 0.01$

$Fs = 1.2$, $\quad$ $Ah(min) = F(Q/Vs)$

Recommended Values of Turbulence Factors (Ft):

Vh/Vs	Turbulence Factor (Ft)
20	1.45
15	1.37
10	1.27
6	1.14
3	1.07

Design Calculation:

Vs = 0.0241 (1.0 - 1.13)/.01 = -0.313 ft/min
** Since Vs is negative, particles should settle to bottom **

Vh(max) = 15 x 0.313 = 4.70 ft/min
** This value is greater than 3.0 ft/min, so take lesser value **

Vh/Vs = 3.0/0.313 = 9.6, So from Ft table, Ft = 1.27

F = 1.2 x 1.27 = 1.524

Ac = Q/Vh = 3.32/3.0 = 1.11 sq. ft

Ah(min) = 1.524(3.32/0.313) = 16.14 sq ft

d(min) = 0.3 x B : Say B = 3.0 ft, Then d = 0.3 x 3.0 = 0.9 ft
** Use d = 1.0 ft **

Now, Vh = Q/Ac = 3.32/(1.0 x 3.0) = 1.11 ft/min

L = F(Vh/Vs)d = 1.524(1.11/0.313) x 1.0 = 5.40 ft

Ah(min) = L x B = 5.40 x 3.0 = 16.20 sq. ft

Check of Design Values Against Columbus AFB Corrosion Control Separator:

** Values are taken from design drawings **

L = 6.0 ft, B = 3.0 ft, d = 5.0 ft

So, Ah = L x B = 6.0 x 3.0 = 18 sq. ft, and Ah > Ah(min)

And, d > d(min), So dimensions of the separator are adequate.

APPENDIX B
Example of A Waste Analysis Plan

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TABLE 2. EXAMPLE OF A WASTE ANALYSIS PLAN

SHOP (BUILDING)	DESCRIPTION OF WASTE STREAM	Proper Shipping Name	EPA NO.	UN or NA NUMBER	ANALYSIS FREQUENCY	SAMPING TECHNIQUE	PARAMETERS
Auto Hobby Shop (338)	Waste lube oil from oil changes	Waste petroleum oil, n.o.s., mixture COMBUSTABLE LIQUID	none	NA1270	Semiannually	COLIWASA	H/C Recovery
BX Service Sta. (907)	Waste lube oil from oil changes	Waste petroleum oil, n.o.s., mixture COMBUSTABLE LIQUID	none	NA1270	Semiannually	COLIWASA	H/C Recovery
Trans Allied Trades (304)	Paint wastes inc. solvents	Waste paint related material, mixture/ FLAMMABLE LIQUID	F003 F005	NA1263	Annual	COLIWASA	Flash Point
	Paint Stripper (methylene chloride)	Hazardous Waste, liquid, n.o.s (methylene chloride)/ ORM-E	F002	NA9189	Each Drum	COLIWASA	pH % methylene chloride
General Purpose Vehicle Maint. (304)	Waste hydraulic fluid	Waste oil, n.o.s. (hydraulic Fluid)/ COMBUSTABLE LIQUID	none	NA1270	Each Drum	COLIWASA	H/C Recovery
	Waste lube oil from oil changes	Waste petroleum oil, n.o.s., mixture COMBUSTABLE LIQUID	none	NA1270	Semiannually	COLIWASA	H/C Recovery

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HQ ATC/DE Randolph AFB TX 78150-5001	1
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