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USAFOEHL REPORT

89-003EQ0013ASC

WASTEWATER CHARACTERIZATION/ HAZARDOUS WASTE SURVEY, BEALE AFB CA

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January 1989

Final Report

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

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This report has been reviewed and is approved for publication.

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS: N/A
2a. SECURITY CLASSIFICATION AUTHORITY: N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT: Approved for public release. Distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): USAFOEHL Report 89-003EQ0013ASC	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): Same as 6c	10. SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11. TITLE (Include Security Classification)
Wastewater Characterization/Hazardous Waste Survey, Beale AFB CA

12. PERSONAL AUTHOR(S)
C. Attebery, 1Lt, USAF, BSC; A. ZIMMER, 1Lt, USAF, BSC, N. Hedgecock, 2Lt, USAF, BSC

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 12 TO 16 Sep 88	Jan 89	120

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Wastewater Characterization/Hazardous Waste Survey

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

A wastewater characterization/hazardous waste survey was conducted at Beale AFB by USAFOEHL/ECQ personnel to provide the base with sufficient information to address a State of California Notice of Violation concerning excessive discharges of boron and cyanide from the base sewage treatment plant (STP). The results of the survey showed that the 9th RTS Precision Photo Lab along with other film processing organizations were major contributors to the boron and cyanide discharge problems being experienced by the base STP. Maintenance organizations which utilize soaps and detergents that contain boron and cyanide also contributed to the problem.

Specific recommendations contained in the report are: (1) Discharges of photographic chemicals to the sanitary sewer system should be discontinued. (2) The source of photographic chemicals entering the sanitary sewer system through manhole 310 should be

(OVER)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: N. Hedgecock, 2Lt, USAF, BSC	22b. TELEPHONE (Include Area Code): (512) 536-3305/AV 240. 22c. OFFICE SYMBOL: USAFOEHL/ECQ

Item #19 Cont'd

investigated. (3) The use of laundry detergent NSN 7930 00 985 6904 should be discontinued. (4) Dilution of washrack soaps to as much as 15:1 water to soap should be implemented. (5) Photo Treatment Plant filters should be serviced. (6) Hazardous waste drums exceeding the 90-day holding requirement should be removed by contractor. (7) The temporary Hazardous Waste Specialist position should be converted to a permanent position. (8) The wastewater treatment plant personnel should be contacted to discuss the possibility of discharging ethylene glycol to the STP. (9) A waste analysis plan, required by RCRA, needs to be developed by the base.

Acknowledgements

The authors greatly appreciate the technical expertise and hard work provided by the other members of our survey team, Lt Col Robert D. Binovi, Maj Elliot K. Ng, 2Lt Shelia P. Scott, 2Lt Rebecca W. Bartine, SSgt Mary M. Fields, Sgt Robert P. Davis and SrA James J. Jarbeau, without whose valuable assistance this survey could never have been accomplished.

We also acknowledge Capt Stephen W. Prawdzik, SMSgt Galen M. Pearson, the staff of the Bioenvironmental Engineering Section and Mr Roger Mills, Hazardous Waste Specialist/DEEV, for the support given us during the survey. Thanks for making our time at Beale AFB enjoyable and worthwhile.

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I. INTRODUCTION

In June 1988, Headquarters Strategic Air Command requested USAF Occupational and Environmental Health Laboratory, Consultant Services Division, Environmental Quality Branch (USAFOEHL/ECQ) to help address a National Pollution Discharge Elimination System (NPDES) Notice of Violation (NOV) for exceeding effluent limits of boron, cyanide and foam from Beale AFB's sewage treatment plant (STP) to Hutchinson Creek. A copy of the NOV and Cease and Desist Order can be found in Appendix A.

As a result, a field survey was conducted by USAFOEHL/ECQ from 12-26 September 1988. The objective of the survey was to determine on-base sources of boron, cyanide and surfactants discharging to the sanitary sewer system and to evaluate the efficiency of the STP.

The survey was accomplished by three teams: (1) The wastewater characterization team consisted of Lt Col Robert D. Binovi, 1Lt Charles W. Attebery, 2Lt Shelia P. Scott and SrA James J. Jarbeau. (2) The hazardous waste team consisted of Maj Elliot K. Ng and 2Lt Nancy S. Hedgecock. (3) The STP evaluation team consisted of 1Lt Anthony T. Zimmer, 2Lt Rebecca W. Bartine, SSgt Mary M. Fields and Sgt Robert P. Davis.

II. DISCUSSION

A. Background

1. General

Beale AFB, home of the 9th Strategic Reconnaissance Wing, is located in Yuba County between the Bear and Yuba Rivers and is approximately 10 miles east of Marysville, California. The base comprises approximately 22,944 acres of land located in the Sacramento Valley and the lower foothills of the Sierra Nevada Mountains. Yuba County has an arid climate, characterized by hot summers, mild winters, and very little precipitation. During the survey, there was no precipitation and the average high and low temperatures were 88 and 70 degrees F, respectively.

The NOV from the California Regional Water Quality Control Board, Central Valley Region, requires that Beale AFB submit by 31 January 1989 a report either describing waste discharges of boron, cyanide and surfactants or a plan and time schedule for terminating unauthorized discharges of these wastes. A Cease and Desist Order, which accompanied the NOV, requires the Beale Air Force Base wastewater treatment plant personnel to immediately cease discharging wastes contrary to existing waste discharge requirements.

2. Wastewater Characterization

The Beale AFB sanitary sewer system is primarily a gravity flow system. Wastewater generally flows unimpeded to the STP. However, two lift stations are required to pump flight line wastewater up a slight grade to the STP. The system services three main areas of the base: (1) The housing area (including the Clinic and PAVE PAWS), (2) the main base, and (3) the flight line. Approximately 97 percent of the flow entering the STP originates from these areas. The remaining 3 percent of the flow is from the 9th RTS Precision Photo Lab (building 2145).

The 9th RTS Precision Photo Lab wastes are collected in a wet well and pumped through an underground line to the Photo Treatment Plant (PTP). Discharge from this pretreatment system combines with sanitary sewage prior to entering the STP influent flume.

The discharge from the STP finishing pond is either pumped to the golf course pond for irrigation purposes or discharged to Hutchinson Creek. A schematic of wastewater flow on Beale AFB is presented in Figure 1.

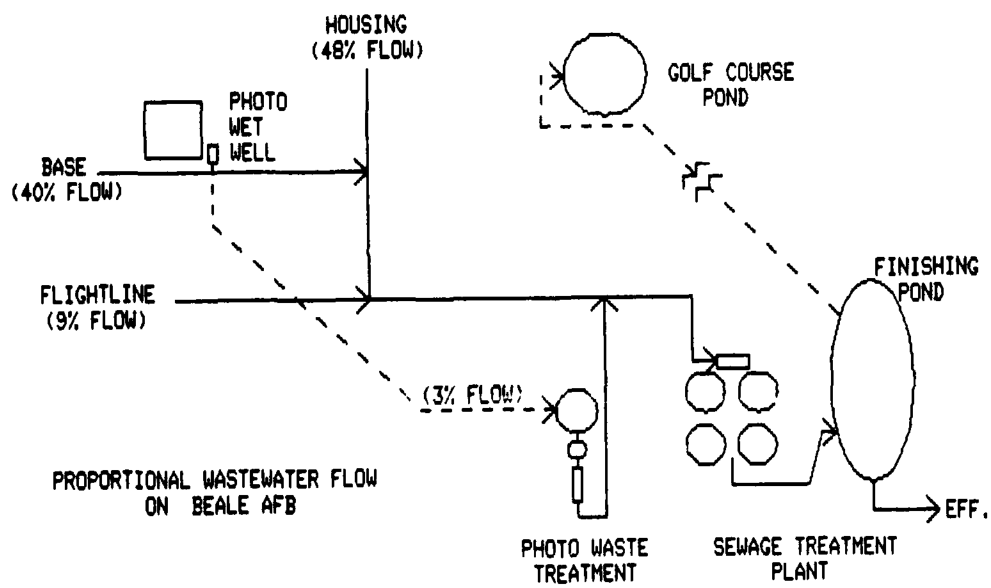

Figure 1. Beale AFB Wastewater Flow

3. Sewage Treatment Plant Evaluation

a. Sewage Treatment Plant: The BAFB sewage treatment plant is located in the southwestern portion of the base. The plant is designed to treat 5.0 million gallons of wastewater per day (MGD). The average daily flow from the base is about 1 MGD. The treatment plant unit operations include a grit chamber, two clarifiers, two trickling filters, two anaerobic digesters, one chlorine contact chamber and an aeration pond. The effluent from the treatment plant normally enters Hutchinson Creek, however, during times of low flow in the creek, a major portion of the treatment plant effluent is diverted to the golf course equalization pond where it is used for irrigation. Solids from the anaerobic digesters are taken to the base landfill for disposal. Figure 2 illustrates the sewage treatment plant layout and sampling points. A description of STP unit operations is presented in Appendix B.

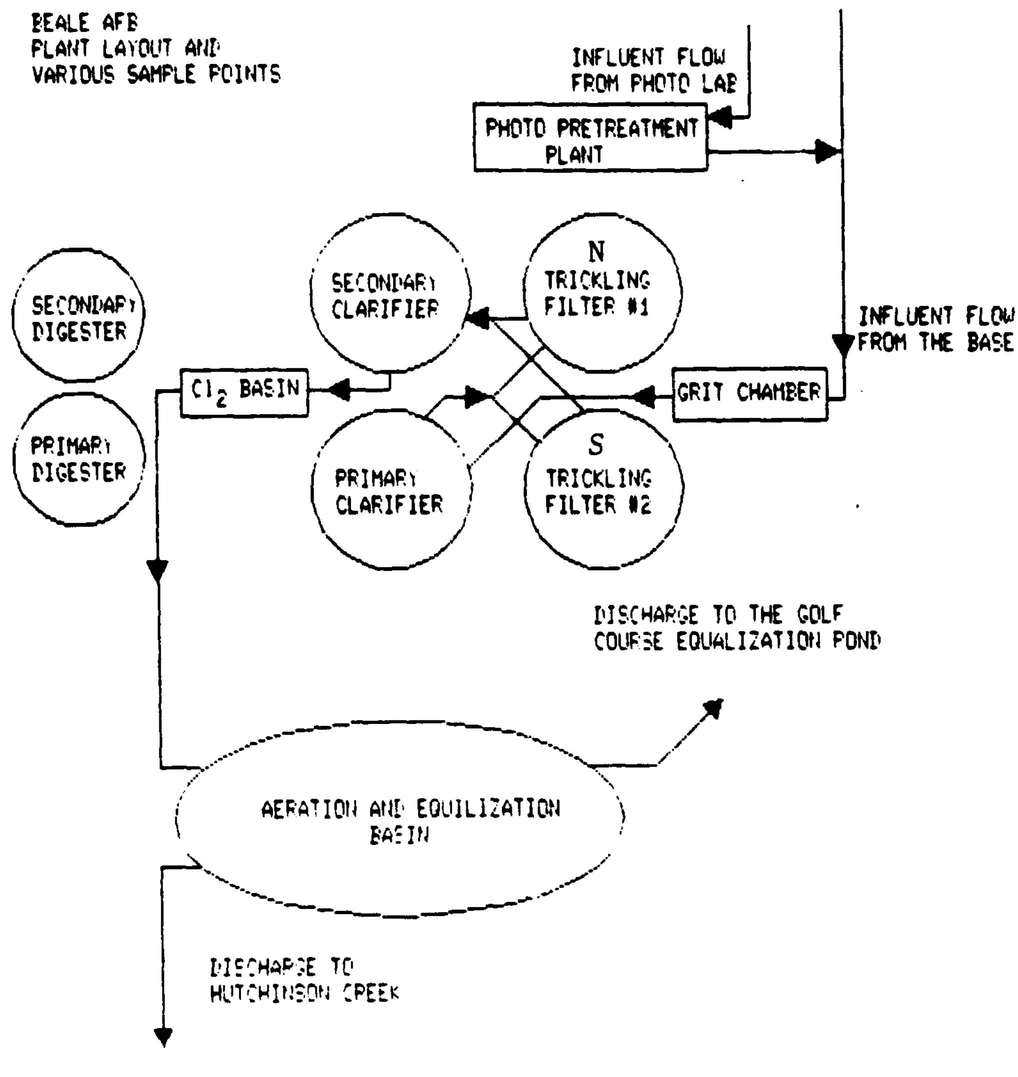

Figure 2. Sewage Treatment Plant Layout

b. Photo Treatment Plant (PTP): The PTP was designed and built in 1966 to pretreat photographic wastes. The plant is located adjacent to the STP. Photo wastes are pumped 2.5 miles from the 9th RTS Precision Photo Lab, building 2145, to the PTP which has a design capacity of 54,700 gallons per day (GPD). The average flow to the plant is 36,000 GPD. Photo waste treatment operations include equalization, neutralization, chemical flocculation, settling, filtration and effluent discharge to the sewer. Waste sludge is pumped to an unlined earthen drying bed located adjacent to the plant.

c. Wastewater Discharge Requirements: The State of California Pollutant Discharge Elimination System (NPDES) permit (number CA0110299) for Beale AFB expires on 1 March 1991. The permit limits discharge of wastewater to Hutchinson Creek with dissolved oxygen less than 5.0 mg/L, visible oil, grease, scum, foam, floating of suspended material and chlorine residual greater than 0.1 mg/L. Other permit limitations are listed in Table 1.

4. Hazardous Waste Survey

At the time of the survey, the Hazardous Waste Program at Beale AFB was operating fairly well. The Environmental Coordinator (DEEV) has the responsibility for all environmental programs on base and the management of the Hazardous Waste Program is the responsibility of the Hazardous Waste Specialist (Mr Roger Mills). The Hazardous Waste Specialist's responsibilities include: training shop personnel, inspecting accumulation sites, providing hazardous waste labels, assisting shop personnel in transporting wastes to the Central Storage Facility (CSF, Building 1317) and providing guidance on waste minimization. DEEV is not involved with the specific day-to-day details of waste disposal.

The base has five designated accumulation sites. The site managers have the responsibility of maintaining and inspecting the accumulation sites as well as inspecting the generation sites. Most site managers keep a weekly site inspection log. The managers generally transport waste from the generation points to the accumulation sites on a weekly basis. If a shop has a drum of waste that needs to be removed before the manager makes a pickup, shop personnel call the manager and request a pickup. The site manager then submits a Request for Hazardous Waste (HW) Labels & Control Numbers form to the Hazardous Waste Specialist. When the accumulation site manager receives the labels, the drums are labeled and prepared for transportation to the CSF. The DD Form 1348-1 is then completed by the site manager and checked for accuracy by the Hazardous Waste Specialist.

After the waste is transported to the CSF by the accumulation site manager, Defense Reutilization and Marketing Office (DRMO) is contacted by the Hazardous Waste Specialist to inspect the drums prior to removal.

Table 1. NPDES Effluent Limitations

Parameter	Units	Average	30-Day Average	7-Day Daily Maximum
BOD_5	mg/L	30	45	90
	lb/day*	1250	1875	3750
Total Suspended Matter	mg/L	30	45	90
	lb/day*	1250	1875	3750
Oil and Grease	mg/L	10	15	20
Settleable Matter	ml/L	0.1	--	0.20
Total Cadmium	mg/L	0.01	--	0.02
Total Lead	mg/L	0.05	--	0.10
Chromium (Hexavalent)	mg/L	0.05	--	0.10
Total Barium	mg/L	1.0	--	2.0
Total Copper	mg/L	0.05	--	1.0
Total Mercury	mg/L	0.002	--	0.005
Total Silver	mg/L	0.05	--	0.10
Boron	mg/L	1.0	--	2.0
Total Cyanide	mg/L	0.0035	--	0.007
Total Coliform	colonies/ml	--	23/100 **	500/100

* Based upon a design treatment capacity of 5.0 MGD.

** Median based upon the last seven days for which analyses have been completed.

B. Procedures

1. Wastewater Characterization Survey

Wastewater samples (24-hour composites and grab samples) were taken from the sanitary sewer system throughout the base and analyzed to determine boron, cyanide and surfactant levels. Equiproportional sampling was accomplished with ISCO Composite Wastewater Samplers Models 2700, 2100, and 1560. Several chemical compounds such as developers and soaps were analyzed to determine boron and cyanide concentrations. Sampling sites are listed in Table 2. Analytical tests and preservation methods are presented in Table 3. Chemical compounds which were analyzed for boron and cyanide content are listed in Table 4.

Table 2. Sampling Sites

Site Number	Location	Days Sampled
Housing Area:		
1	Flume located at manhole 953. The flow represents a composite of housing, the clinic and the PAVE PAWS Radar Site	7
2	Manhole 1051. Services the Clinic	1
3	Manhole 1051. Services PAVE PAWS	1
Base Area:		
4	Flume located at manhole 210. The flow represents a composite of manholes 310, 349, 357, 372, 379, 385, and 391	7
5	Manhole 310. Services the 9th RTS Precision Photo Lab	1
6	Manhole 335. Services Audio Visual Shop	1
7	Manhole 349. Services the Commissary and the Auto Hobby Shop	1
8	Manhole 357. Services the BX complex	1
9	Manhole 372. Services Transportation	1

Table 2. Sampling Sites, Cont'd

Site Number	Location	Days Sampled
10	Manhole 379. Services Civil Engineering (CE) and Transportation	1
11	Manhole 385. Services CE	1
12	Manhole 391. Services Entomology and CE Roads and Grounds	1
13	Manhole 398. Services the Trailer Park and Laundry Facility	1
Flight Line Area:		
14	Lift Station 6. The flow represents a composite of manholes 530, 534, 534a, 537, 539, 539a	7
15	Manhole 530. Services SR-71 Phase docks	1
16	Manhole 534. Services FMS, Corrosion Control, and KC-135 Phase Docks and Washrack	1
17	Manhole 537. Services the Automobile Washrack	1
18	Manhole 539. Services the NDI and T-38 Phase Dock	1
19	Manhole 539a. Services the TEB Facility and AGE Shop	1
Miscellaneous Samples:		
20	9th RTS Precision Photo Lab Wet Well	1
21	Manhole 534. Services the Aircraft Washrack	g
22	Fitness Center Drinking Water Distribution Sample	g
23	Golf Course Pond	g

g = 1 grab sample, all other samples were 24-hour hourly composite samples.

Table 3. Analysis and Preservation Methods

Analysis	Preservation	Method[1]	Where	Who
Cyanide	NaOH	A412D	Brooks AFB	USAFOEHL
Boron	None	A404A	Brooks AFB	USAFOEHL
Surfactants (MBAS)	None	E425.1	Brooks AFB	USAFOEHL
ICP Metals	None	E200.7	Brooks AFB	USAFOEHL

[1] A Indicates Standard Methods for the Examination of Water and Wastewater, 1985
E indicates EPA Methods for Chemical Analysis of Water and Wastes

Table 4. Chemical Compounds Analyzed for Boron and Cyanide.

Chemical	Location
Fultron Developer	Precision Photo Lab
HTA Developer	Precision Photo Lab
Fixer	Precision Photo Lab
Audio Visual B & W Fixer	Auto Visual Facility
Stop Bath	Base Photo Shop
Audio Visual B & W Developer	Audio Photo Lab
Fultron Developer	Base Photo Shop
NDI Fixer	NDI Shop
NDI Developer	NDI Shop
Pan Dandy Soap (NSN 7930 00068 1669)	Basewide
Laundry Detergent (NSN 7930 00985 6904)	Basewide
Soap (NSN 7930 00958 6033)	Basewide
Soap (NSN 7930 00177 5217)	Basewide
X-Ray Developer	Clinic
X-Ray Fixer	Clinic
Aircraft Soap (NSN 6850 01184 3182)	Washrack

Flow measurements were taken wherever possible. Sites 1 and 4 have measuring flumes dedicated to the existing sewer lines. USAFOEHL personnel installed a portable Manning flowmeter and flume in the sewer line leading to lift station 6. Other instantaneous flows were measured using 8-inch Palmer-Bollis flumes manually inserted into the sewer lines. Flows from several sampling sites were impossible to measure because of irregularly shaped sewer channels. Flow data are presented in Appendix C.

2. Sewage Treatment Plant Evaluation: A sewage treatment plant evaluation was conducted to determine the plant's waste removal efficiency. The objectives of the sewage treatment plant (STP) evaluation were to determine the influent and effluent water quality and analyze the efficiency of the treatment plant. The PTP efficiency was also evaluated.

a. Flow: Both the STP and the PTP have flumes dedicated to their influent channels. The average daily flowrates during the survey period were 832,000 and 32,650 gallons, respectively. Both flowmeters are calibrated on a quarterly basis by a private contractor.

b. Sampling: Five days of 24-hour equiproportional samples, composited hourly, were taken at sample sites 24-29. Sludge grab samples were collected at sites 30 and 31. The site locations are listed in Table 5. Composite samples were collected on 15, 16, 17, 20 and 21 September. Table 6 presents the chemical and physical parameters analyzed at each site.

c. Microbiological Examination of STP Trickling Filter Sludge: A microbiological examination was performed on sludge collected from the STP trickling filters. A wide variety of microbes were identified and included nematodes, protozoa, diatoms, fungi, algae, and bacteria. Table 7 presents the staining procedures used for microbe identification. Characteristics used for identifications are as follows:

- o Cell type - Eukaryote or Prokaryote
- o Motility
- o Pigmentation
- o Size and shape of the organism
- o Whether or not branching occurs
- o If the organism appears in chains, whether or not septa were visible
- o If the organism was filamentous, the type of filaments
- o Staining results

Table 5. STP Sample Site Locations

Site Number	Sample Site Location
24	Sewage Treatment Plant Influent
25	Primary Clarifier Effluent
26	Trickling Filter Effluent
27	Secondary Clarifier Effluent
28	Sewage Treatment Plant Effluent
29	Photo Pretreatment Plant Effluent
30	Anaerobic Sludge Digester
31	Photo Sludge Drying Bed

Table 6. STP Wastewater Characterization Analytical Methods

Analysis	Sites	Method[1]	Where	Who
Alkalinity	24-29	A403	on-site	USAFOEHL
pH	24-29	A423	on-site	USAFOEHL
Temperature	24-29	E170.1	on-site	USAFOEHL
Chlorine Residual	28	A408E	on-site	USAFOEHL
Dissolved Oxygen	28	A421F	on-site	USAFOEHL
Total Coliform	28	A909A	on-site	USAFOEHL
BOD_5	24-29	E405.1	on-site	USAFOEHL
COD	24-29	Hach Mod.	on-site	USAFOEHL
Settleable Solids	24-29	A209E	on-site	USAFOEHL
Total Suspended Solids	24-29	A209A	on-site	USAFOEHL
Total Dissolved Solids	24-29	A209B	on-site	USAFOEHL
Oil and Grease	24,28,30	E413	off-site	USAFOEHL
Ammonia	24,28-30	E350.1	off-site	USAFOEHL
Total Kjeldahl Nitrogen	24,28-30	E351.2	off-site	USAFOEHL
Nitrates-Nitrites	24,28-30	E353.2	off-site	USAFOEHL
Phosphorus	24,28-30	E365.4	off-site	USAFOEHL
Hexavalent Chromium	24,28-31	A312A	off-site	USAFOEHL
ICP Metal Screen B, Cd, Cr, Cu, Zn, Pb, Ni, Se, Mn, Ag, Hg	24,28-31	E200.7	off-site	USAFOEHL
MBAS	24,28,30	E425.1	off-site	USAFOEHL
Boron	24,28-30	A404A	off-site	USAFOEHL
Cyanide	24,28-30	A412D	off-site	USAFOEHL
Sulfate	24,28-30	E375.2	off-site	USAFOEHL
Sulfides	24,28-30	E376.2	off-site	USAFOEHL
Volatile Halocarbons	24,28	E601	off-site	USAFOEHL
Volatile Aromatics	24,28	E602	off-site	USAFOEHL
Phenols	24,28-31	E604	off-site	contract
Pesticides	24,28-30	E608	off-site	contract
Volatile Hydrocarbons	24,28-31	E624	off-site	contract
Acid/Base/Neutrals	24,28-31	E625	off-site	contract

[1] A indicates Standard Methods for the Examination of Water and Wastewater, 1985
E indicates EPA Methods for Chemical Analysis of Water and Wastes

Table 7. Staining Procedures for Microbe Identification.

Stain	Description
Wet Mount	Used to view microbes in the living state, showing pigmentation, cell size and shape, and motility
Gram	A common stain used in determinative bacteriology, it divides the prokaryotes into two large groups
Acid Fast	Measures the resistance of a bacterial cell to decolorization by acid
Capsule	Reveals whether or not the bacterium has the ability to produce a polysaccharide layer around the cell which protects it from predators and allows it to attach to various objects and other cells
Endospore	Measures the capacity of the bacterium to produce a covering which protects it from periods of environmental stress
Neisser	Introduced as a method to stain polyphosphate granules in bacteria, it is also used to classify filamentous organisms
Flagella	A mordant which thickens the hairlike appendages on some bacteria, allowing them to be observed

3. Hazardous Waste Survey

The first step of the hazardous waste program evaluation was to review the "Operations Plan for Beale Air Force Base, California, Hazardous Waste Facilities", the Notices of Violation which were received from the California Regional Water Quality Control Board, and the Bioenvironmental Engineer's shop folders to determine which industrial shops should be visited. Chemical listings contained in the shop folders were reviewed for chemicals containing boron and cyanide. After this preliminary assessment of chemical usage, the survey team visited all major industrial shops to observe industrial activities, discuss chemical waste disposal practices with laboratory/shop personnel, and hand out chemical waste disposal survey forms (see Appendix D). A total of 28 industrial shops were visited and shops with known or suspected boron, cyanide or large detergent or soap usage were selected to be visited first. The following individuals were contacted to discuss their respective areas of responsibility in the hazardous waste management program:

Capt Stephen Prawdzik, Chief, Bioenvironmental Engineering Section, AV 368-2635
Mr Schmalz, Environmental Coordinator, AV 368-4485
Mr Mills, Hazardous Waste Specialist, AV 368-4485
Mr Wishart, DRMO, McClellan AFB CA, AV 633-4150
TSgt Thomas, Civil Engineering Accumulation Site Manager, AV 368-4133
SSgt Morgan, PAVE PAWS Accumulation Site Manager, AV 368-5761
Sgt Snodgrass, FMS Accumulation Site Manager, AV 368-4482
SrA Williams, OMS Accumulation Site Manager, AV 368-4810
Mr Young, TRANS Accumulation Site Manager, AV 368-4240

C. RESULTS

1. Wastewater Characterization Survey

a. Results By Specific Compound: Results are presented by compound to develop general trends in wastewater quality. Complete results are included in Appendix C.

(1) Boron: Low levels of boron were detected in almost every wastewater sample collected. The most concentrated boron sources were photographic film processing chemicals, specifically, developers and fixers. Rinsate containing these chemicals discharges directly to the sanitary sewer system on a weekly basis. Consequently, measured boron levels were higher than average in samples taken from sewer lines servicing photographic film processing facilities, e.g., NDI and the 9th RTS Precision Photo Lab. Another source of boron which was less concentrated than the photographic chemicals but used basewide, is laundry detergent (NSN 7930 00985 6904) and washrack aircraft soap (NSN 6850 01184 3182).

(2) Cyanide: Low levels of cyanide were detected in almost every wastewater sample collected. The most concentrated cyanide source was found in the photo wet well utilized by the 9th RTS Precision Photo Lab. This was surprising because shop personnel were confident that the photo processing chemistry employed at the lab contained no cyanide. Another major cyanide source was laundry detergent (NSN 7930 00 985 6904). This laundry detergent, which was used throughout the base, contained 2.5 μg/gm cyanide.

(3) Surfactants: High concentrations of surfactants as measured by MBAS were found in wastewater collected at a flight line manhole (site 16) that services the Corrosion Control Shop, KC 135-Phase Docks and the aircraft and automobile washracks (328 mg/L, 160 mg/L, and 9300 mg/L, respectively).

(4) Analyses of Commercial Products: All of the chemicals analyzed contained boron. In fact, six out of nine developers and fixers previously listed in Table 4 contained over 1000 mg/L boron while the washrack soap (NSN 6850 01184 3182) contained 21 mg/L boron

(analytical results are presented in Appendix C). The only chemical analyzed which contained cyanide was a laundry detergent (NSN 7930 00985 6904) which contained 2.5 μg/gm (dry measurement) cyanide.

b. The concentration of cyanide introduced into the sanitary sewer system exceeds the STP effluent limitation of .0035 mg/L in many cases. Analytical results along with a site-by-site discussion are presented below:

(1) Site 1, Manhole 953: Boron, cyanide and surfactants were detected in the composite sample from the housing area, clinic and PAVE PAWS. The STP effluent limits for cyanide was exceeded. The average boron, cyanide and surfactant concentrations were 0.5, 0.009 and 53.3 mg/L, respectively. The average flow was 0.58 MGD. Sources of boron are developers and fixers used in x-ray film developing at the Clinic and cleaning soaps. The only source of cyanide found was laundry detergent. Surfactants (MBAS) are used in soaps to aid in cleaning. Site 1 is presented in Figure 3.

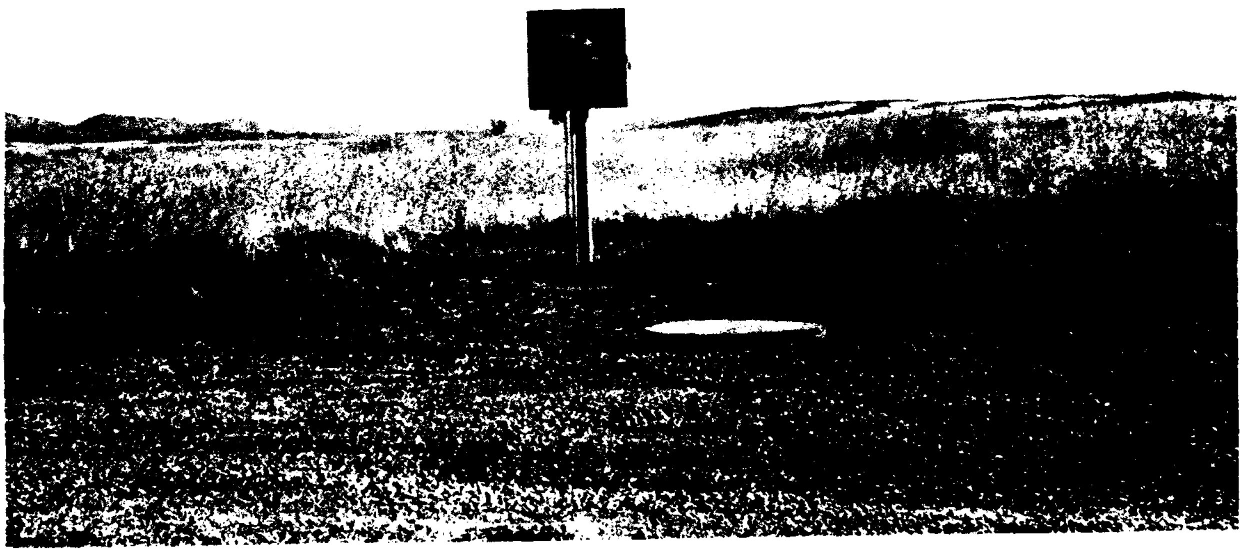

Figure 3: Housing Composite Sampling Site

(2) Site 2, Manhole 1051, Clinic: Boron, cyanide and surfactants were detected in the wastewater from the Clinic. Cyanide limits were exceeded. Boron, cyanide and surfactant concentrations were 0.8, 0.012 and 1.4 mg/L, respectively. The flow was 55 GPM. The probable sources of boron are developers and fixers used in x-ray film developing at the Clinic and cleaning soap. Cyanides and surfactants may be coming from detergents.

(3) Site 3, Manhole 1051, PAVE PAWS: Boron, cyanide and surfactants were detected in the wastewater from the the PAVE PAWS Radar Site. Boron, cyanide and surfactant concentrations were 0.32, 0.008 and <.1 mg/L, respectively. The cyanide daily limit was exceeded. The average flow was 67 GPM. The sources of boron and cyanide were not determined.

(4) Site 4, Manhole 210: Boron, cyanide and surfactants were detected in the wastewater from the main base. The average boron, cyanide and surfactant concentrations were 0.4, 0.008 and 7.2 mg/L, respectively. The limit for cyanide was again exceeded. The average flow was .48 MGD. The primary source of the boron and cyanide is 9th RTS Precision Photo Lab wastes. Photo Lab wastes are apparently being discharged to the sanitary sewer system through manhole 310. Other sources of boron and cyanide contamination are photographic chemicals used at the Audio Visual Facility and laundry detergent. The source of surfactants is soap for normal cleaning and maintenance operations. Site 4 is presented in Figure 4.

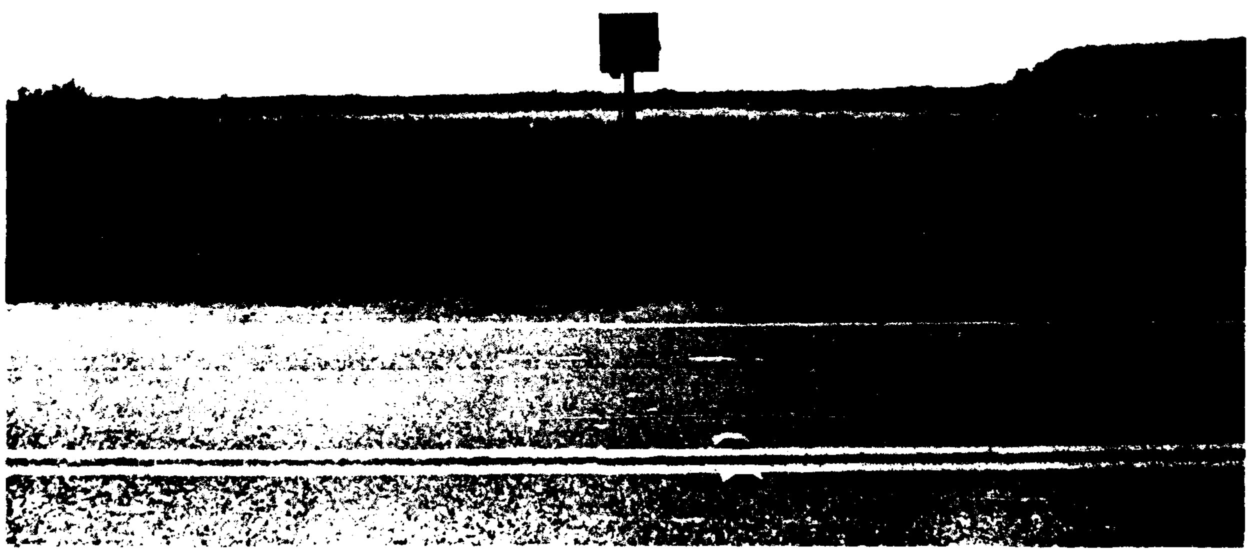

Figure 4. Base Composite Sampling Site

(5) Site 5, Manhole 310: Boron, cyanide and surfactants were detected in the wastewater from the the 9th RTS Precision Photo Lab. Boron, cyanide and surfactant concentrations were 2.7, 0.068 and 0.3 mg/L, respectively. The flow was intermittent and beyond our capability to accurately measure. Contaminants associated with film processing chemicals such as cyanide and boron are obviously present in the sanitary sewer. However, how the chemicals entered the sewer is not obvious. The waste is either being discharged directly to the sanitary sewer through floor drains in building 2145 or is leaching from the photo wet well into the adjacent sanitary sewer line.

(6) Site 6, Manhole 335: Boron, cyanide and surfactants were detected in the wastewater from the the Audio Visual Facility. Boron, cyanide and surfactant concentrations were 0.4, 0.015 and 0.4 mg/L, respectively. The daily limit for cyanide was exceeded. The flow was intermittent and beyond our capability to accurately measure. The source of boron is likely developers and fixers used in film processing. The source of cyanide is unknown but may be linked to film processing or a laundry detergent (NSN 7930 00985 6904).

(7) Site 7, Manhole 349: Boron, cyanide and surfactants were detected in the wastewater from the Commissary and the Auto Hobby Shop. Cyanide limits were exceeded. Boron, cyanide and surfactant concentrations were 0.7, 0.010 and 0.5 mg/L, respectively. The flow was 40 GPM.

(8) Site 8, Manhole 357: Boron and surfactants were detected in the wastewater from the BX Complex. Boron, cyanide and surfactant concentrations were 0.4, <0.005 and 0.2 mg/L, respectively. The average flow was 60 GPM.

(9) Site 9, Manhole 372: A trace amount of boron was detected in the wastewater from the Transportation Squadron area. Boron, cyanide and surfactant concentrations were 0.2, <0.005 and <0.1 mg/L, respectively. The average flow was 160 GPM.

(10) Site 10, Manhole 379: Boron, cyanide and surfactants were detected in the wastewater from the CE and Transportation area. Boron, cyanide and surfactant concentrations were 0.7, 0.012 and 3.7 mg/L, respectively. Cyanide discharge limit was exceeded. The flow was not obtained due to irregularly shaped sewer channels.

(11) Site 11, Manhole 385: Boron, cyanide and surfactants were detected in the wastewater from the Civil Engineering area. Boron, cyanide and surfactant concentrations were 0.3, 0.005 and 0.1 mg/L, respectively. The flow was not obtained due to irregularly shaped sewer channel.

(12) Site 12, Manhole 391: Boron, cyanide and surfactants were detected in the wastewater from the Entomology and CE Roads and Grounds area. Boron, cyanide and surfactant concentrations were 0.8, 0.030 and 0.2 mg/L, respectively. The cyanide limit was exceeded. The flow was not obtained due to irregularly shaped sewer channel.

(13) Site 13, Manhole 398: Boron, cyanide and surfactants were detected in the wastewater from the Trailer Park and Laundry Facility area. Boron, cyanide and surfactant concentrations were 0.9, 0.005 and 3.6 mg/L, respectively. The flow was not obtained due to irregularity of the sewer channel. The only source of boron, cyanide, and surfactants were found in laundry detergents such as 20 Mule Team Borax or NSN 7930 00985 6904.

(14) Site 14, Lift Station 6: Boron, cyanide and surfactants were detected in the wastewater from the flight line area lift station. Boron, cyanide and surfactant concentrations were 1.3, 0.038 and 337.9 mg/L, respectively. The average flow was .11 MGD. The major sources of boron are likely the developers and fixers used in film processing at the NDI Shop along with soaps used in normal cleaning and maintenance operations. The only source of cyanide found was in a laundry detergent, NSN 7930 00985 6904. Cyanide limit was exceeded. The concentration of MBAS was significant in causing foaming.

(15) Site 15, Manhole 530: Boron, cyanide and surfactants were detected in the wastewater from the Old SR-71 Phase Docks. Boron, cyanide and surfactant concentrations were 2.9, 0.028 and 2.0 mg/L, respectively. The flow was extremely low. Boron and cyanide limits were exceeded.

(16) Site 16, Manhole 534: Boron, cyanide and surfactants were detected in the wastewater from the FMS/ Corrosion Control/ Phase Dock area. Boron, cyanide and surfactant concentrations were 1.9, 0.032 and 160 mg/L, respectively. The flow was not obtained due to irregularly shaped sewer channel. Cyanide limits were exceeded. A major source of boron and surfactants is aircraft washrack rinsate which contained aircraft soap (NSN 6850 00184 3182). Site 16 is presented in Figure 5.

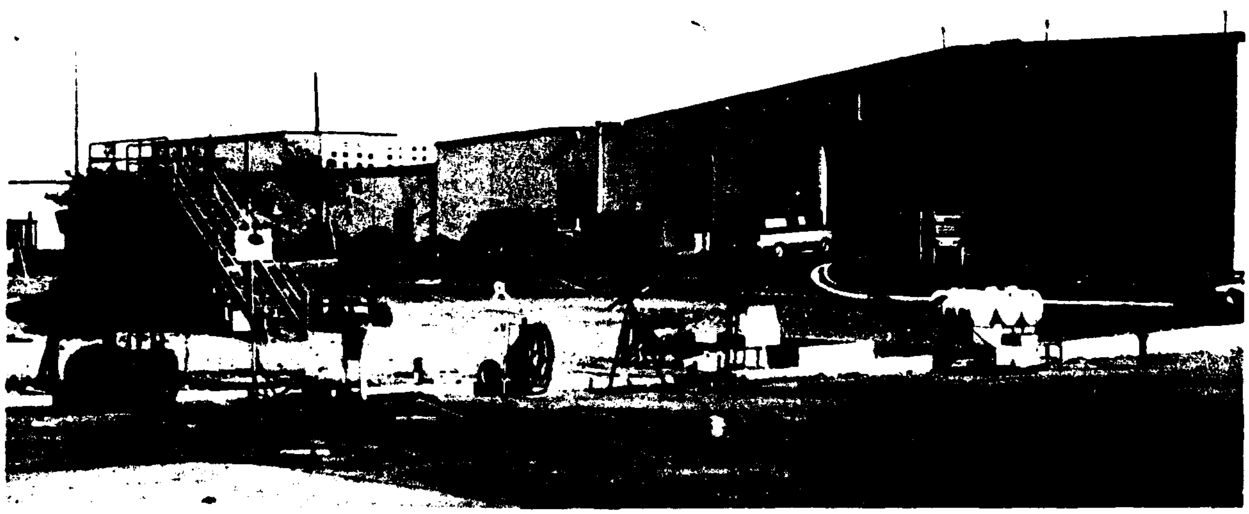

Figure 5. Washrack Adjacent to Manhole 534

(17) Site 17, Manhole 537: Boron, cyanide and surfactants were detected in the wastewater from the Automobile washrack area. Boron, cyanide and surfactant concentra- tions were 3.2, <0.005 and 9.3 mg/L, respectively. The flow could not be obtained due to an irregularly shaped sewer channel. Boron limits were exceeded.

(18) Site 18, Manhole 539: Boron, cyanide and surfactants were detected in the wastewater from the NDI and T-38 Phase Dock area. Boron, cyanide and surfactant concentrations were 5.8, 0.027 and 0.2 mg/L, respectively. Boron and cyanide levels were exceeded. The flow was not obtained because of sewer channel problems. The source of boron is rinsewater containing developers and fixers from the NDI Shop. The source of cyanide was not determined.

(19) Site 19, Manhole 539a: Boron, cyanide and surfactants were detected in the wastewater from the TEB Facility and AGE Shop. Boron, cyanide and surfactant concentrations were 4.0, 0.040 and 4.1 mg/L, respectively. The boron and cyanide limits were exceeded. The flow observed in the sewer channel was very low. The only source of boron and cyanide was laundry detergent NSN 7930 00985 6904. The source of surfactants is normal cleaning and maintenance operations.

(20) Site 20, Photo Lab Wet Well: Boron, cyanide and surfactants were detected in the wastewater from the 9th RTS Precision Photo Lab Wet Well. Boron, cyanide and surfactant concentrations were 5.5, 0.256 and 0.2 mg/L, respectively. The amount of flow discharged to the wet well was .ʃ33 MGD. Boron and cyanide are used in normal color film processing. Boron is used in black and white film processing. The source of surfactants is normal cleaning operations. Boron and cyanide concentrations exceeded discharge limits. Site 20 is presented in Figure 6. Concentrations of several metals were also found including iron (.282 mg/L), silver (.052 mg/L), magnesium (12.2 mg/L), sodium (34.8 mg/L) and aluminum (.288 mg/L).

(21) Site 21, Manhole 534: Boron, cyanide and surfactants were detected in the wastewater from the KC-135 washrack. Soap (NSN 6850 01184 3182) used at the washrack is diluted with five parts water. Boron, cyanide and surfactant concentrations were 1.1, 0.020 and 220 mg/L, respectively. The limit for cyanide was exceeded. High concentrations of surfactants were found. Washing operations were in progress when the sample was grabbed.

(22) Site 22, Fitness Center Drinking Water distribution sample: This sample was taken to determine whether background concentrations of boron, cyanide or surfactants might be contributing to the levels found in the wastewater. No boron, cyanide or surfactants were found.

Figure 6. 9 RTS Precision Photo Lab Wet Well

(23) Site 23, Golf Course Pond: The Golf Course Pond contained boron and cyanide at concentrations of .9 and .01 mg/L, respectively. Effluent from the sewage treatment plant is pumped to the pond to irrigate the golf course.

Concentrations of several metals were also found including barium (6.093 mg/L), chromium (.851 mg/L), iron (148.2 mg/L), manganese (7.153 mg/L), mercury (.0015 mg/L), zinc (4.505 mg/L), magnesium (40.3 mg/L), sodium (52.0 mg/L), aluminum (25.2 mg/L), cobalt (.121 mg/L) and vanadium (.751 mg/L).

2. Sewage Treatment Plant Evaluation. Analytical results are presented and discussed below. Unless otherwise noted, all results presented are averages based on five days of sampling data. Complete analytical results are presented in Appendix E.

a. Total Suspended Solids (TSS): Total Suspended Solids concentrations were measured over a five-day period at sites 24-29. The levels measured in the STP influent ranged from 70 to 132 mg/L with a five-day average of 104 mg/L. The levels measured in the STP effluent ranged from 10 to 17 mg/L with a five-day average of 14 mg/L. The five-day average at the STP effluent was below the 30 mg/L NPDES permit limitation. The five-day TSS average of the PTP effluent (Site 29) was 2 mg/L.

Primary clarification removed 81% of the available TSS. Trickling filter biodegradation removed an additional 8% while secondary clarification removed another 5% for a total TSS removal of 94%. However, 7.5% TSS was put back into the wastewater in the aeration pond for an overall effluent TSS removal efficiency of 86.5%. The increase in suspended solids after aeration is probably a result of biological growth. The 86.5% suspended solid removal is above the 85% removal requirement of the current NPDES permit.

b. Total Dissolved Solids (TDS): TDS concentrations were measured over a five-day period at sites 24-29. The levels measured in the STP influent ranged from 203 to 412 mg/L with a five-day average of 302 mg/L. Effluent concentrations ranged from 262 to 362 mg/L with a five-day average of 334 mg/L. The results show a 10% increase in TDS from the influent to the effluent. The five-day average TDS concentration in the PTP effluent was 334 mg/L.

c. Five-Day Biological Oxygen Demand (BOD_5): BOD_5 concentrations were measured for a five-day period at sites 24-29. Due to laboratory quality control checks only three days of BOD_5 results have been reported. The levels measured at the STP influent ranged from 111.3 to 157.5 mg/L with a three-day BOD_5 average of 141.3 mg/L. Effluent concentrations ranged from 6.9 to 18.4 mg/L with a three-day average of 13.5 mg/L. The average overall BOD_5 removal efficiency was 90.4%. The BOD_5 effluent concentration was well below the NPDES limitation of 30 mg/L. The five-day average of the PTP effluent (Site 29) was 7.2 mg/L.

d. Chemical Oxygen Demand (COD): COD was measured over a five-day period at Sites 24-29. The average COD concentrations at the STP influent and effluent were 280 mg/L and 61 mg/L, respectively.

Primary clarification removed 70% of the available COD. Trickling filter biodegradation removed an additional 6% while secondary clarification took out another 4% for an overall COD removal efficiency of 80%. The five-day average at the PTP effluent was 21.4 mg/L.

e. Cyanide: Cyanide concentrations were measured over a five-day period at Sites 24-29. The levels measured in the STP influent ranged from 0.005 to 0.010 mg/L with a five-day average of 0.008 mg/L. The levels measured in the STP effluent ranged from 0.005 to 0.020 mg/L with a five-day average of 0.011 mg/L. These results suggest that cyanide passes through the STP without treatment to violate the current NPDES limitation of 0.0035 mg/L. The five-day average cyanide concentration of the PTP effluent was 0.010 mg/L.

f. Boron: Boron concentrations were measured over a five-day period at Sites 24-29. The levels measured in the STP influent ranged from 0.7 to 1.0 mg/L with a five-day average of 0.78 mg/L. The levels measured in the STP effluent ranged from 2.7 to 3.1 mg/L with a five-day average of 2.88 mg/L. These results show a 370% increase in the boron levels. The effluent boron concentrations exceeded the NPDES limitation of 1.0 mg/L. The average PTP effluent boron concentration was found to be 9.44 mg/L.

Additional boron samples were taken in December 1988 by the Bioenvironmental Engineering (BEE) Shop personnel. The one day result indicated that the influent concentration of 0.25 mg/L for boron elevated to 2.7 mg/L after primary clarification and remained constant throughout the treatment plant's unit processes with a final effluent concentration of 2.8 mg/L. Results of boron analysis run on anerobic digester sludge, supernatant, and settled solids from the clarification units ranged from 2.8 mg/L to 4.0 mg/L.

g. Surfactants: The Methylene-Blue-Active Substances (MBAS) test indicates the presence of anionic surfactants. The five-day average result for MBAS at the STP influent channel was 5.9 mg/L. The five-day average at the STP effluent was 0.3 mg/L. Approximately 95% of MBAS was removed by the sewage treatment plant.

h. Oils and Grease: Oil and grease concentrations were measured for five days at Sites 24-29. The average concentration at the influent to the STP was 10.5 mg/L, neglecting an unusually high level (5000 mg/L) detected on 20 September. The average STP effluent oil and grease concentration was less than 0.3 mg/L. The average concentration for oils and grease was well below the 30-day average 10 mg/L NPDES limitation.

A distinct fuel odor was noticed on 20 September originating from the STP influent wet well. A grab sample of the influent at that time revealed an oil and grease concentration of 5000 mg/L. Since wastewater normally takes about 24 hours to pass through the STP, the oil and grease concentration of the 21 September STP effluent sample was evaluated. The sample contained an oil and grease concentration of 0.5 mg/L which suggests the STP is effectively removing the oils and grease from the wastewater.

i. Chlorine Residual: Chlorine concentrations were monitored for five days at the effluent from the STP. The average concentration for chlorine residual in the STP effluent was less than 0.01 mg/L with the exception of a 0.36 mg/L level detected on 16 September. The 30-day NPDES limitation for chlorine residual in Hutchinson Creek is 0.10 mg/L.

j. Dissolved Oxygen: Dissolved oxygen concentrations were monitored for two days at the effluent from the STP. The average dissolved oxygen concentration was 8.8 mg/L. The water temperature for both days averaged 21°C. The solubility of oxygen in water at 21°C and 760 mm of pressure is 9.2 mg/L. Assuming the pressure at BAFB is nearly 760 mm (sea level), the aeration pond is 95% effective in saturating the effluent wastewater with oxygen, either by aeration or photosynthesis. However, the dissolved oxygen concentration in Hutchinson Creek was depleted to 0.3 mg/L at NPDES Site R2 located 1000 feet downstream. Nutrients in the wastewater such as nitrogen and phosphorus promote algal growth. Algae exert significant oxygen demand, especially in their respiration cycle. Other factors preventing reaeration are the flat slope of the terrain and excessive vegetation impeding flow and catching sediment. The average dissolved oxygen level of 0.3 mg/L violated the NPDES limitation of 5.0 mg/L.

k. Settleable Matter: Sample results for three days of analysis show trace quantities of settleable matter. The effluent concentration was 0.1 ml/L on two days of analysis. The average results were below the NPDES effluent limitation for settleable matter of 0.1 ml/L.

l. Total Coliform: No coliforms were detected in the STP effluent with the exception of a 2 colonies per ml result on 21 September. The average results for total coliform were well below the 7-day average NPDES effluent limitation of 23 colonies per ml.

m. Metals: Average STP effluent values for aluminum and iron were 0.184 mg/L and 0.125 mg/L, respectively. Analyses for all other metals in the STP effluent, including metals in the current NPDES permit, were below detection limits. Metals detected in the digested sludge were aluminum (271 μg/g), barium (72 μg/g), chromium (15 μg/g), copper (48 μg/g), iron (595 μg/g), manganese (57 μg/g) and zinc (66 μg/g).

Average metal concentrations detected in the PTP effluent were aluminum (0.305 mg/L), iron (0.809 mg/L) and manganese (0.206 mg/L). A PTP sludge sample yielded aluminum (950 mg/L), barium (0.466 mg/L), chromium (6.560 mg/L), iron (54.4 mg/L), manganese (0.732 mg/L), lead (0.002 mg/L), molybdenum (0.651 mg/L), silver (0.052 mg/L), vanadium (4.32 mg/L), and zinc (1.12 mg/L).

n. Nitrogen: Average influent values for ammonia (16.02 mg/L), total Kjeldall nitrogen (26.9 mg/L), nitrate (<0.1 mg/L), and nitrite (0.02 mg/L) are typical in domestic sewage. Through nitrogen conversion/removal processes in the STP the average effluent concentrations were reduced for ammonia (0.48 mg/L) and total Kjeldall nitrogen (3.96 mg/L); increased for nitrate (10.3 mg/L) and nitrite (0.06 mg/L). The reduction in ammonia and subsequent increase in nitrate indicates that the nitrogen is being oxidized which is indicative of aerobic conditions throughout the STP.

o. Phenols: Average influent phenol concentrations ranged from 0.010 mg/L to 0.015 mg/L with an average of 0.012. Effluent results for phenols were less than the detection limit (0.010) for all five days of sampling.

p. Volatile Halocarbons and Aromatics (EPA Methods 601 and 602): Grab samples for EPA Method 601 & 602 were collected on two separate days. Chloroform (0.4 μg/L on 15 September and 0.6 μg/L on 21 September) was the only chemical detected in the effluent channel. A one-day grab sample was also collected for EPA Method 624 on 21 September. Acetone (25 μg/L) was the only chemical detected at the STP effluent.

EPA Method 624 analysis was also run on the sludge from the anaerobic digesters and PTP sludge. Sample results for the sludge in the anaerobic digesters could not be adequately determined due to sample interference in laboratory procedures. EPA Method 624 results for the PTP sludge detected acetone (1100 μg/L) and carbon disulfide (190 μg/L).

q. Acid/Base/Neutral Extractables: One-day composite samples for EPA Method 625 detected bis(2-ethylhexyl)phthalate (10 μg/L) in the STP effluent. Detection limits were too high to be useful for characterizing the sludge samples taken in the anaerobic digesters.

Phenol (13 μg/L) and bis(2-ethylhexyl)phthalate (18 μg/L) were the only detected chemicals in the PTP effluent. There were no EPA Method 625 compounds detected in the PTP sludge.

r. Microbiological Examination: No organisms were found that were either significantly pathogenic or the cause of the foaming problem. The only significant observation was a distinct difference in the amount of growth on the two trickling filters. The north filter showed significantly less growth than the south filter. Also, the north filter had a higher percentage of facultative anaerobes to aerobic organisms than did the south filter. A possible explanation is there is an apparent lack of proper aeration in the north filter. The media was noted to be smaller and more compact in the north filter than in the south filter. Also, the north filter is used solely when large amounts of fuels or oils are present in the influent. A recent spill may have reduced the total amount of growth in that filter.

3. Hazardous Waste Survey

a. Annual Forecasted Quantities of Wastes: Information from the chemical waste disposal survey forms is summarized in Table 8. This summary shows the forecasted wastes generated annually at Beale AFB by category. From Table 8, Column 5, waste fuels, solvents and degreasants, and miscellaneous chemicals (antifreeze) comprise 82.3% of the drummed wastes generated at BAFB. Fifty-three percent of the total wastes are photographic wastes which are treated in the PTP (acetic acid and other photo chemicals from the 9 RTS Photo Lab).

All waste oils and fluids are either placed into drums or directly into above ground or underground tanks (See Figure 7). The drums are then emptied into the appropriate waste oil storage tank. The waste oil is then sold to a waste oil contractor for 11 cents/gallon.

All other drummed wastes are disposed of by the Defense Reutilization and Marketing Office at McClellan AFB CA. Waste not drummed, i.e., some waste acids, soaps, PD-680, and NDI chemicals are disposed of down drains connected to oil/water separators then to the sanitary sewer. Itemized listings of waste categories, shop, amount of waste, and disposal methods are found in Appendix F for all wastes and in Appendix G for drummed wastes.

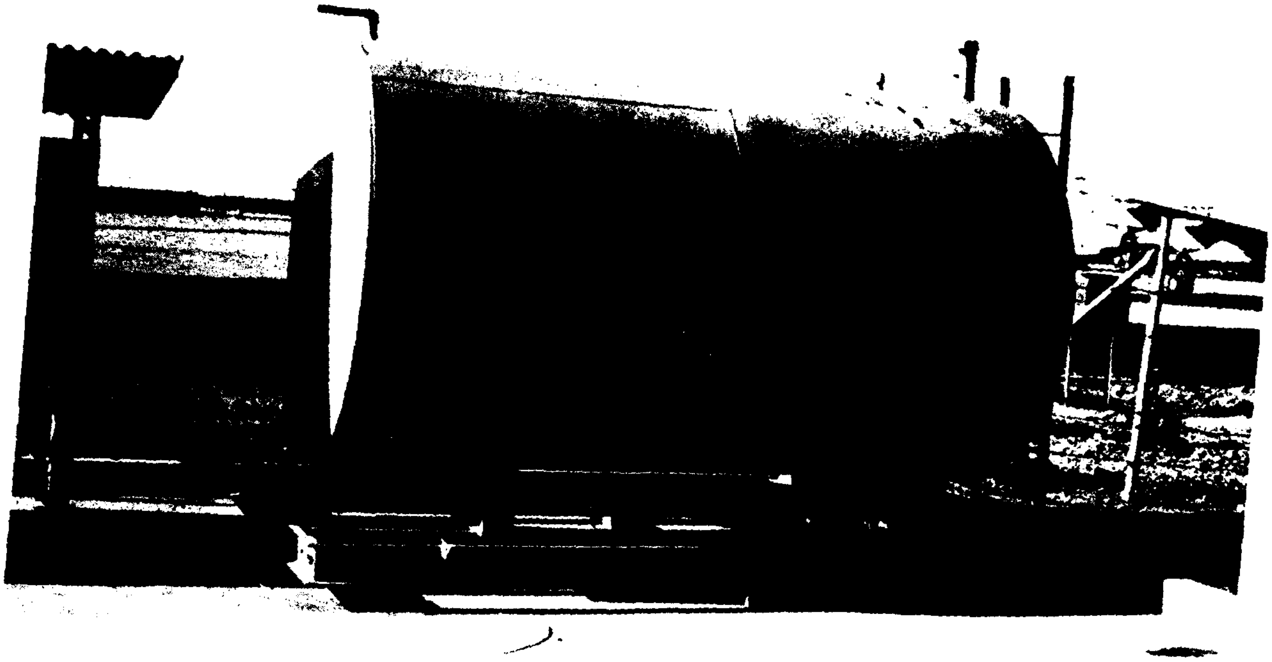

Figure 7. Above Ground Waste Oil Storage Tank

Table 8. ANNUAL FORECASTED QUANTITIES OF WASTES GENERATED AT BEALE AFB

PRODUCT	TOTAL (Gal/Yr)	%TOTAL	TOTAL DRUMMED (Gal/Yr)	%TOTAL DRUMMED
Paint & Thinners	157	2.66	792	7.61
Strippers	474	0.80	462	4.15
Acids	11820	19.97	0	0
Soaps	3172	5.36	60	0.58
Oils & Fluids	13077	22.1	0	0
Solvents & Degreasants	4541	7.67	2004	19.25
Photo & NDI Chemicals	20054	33.88	530	5.09
Fuel	4462	0.78	4242	40.75
Miscellaneous Chemicals	4012	6.78	2320	22.29
TOTALS	59184		10410	

b. Soap and Detergent Usage: Supply (MSgt Bailey) was also contacted in order to determine the quantities and types of soaps and detergents used throughout the base. The soaps which were used in the largest quantities throughout the base were analyzed to determine the boron and cyanide content. Soap and detergent proved to be a contributor to both the boron and cyanide problems as shown in Table 9.

c. Description of Industrial Activities and Waste Disposal Practices: This section gives a shop-by-shop summary of chemical usage and disposal practices (See Appendix H for a shop-by-shop listing of waste disposal practices).

Table 9. Boron and Cyanide Content of Soaps

Stock Number (NSN)	QTY(GAL/YR)	Boron (mg/L)	Cyanide (mg/L)
7930 00068 1669	21880	6.5	< .04
7930 00177 5217	732	4.5	< .03
7930 00958 6033	560	3.7	< .04
7930 00985 6904	3380 (20 oz boxes)	40 mg/gm	2.5 µg/gm
6850 01184 3182	1200	21	< .03

(1) 9th TRANSPORTATION

Shop: General and Special Purpose Maintenance — Bldg: 2496
Contact: Mr Young — AV: 368-4240

Vehicle Maintenance Shop personnel repair and maintain Beale AFB military vehicles. The shop generates used motor oil (40 gallons/month), transmission fluid (4 gallons/month), and brake fluid (1 gallon/month). These wastes are drained from the vehicles into drip pans which are emptied into a 55-gallon drum. The 55-gallon drum is then drained into an above ground used oil storage tank. The shop has two 25-gallon Type II degreasing tanks which are changed out every three months. The waste is placed in a 55-gallon drum and disposed of as hazardous waste through DRMO. Waste diesel fuel (110 gallons/year) and antifreeze (220 gallons/year) are drummed and disposed of through DRMO. Used rags are returned to base supply. Used Speedy Dry, oil absorbant, is placed in a plastic bag and disposed of in the trash. Batteries are exchanged one-for-one through a local contractor (Co-Pars). Aircraft cleaning soap (NSN 6850 01184 3182), used to clean the shop floors, is discharged to the sanitary sewer system.

Shop: Allied Trades | Bldg: 2489
Contact: SrA Hamrick | AV: 368-4270

Allied Trades personnel are responsible for auto body repair including sanding, grinding, welding, and painting. The shop generates waste polyurethane paint and thinner (8 gallons/month) and enamel paint and thinner (15 gallons/month). The wastes are drummed, stored at the TRANS Accumulation Site, and disposed of through DRMO. Rags contaminated with dried paint are thrown in the trash.

Shop: Fire Truck Maintenance | Bldg: 1086
Contact: Mr Berger | AV: 368-4434

This shop is responsible for all maintenance on fire and crash trucks. This includes safety and scheduled inspections, lubrication, and oil and filter changes. The shop has one 30-gallon PD-680 parts cleaning tank that has not been changed out in several years. Used oil (120 gallons/year) and transmission fluid (12 gallons/year) are placed together in a 55-gallon drum and taken to the used oil storage tank at the main transportation complex. Waste antifreeze (110 gallons/year) is drummed, stored at the TRANS Accumulation Site, and disposed of through DRMO. Used oil and fuel filters are disposed of in the trash. Dirty rags are turned in to the base laundry service. Used batteries are turned in to the main transportation complex for exchange. Aircraft cleaning soap (NSN 6850 00935 0995 - 5 gallons/month), used to wash the shop's vehicles, is discharged to the sanitary sewer system.

Shop: Refueling Maintenance | Bldg: 1073
Contact: SSgt Thomas | AV: 368-2096

Shop personnel are responsible for the maintenance of refueling tankers for aircraft. Waste oil (55 gallons/3 months) is placed in a 55-gallon drum which is taken to the main transportation complex. The oil is put into the used oil storage tank. Shop personnel rarely drain any transmission or hydraulic fluid from the vehicles; when they do, the wastes are drummed separately. The floor drains are connected to an oil/water separator that is connected to a leak detection system.

(2) 9th COMBAT SUPPORT GROUP

Shop: Auto Hobby Shop | Bldg: 2427
Contact: Mr Heimburger | AV: 368-2428

Auto Hobby Shop personnel are responsible for checking out equipment and tools to patrons to use for maintenance of personal vehicles. The shop generates waste motor oil (100 gallons/month), brake fluid (3 gallons/year), and transmission fluid (5 gallons/month). These wastes are drained into a 500-gallon underground tank. The shop has two 35-gallon Safe-Way Chemical Co. solvent tanks. The company changes out the tanks once a month at a cost of $100. Speedy Dry is used to clean up small spills; it is placed in a plastic bag and disposed of in the trash. Dirty rags are turned in to the base laundry service. Shop patrons take any waste paint and used batteries with them when they leave. Break-Up soap (1 gallon/month) is used to clean the shop floors. The floor drains lead to an oil/water separator. The shop has a 4000-gallon above ground tank for storing used oil, but the tank is not yet in use.

Shop: Entomology — Bldg: 2681
Contact: Mr Fowler — AV: 368-2681

Entomology Shop personnel are responsible for pest control throughout the base. The chemicals are used up in process. Any leftover chemicals are drained and stored in containers for use at a later time. All empty containers are triple rinsed, punctured, and disposed of as municipal waste. The rinsewater is stored in a holding tank and used to mix herbicides. The shop does not generate any hazardous waste.

Shop: Paint Shop — Bldg: 2536
Contact: TSgt Thomas — AV: 368-4765

Shop personnel are responsible for painting the interior and exterior of buildings, structures, and signs on Beale AFB. All waste paints and thinners are placed in a 55-gallon drum. Thinners are skimmed off the top and drummed separately (See Figure 8). When the paint waste is dry, the drum is disposed of as municipal waste.

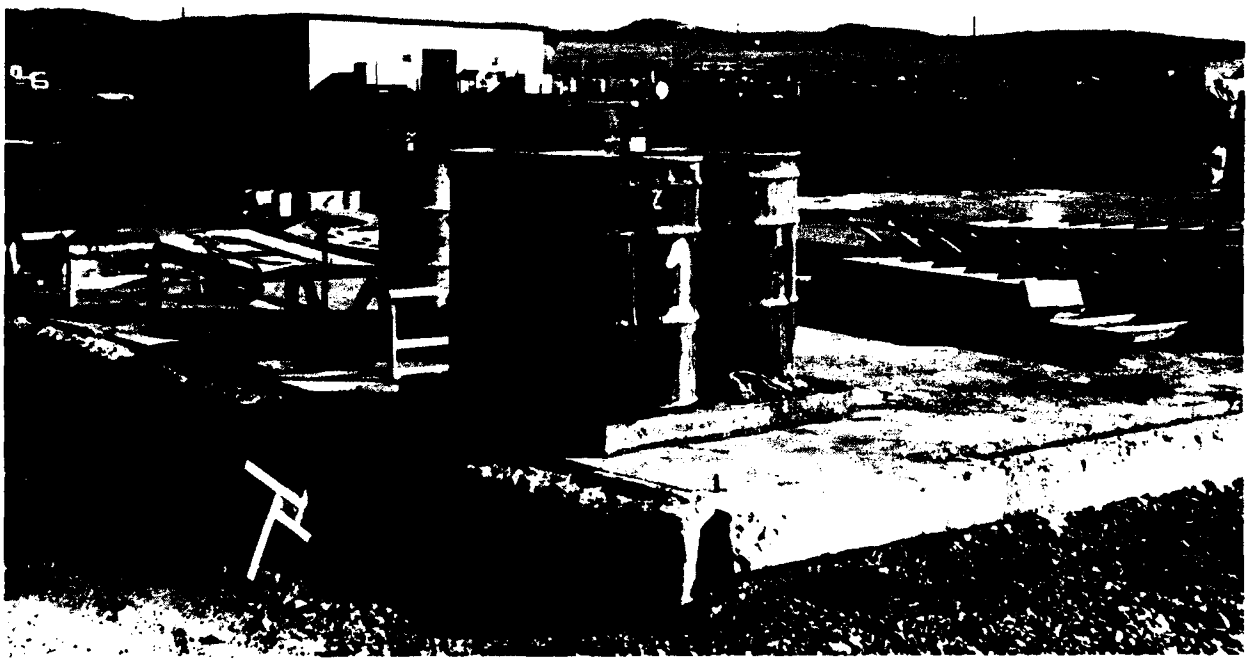

Figure 8. CSG Paint Shop Waste Storage Drums

Shop: Power Production | Bldg: 2541
Contact: TSgt Thomas | AV: 368-4708

Power Production personnel operate and maintain emergency powered generators. The shop generates waste oil, diesel fuel, and antifreeze (50 gallons each/month during summer and 300 gallons each/month during winter). The used oil is taken to the waste oil storage tank at the transportation complex. The antifreeze and diesel fuel are drummed separately in 55-gallon drums and taken to the CSF. Batteries (10/month) are palletized and taken to the transportation complex.

(3) 9th Strategic Hospital

Lab: Medical X-Ray | Bldg: 5700
Contact: Mr Wise | AV: 368-2328

Lab personnel are responsible for developing x-rays produced at the Clinic. The lab discharges waste fixer (40 gallons/month) to the sanitary sewer. The developer is used up in process and replenished as needed; no waste is generated.

Lab: Clinical Laboratory | Bldg: 5700
Contact: Mr Wise | AV: 368-2328

Lab personnel are responsible for analyzing clinical samples for the Clinic. The laboratory discharges a small amount of reagents to the sanitary sewer. No other wastes are generated.

(4) 9th RTS

Lab: Precision Photo Lab | Bldg: 2145
Contact: Lt Girard | AV: 368-2514

This Precision Photo Lab is responsible for processing black and white aerial films in support of SR-71/U-2 requirements. The shop also provides black and white and color photographic visual aids in support of local and national agencies. The shop generates waste diluted glacial acetic acid (980 gallons/month), developer (1270 gallons/month), fixer (320 gallons/month), bleach (9 gallons/month), conditioner (6 gallons/month), stabilizer (8 gallons/ month), activator (8 gallons/month), and reversal bath (6 gallons/month). All chemical wastes are discharged to the PTP.

(5) 9th OMS

Shop: U-2/TR-1 Phase Dock — Bldg: 1075
Contact: MSgt Shaw — AV: 368-4243

Shop personnel are responsible for conducting periodic inspections of the U-2/TR-1 aircraft. The shop generates waste brake fluid and hydraulic fluid (5 gallons total/month). The waste is accumulated in 5-gallon cans, transported to the accumulation site, and poured into the used oil storage tank. PD-680 (2 pints/month), used to clean landing gear axles, is accumulated in 5-gallon cans. Waste JPTS fuel (2 gallons/month) is drained from the aircraft into a bowser; the fuel is turned over to POL personnel to be changed into JP-4. Pan Dandy soap (NSN 7930 00068 1669) is used to clean the floors; the floor cleaner recovery tank is drained into 5-gallon cans. Used rags are exchanged for clean ones through the base laundry. Used Speedy Dry is placed in plastic bags and thrown in the trash.

Shop: SR-71 Phase Dock — Bldg: 1075
Contact: Capt Van Oteghem — AV: 368-4243

At the time of the survey, the phase dock was being used for the maintenance of hydraulic jacks. Hydraulic fluid was the only waste generated. As of 1 Oct 88, Non-Powered AGE assumed responsibility for maintaining the jacks. Phase inspections are not conducted on the SR-71.

Shop: TEB Maintenance — Bldg: 1230
Contact: TSgt Nusbaum — AV: 368-4378

This shop is responsible for maintaining the triethylbromine systems on the SR-71 aircraft. The shop generates 55-gallon/month of hydraulic fluid (25%) and oil (75%). The waste is contaminated with trace amounts of triethylbromine. SrA Williams (OMS Accumulation Site Manager) comes to the shop monthly and transports the waste to the OMS Accumulation Site.

Shop: Washrack — Bldg: 1083
Contact: SrA Williams — AV: 368-4810

Shop personnel are responsible for washing KC-135 (1/week) and TR-1 (1/month) aircraft. Other shops wash U-2 (1/month) and SR-71 (1/week) aircraft at the washrack. Safety Kleen Soap (5 gallons/month) is mixed at a 1:2 ratio for washing the SR-71. PD-680 (150 gallons/ month), Pen Air M-5572 (100 gallons/month), and Aircraft Cleaning Compound (NSN 6850 01184 3182 - 100 gallons/month) are used for washing the other aircraft. Both soaps are mixed at a 1:5 ratio. The soap is normally applied with a pressure cleaner; however, when the machine is not working the soap is applied by hand. Applying the soap by hand usually requires more soap. In the future, PD-680 will be replaced with Citrikleen. The drains lead to an oil/water separator that is cleaned out every two years by shop personnel (See Figure 9). Sludge from the separator is pumped into a bowser and eventually into 55-gallon drums.

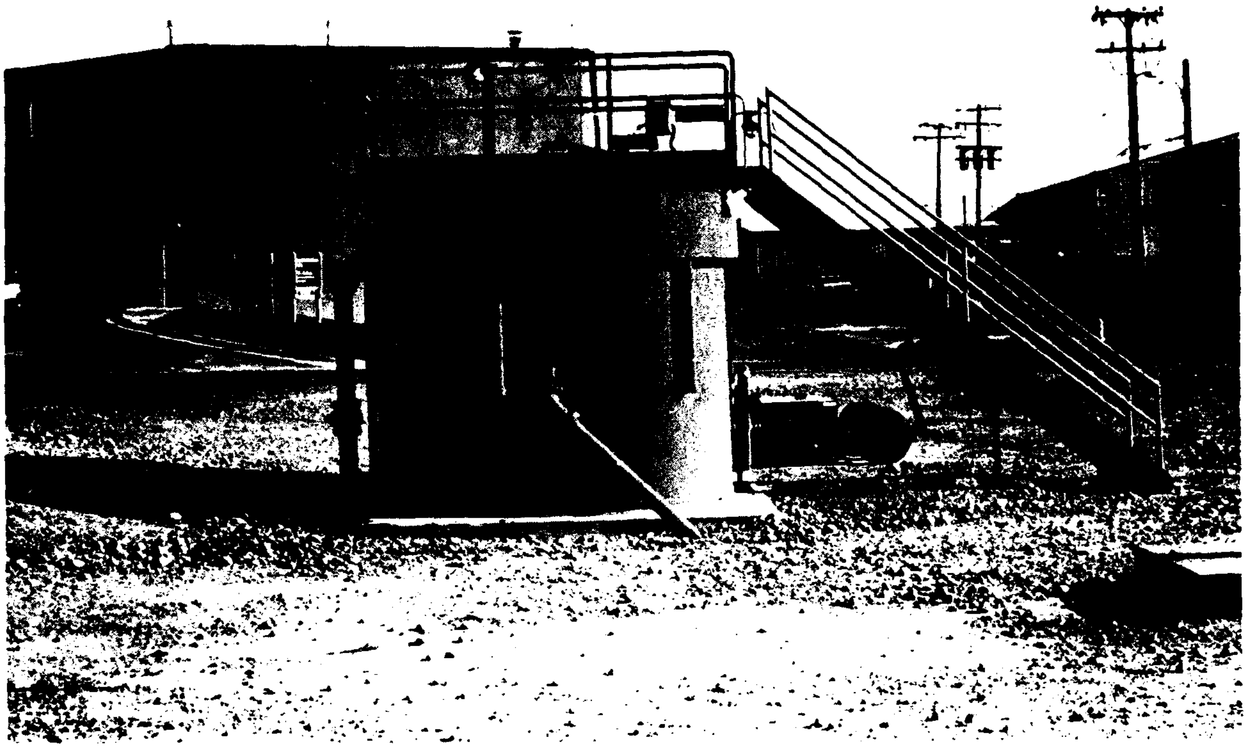

Figure 9. Washrack Oil/Water Separator

Shop: KC-135 Phase Dock Bldg: 1076
Contact: MSgt Yeager AV: 368-4370

This shop is responsible for the periodic inspection and repair of KC-135 aircraft. The shop generates waste hydraulic fluid (4 gallons/month) and synthetic oil (4 gallons/month). The shop does not have a satellite accumulation site; all wastes are taken to the OMS Accumulation Site. Waste JP-4 (16 gallons/month) is placed into a fuel bowser and taken to the OMS Accumulation Site. Used Speedy Dry is thrown in the trash. Dirty rags are exchanged through the base laundry.

Shop: T-38 Phase Dock Bldg: 1243
Contact: SMSgt Riniker AV: 368-4892

Shop personnel are responsible for conducting periodic inspections and general maintenance on T-38 aircraft. The shop generates hydraulic fluid (5 gallons/month) and synthetic oil (1 gallon/month). The wastes are accumulated in 10-gallon drums, transported to the OMS Accumulation Site, and poured into the used oil storage tank. Aircraft (1/month) are washed using aircraft cleaning soap (NSN 6850 00935 0995 - 3 gallons/plane) and PD-680 (2 gallons/plane). The shop floor drains lead to an oil/water separator. Dirty rags are exchanged through the base laundry service. Used Speedy Dry is placed in a plastic bag and thrown in the trash.

(6) PAVE PAWS

Shop: 7MWS CE | Bldg: 5761
Contact: SSgt Morgan | AV: 368-5284

Shop personnel are responsible for operating and maintaining generators, air compressors, diesel fire pump, emergency diesel generator, power supplies, battery banks, above and underground fuel, oil and waste oil storage tanks, and oil/water separators. Used oil filters are drained and put in 55-gallon drums for disposal as hazardous waste. Used Speedy Dry is drummed along with the oil filters. The oil from the filters is placed in a 55-gallon drum. Waste oil (100 gallons/month) from the generator engines is drained into a 2500-gallon underground storage tank. The tank is emptied approximately every four months by a contractor. Waste thinner (1 gallon/month) is mixed in with the used oil. The shop has one 15-gallon diesel fuel parts cleaning tank that is changed out quarterly. Waste diesel fuel (15 gallons/quarter) and antifreeze (40 gallons/month) are accumulated in 55-gallon drums. Wastes are transported to the TSD facility by transportation. Dirty rags are exchanged through the base laundry service.

(7) 9th FMS

Shop: Corrosion Control | Bldg: 1071
Contact: MSgt Bone | AV: 368-2002

This shop is responsible for corrosion treatment and painting of aircraft, associated aircraft parts, and support equipment. The shop has two waterfall paint booths that are drained every Friday. The sludge is placed in the paint waste drum and the water is discharged to the sanitary sewer. A bead blasting unit is used to strip small parts; however, because of the unit's small size, it is not used often. The shop generates waste polyurethane paint (27 gallons/month) and enamel paint (5 gallons/month). The wastes are accumulated in a 55-gallon drum and disposed of as hazardous waste through DRMO. A recycling unit is used for solvent recovery. MEK (30 gallons/month), toluene (30 gallons/month), polyurethane thinner, (4 gallons/month), and xylene (1 gallon/month) are processed through the recovery unit. The unit has been in place for nine months and has reduced the amount of solvent wastes generated by 90%. Shop personnel are satisfied with its performance. Each drum of recycled material is analyzed by McClellan AFB or quality control. Naphtha, mineral spirits, denatured alcohol, and dope and lacquer thinners are used for parts cleaning; no waste is generated. The shop also uses chromium trioxide, calcium sulfate, alodine 1200, deoxidine 605, and phosphoric acid in small quantities. The wastes are neutralized with sodium bicarbonate and discharged to the sanitary sewer system.

Shop: NDI | Bldg: 1243
Contact: TSgt Boone | AV: 368-2306

Nondestructive Inspection (NDI) personnel are responsible for inspecting aircraft and aircraft parts for structural flaws using magnetic particle inspection, dye penetrant inspection, and x-ray inspection. Chemicals used for the x-ray inspection (20 gallons of fixer and 20 gallons of developer/3 months) are drummed and disposed of as hazardous waste through DRMO. Magnaflux emulsifier (55 gallons/6 months), dye penetrant (55 gallons/6 months), and developer (55 gallons/6 months) are drummed and disposed of as hazardous waste. Currently, the rinsewater goes down the drain; the shop is in the process of developing a method to recover all chemicals going into the drain. The chcmicals will then be processed through the base PTP. Fluorescent particles are combined with Norpar 13 (an oil-based solvent) for magnetic particle inspection. The waste is drummed and disposed of as hazardous waste. Used rags are exchanged through base laundry.

Shop: J-57 Intermediate Maintenance — Bldg: 1086
Contact: Sgt Snodgrass — AV: 368-4482

Shop personnel are responsible for repairing engines, draining and servicing oil tanks, cleaning engine parts, and cleaning and inspecting engine bearings. The shop generates hydraulic fluid (2 gallons/month) and 7808 oil (55 gallons/month). These wastes are drummed, transported to the used oil storage tank at the OMS Accumulation Site. The shop has one 20-gallon PD-680 tank that is replenished as needed; no waste is generated. JP-4 (55 gallons/3 months) is drained from the engines, placed in 55-gallon drums, and disposed of through DRMO. The bearing room has three small tanks which contain PD-680 (3-4 gallons/6 months), carbon remover (3-4 gallons/6 months), and 7808 oil (15 gallons/3 months). In the future, the carbon remover will be replaced by Citrikleen. The shop also has five other small tanks which contain mineral oil, perchlorethane, engine oil, fingerprint remover, and 7808 oil. These tanks are changed out as necessary. All wastes are drummed along with the shop's other wastes. Used cleaning rags are exchanged through the base laundry. Speedy Dry is put in a 55-gallon drum located at the FMS Accumulation Site. Citrikleen (5 gallons/month) is mixed at a ratio of 15:1 for use in the floor cleaning machine. The used Citrikleen Soap and water is poured down a drain into an oil/water separator.

Shop: J-58 Intermediate Maintenance — Bldg: 1025
Contact: Sgt Short — AV: 368-4122

Shop personnel are responsible for disassembling J-58 engines to the extent necessary to repair and replace engine parts, and clean and inspect engine components. The shop uses a mixture of 90% JP-7 and 10% triethylbromine to purge the TEB tanks on the engines. Most of the triethylbromine is burned in the process. The remaining JP-7 (55 gallons/6 months) is drummed. Parts are cleaned in a drip pan. Aircraft cleaning soap is used to clean the shop floors. The soapy water (55 gallons/6 weeks) is drummed and then poured into an oil/water separator which is connected to the sanitary sewer system.

Shop: Accessory Repair Fuel Room | Bldg: 1086
Contact: Sgt Snodgrass | AV: 368-4482

This shop is responsible for cleaning parts before they are sent to NDI. The shop has a 40-gallon PD-680 tank that is replenished as necessary. The tank has never been changed out.

Shop: Wheel and Tire | Bldg: 1086
Contact: Sgt Crowell | AV: 368-4867

Wheel and Tire Shop personnel tear down, clean and rebuild aircraft wheels. The shop has three PD-680 tanks (55, 40, and 15 gallons) that are changed out every two months. The waste is drummed and turned over to the FMS Accumulation Site Manager. A contract has been established with the Safety Kleen Corporation; Safety Kleen's solvent will be used in the shop's existing tanks. This will eliminate PD-680 usage in the shop. Citrikleen (55 gallons/2 months) is used to clean the wheels. The waste is drummed and disposed of through DRMO. Shop personnel say that the Citrikleen cleans faster and better than the PD-680. In the past, acrylic- nitrocellulose (55 gallons/ 2 months) was used to strip paint from the wheels. Currently, the wheels are sent to Corrosion Control to be stripped by the bead blasting unit. The shop also generates waste polyurethane paint (5 gallons/ month) and lacquer (5 gallons/month). The wastes are drummed, turned over to the FMS Accumulation Site Manager, and disposed of through DRMO. Used rags are exchanged through the base laundry.

Shop: Pneudraulics | Bldg: 1086
Contact: Sgt Snider | AV: 368-2433

Shop personnel are responsible for the maintenance of aircraft pneudraulic components. The shop has two 25-gallon PD-680 tanks that are changed out every month. The waste is drummed and turned over to the FMS accumulation site manager. A contract has been established with the Safety Kleen Corporation; Safety Kleen solvent will be used in the existing tank. This will eliminate the PD-680 usage. The shop has one hydraulic test unit; the used hydraulic fluid is contained in 5-gallon containers. When full, the containers are taken to the AGE Shop and put in a bowser.

Shop: J-58 Test Cell | Bldg: 1152
Contact: Sgt Snodgrass | AV: 368-4464

Test Cell personnel troubleshoot engines, perform field tests and conduct engine rev-up procedures on the J-58 jet engines. The shop generates waste JP-7 and 1010 Oil (110 gallons total/month). The waste is drummed and disposed of through DRMO. Small amounts of trichloroethylene used to flush the engines are drummed along with the oil.

Shop: AGE | Bldg: 1225
Contact: MSgt Dobler | AV: 368-4448

The AGE shop services, maintains, and dispatches both powered and non-powered flight line support equipment. The shop has one 110-gallon Citrikleen tank that is changed out on an as needed basis (about every 6 months). The waste is drummed and disposed of through DRMO. The shop uses spray paint to touch-up the equipment. No waste paints or thinners are generated. Used transmission fluid (10 gallons/month), 832-82 hydraulic fluid (5 gallons/month), 5606 hydraulic fluid (25 gallons/month), motor oil (110 gallons/month), 7808 oil (110 gallons/month), and steam turbine oil (20 gallons/month) are drummed, transported to the OMS Accumulation Site and poured into the used oil storage tank. 27601A hydraulic fluid (55-gallons/month) is placed in a 55-gallon drum and turned in to supply for reprocessing. MEK (1.5 gallons/month) is used for parts cleaning and no waste is generated. JP-4 (10 gallons/month) is drummed, sent to the fuels lab for analysis, and if it is contaminated with less than 10% water, the fuel is sent to the fire training pit to be burned. If the fuel has more than 10% water or some other contaminant, it is disposed of through DRMO. MoGas (10 gallons/month) and diesel (10 gallons/month) is placed in a 55-gallon drum and disposed of through DRMO. Dirty cleaning rags are exchanged through the base laundry service. Speedy dry is placed in a plastic bag and thrown in the trash.

Shop: J-57-85 Test Cell | Bldg: 1247
Contact: TSgt Dearman | AV: 368-4934

Test Cell personnel troubleshoot engines, perform field tests and conduct engine rev-up procedures on the J-57 and J-85 jet engines. The shop has been in place for more than thirty years and is located outdoors on an asphalt and concrete pad. JP-4 (55 gallons/ 3months) and 7808 oil (55 gallons/3 months) are accumulated in 55-gallon drums. The used oil is taken to the OMS Accumulation Site and placed in the used oil storage tank. The JP-4 is taken to the FMS Accumulation Site. Citrikleen is used full strength to clean the pad and rinsed with water from a fire hose. The runoff does not lead to any waterways.

d. Description of Accumulation Sites: Beale AFB has five accumulation areas for containerized hazardous wastes. Drums are accumulated in these areas prior to being transferred to the CSF. This section contains a brief summary of our findings while visiting these areas.

Site: Civil Engineering
Contact: TSgt Thomas | AV: 368-4133

This accumulation site is used for storage of wastes generated at Civil Engineering shops (See Figure 10). All waste oils and fluids are taken to the used oil storage tank at the Transportation Complex.

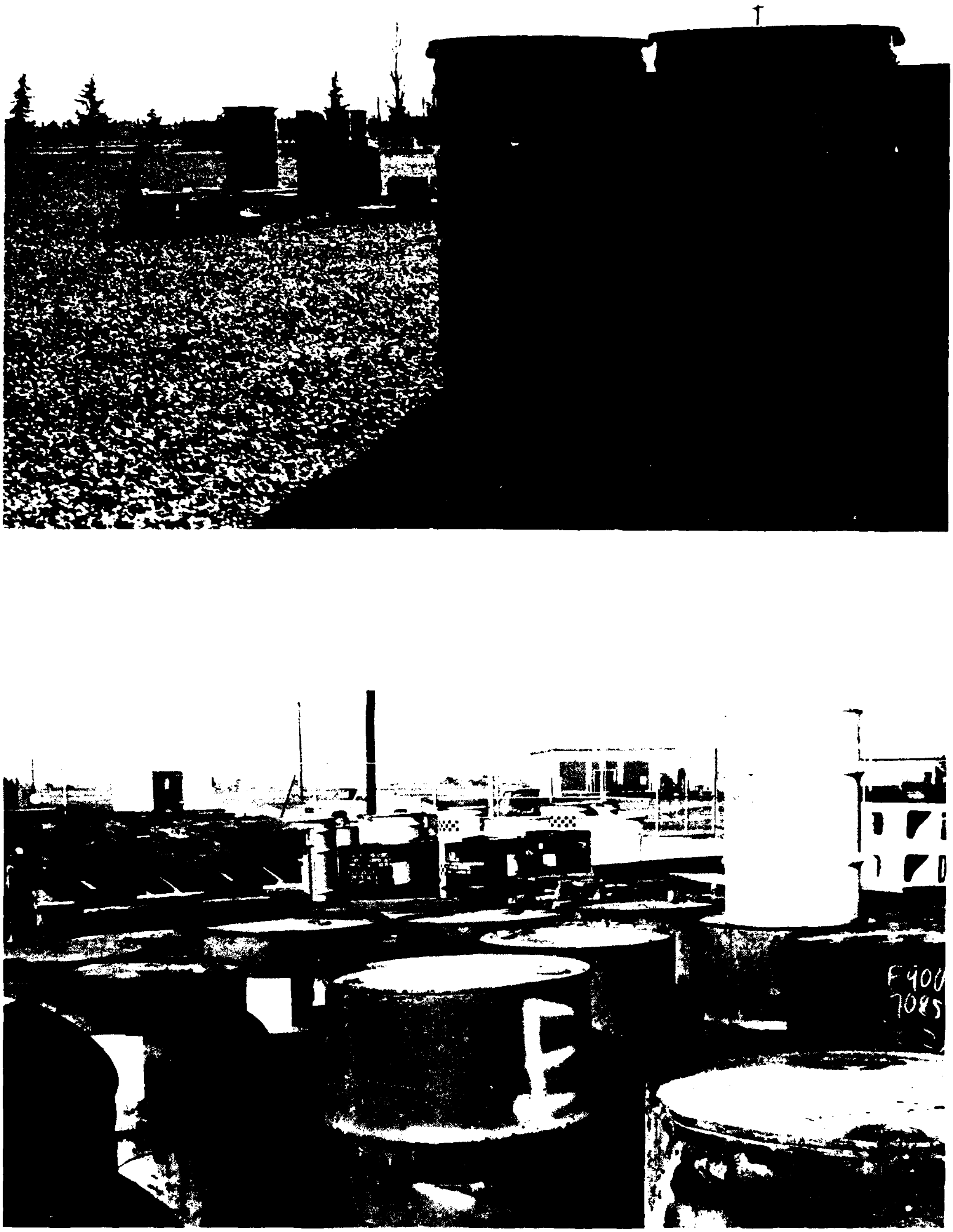

Figure 10. Civil Engineering Accumulation Site

Site: PAVE PAWS
Contact: SSgt Morgan AV: 368-5284

This accumulation site is used for storage of wastes generated at PAVE PAWS. At the time of the survey, a new accumulation site was under construction.

Site: OMS
Contact: SrA Williams AV 368-4810

The OMS Accumulation Site is located at the washrack (See Figure 11). The site also serves as the KC-135 Phase Dock generation point. The area is situated on a concrete pad adjacent to the flight line. At the time of the survey, washrack sludge (from the oil/water separator), waste JP-7, JP-4, and 7808 oil were being accumulated at the site. All drums are stored on pallets. The site has a 2000-gallon above ground tank that is used for the storage of used oils and fluids from the flight line. The oils and fluids are first placed in a drum at the generation point, transported to the site, and pumped into the tank. The tank is pumped out approximately every two months by a contractor. A work order has been submitted to construct a dike around the tank.

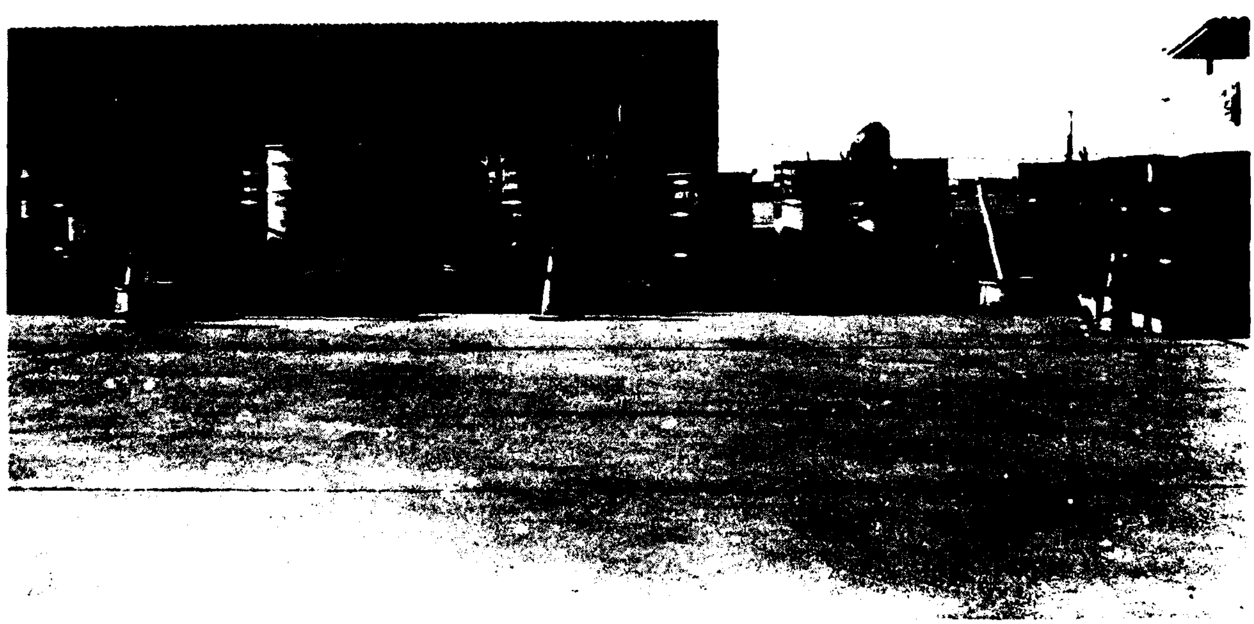

Figure 11. OMS Accumulation Site

Site: FMS
Contact: Sgt Snodgrass AV: 368-4482

The FMS Accumulation Site is located on an uncovered concrete storage pad (See Figure 12). At the time of the survey, waste MEK, JP-7, NDI developer, Speedy Dry and Citrikleen were being accumulated at the site. All drums are stored on pallets. No plans have been made for upgrading the site. Used oils and fluids generated at FMS shops are accumulated in drums, taken to the OMS Accumulation Site, and pumped into the used oil storage tank.

Figure 12. FMS Accumulation Site

Site: Transportation
Contact: Mr Young AV: 368-4240

The Transportation Accumulation Site is located in the back corner of the Transportation Complex on a concrete pad. The area has a dike on one side. At the time of the survey, waste antifreeze, diesel, gasoline, and 8011 solvent were being stored at the site. The manager expressed a desire for the site to be upgraded with a dike completely surrounding the area. An oil/water separator is already in place at the site and could be used to drain rain water from the area.

The site has a 2000-gallon above ground tank that is used for the storage of used oils and fluids generated at the Transportation and Civil Engineering Shops. The oils and fluids are placed in 55-gallon drums at the generation points, transported to the tank and poured into it. Shop personnel have difficulty getting the material from the drums to the tank because funds are not available to purchase equipment to pump the tank.

e. Summary of Waste Disposal Practices at Beale AFB: The waste disposal practices for different categories of wastes are summarized in this section. A shop-by-shop summary of disposal practices is contained in Appendix H.

(1) Most waste oils and fluids are stored in 55-gallon drums located at the generation points. When full, the drums are transported to above ground used oil storage tanks located at the Transportation Complex, OMS Accumulation Site, or the Auto Hobby Shop. The oil is then pumped out or drained into waste oil storage tanks. The Auto Hobby Shop and PAVE PAWS each have an underground waste oil storage tank. The 27601A hydraulic fluid is stored in a 55-gallon drum and turned in to supply for reprocessing.

(2) Waste paints are generally drummed and disposed of as hazardous waste. Waste paint from the CE Paint Shop is allowed to dry and then disposed of in the trash. A distillation unit is used for thinner recovery.

(3) Waste antifreeze is drummed and disposed of as hazardous waste through DRMO.

(4) Used Speedy Dry is either drummed and disposed of as hazardous waste through DRMO or placed in plastic bags and thrown in the trash.

(5) Dirty rags are generally exchanged on a one-for-one basis through the base laundry. Some shops have a contract with a local linen service which supplies the shops with clean rags. Other shops dispose of dirty rags in the trash.

(6) Waste strippers from Corrosion Control are drummed and disposed of as hazardous waste through DRMO.

(7) Waste acids used at Corrosion Control are neutralized with sodium bicarbonate and discharged down the drain to the sanitary sewer.

(8) Lead-acid batteries used in vehicles maintained by transportation are exchanged through a local contractor (Co-Pars). Other batteries used throughout the base are disposed of wet through DRMO.

(9) Soaps used throughout the base are discharged into the sanitary sewer either directly or via an oil/water separator.

(10) Waste solvents and degreasers (e.g., PD-680, Citrikleen) are either drummed and disposed of as hazardous waste or are recovered by distillation. Several shops have contracts with the Safety Kleen Corporation to service solvent tanks. PD-680 used in washrack operations is discharged to the sanitary sewer via an oil/water separator. Several other solvents (e.g., MEK, carbon remover) are used up in process.

(11) Chemicals from the NDI shop are generally drummed and disposed of as hazardous waste. Chemicals from NDI rinsing operations are discharged down the drain to the sanitary sewer. All photo processing chemicals used at the Precision Photo Lab are discharged to the PTP.

(12) Depending on the level of contaminiation, waste fuels are recycled, drummed and disposed of as hazardous waste or burned at the Fire Training Pit.

III. CONCLUSIONS

A. The primary sources of cyanide in the wastewater entering the sewage treatment plant are the film bleaching chemicals used at the 9th RTS Precision Photo Lab, building 2145, and laundry detergent (NSN 7930 00 985 6904). Although the cyanide contamination is wide spread no other sources were identified by the hazardous waste survey team.

Photographic wastes seem to be discharged to the STP via the sanitary sewer (manhole 310) as well as the PTP. Additionally, the PTP is not completely removing cyanide from the wastewater.

B. The primary sources of boron in the wastewater entering the sewage treatment plant are rinsewater containing photo processing chemicals, such as fixers and developers, and biodegradeable aircraft soaps. Additionally, photo processing chemicals (fixers and developers) are discharged directly to the sanitary sewer system. These chemicals typically contain over 1000 mg/L boron while washrack soap contains 21 mg/L boron.

C. The primary source of surfactants in the wastewater entering the sewage treatment plant is rinsewater from routine maintenance operations on the flight line. Aircraft, vehicle and facility washing operations involve large amounts of water along with various biodegradeable soaps. Mr Tony Leon-Guerrero, the STP operation manager, stated that the foaming problem experienced at the plant was "seasonal", meaning that the foam becomes visible when large scale aircraft washing operaticns are in progress. Aircraft soap is diluted to a ratio of 5:1 water to soap.

D. The PTP effectively removed 96 percent of the cyanide contained in the photo lab wastewater but does not effectively remove boron from the wastewater.

E. During the survey period, the BOD_5 removal efficiency was 90.4% and the TSS removal efficiency was 86.5%. Because of algal growth in the aeration basin, there was a 7.7% decrease in the TSS removal efficiency from the secondary clarifier to the STP effluent. Although the TSS removal efficiency decreased from secondary clarification to the final effluent, the BOD_5 and TSS removal efficiencies were well within the current NPDES requirements and indicate that the domestic waste entering the plant is effectively treated.

F. The STP is effectively treating the domestic portion of the wastewater as demonstrated by the BOD and TSS removal efficiencies. However, the cyanide waste is passing through the sewage treatment plant untreated. NPDES cyanide limitations necessitate either the removal of a significant portion of cyanide discharges from the sewage or the installation of a pretreatment process.

Numerous processes are available for treating cyanide waste such as gaseous addition of chlorine or hypochloride addition with ferrous sulfate. Oxidation with ozone or photozone activated oxygen are recent chemical oxidation processes that have been very effective. Tinker AFB is currently doing a pilot plant study for photozone destruction of cyanide waste with promising results. Mr Martin F. Herlacher can be contacted (405-736-3424) at Tinker AFB to discuss the results of their pretreatment study.

G. One day of sampling at the STP is not sufficient to characterize the extent and occurrence of boron contamination. The wastewater entering the sewage treatment plant contains an average of 0.7 mg/L boron. This concentration is less than the NPDES Wastewater Permit limitation of 1 mg/L. However, the effluent from the STP contains an average concentration of 2.8 mg/L. Sampling results indicate that the boron concentration increases at the primary clarifier and remains constant throughout the rest of the STP. There are several possible explanations for these results:

The most obvious explanation is that a slug of highly concentrated waste periodically enters the plant, boosting the boron concentration in the primary clarifier as well as the rest of the plant. The slug was not "caught" by the automatic samplers. This is understandable since they sample for approximately 1 minute per hour. Shop survey results from NDI and the Clinic along with sampling results from manhole 310 support this conclusion.

Sludge digester supernatant returned to the primary clarifier is another source of boron. Slugs of cleaning and photo wastes which initially boost boron concentrations in the primary clarifier will settle out into the sludge and eventually be transferred to the sludge digester. Considering the retention time of the sludge digesters, approximately 30 days, the supernatant returning to the primary clarifier would continually affect the concentration of boron in the clarifier.

Analytical results actually indicate that a possible source of contamination is the concrete used thoughout the STP. Fifty grams of concrete collected from the STP chlorine contact chamber was mixed with 100 ml of influent wastewater (0.4 mg/L boron) for 24 hours and yielded a final boron concentration of 3.1 mg/L.

H. One of the cited violations on the cease and desist order was excessive chlorine residuals at NPDES site R2. Since the time of the violation, the STP manager has reduced the chlorine entering the chlorine contact basin. During the survey period, the average five-day chlorine residuals result from the STP effluent was essentially zero.

I. Another violation cited the discharge of visible oil, grease, scum, foam, floating or suspended material to Hutchinson Creek. A slight amount of foam was noticed in the receiving waters to Hutchinson Creek during the survey. Analytical results indicate STP removal efficiency for MBAS was 95% with an effluent concentration of 0.3 mg/L. The average STP effluent oil and grease concentration was less than 0.3 mg/L. When large amounts of washrack wastewaters are generated, levels of surfactants may become high enough to cause foaming, despite the 95% removal efficiency.

J. According to survey results, the aeration pond is effectively saturating the STP effluent with dissolved oxygen. An effluent BOD_5 of 13.5 mg/L, dry stream conditions above the STP, stagnant flow conditions and large quantities of aquatic growth in Hutchinson Creek lead to a substantial oxygen depletion from the STP effluent to NPDES site R2 located 1000 feet downstream.

Numerous alternatives are available to increasing the dissolved oxygen concentration before site R2. Some of these alternatives include the following: (1) Install a treatment process (such as denitrification) to deprive nutrients to biological organisms which use the dissolved oxygen; (2) dredge out Hutchinson Creek to improve the gradient and remove biological growth; (3) supersaturate the effluent with dissolved oxygen by installing another aeration unit in the aeration basin; (4) install an aeration unit before site R2 to increase the dissolved oxygen concentration.

K. According to the STP manager, the media in the PTP limestone filter and three PTP sand filters have not been changed out in over five years. One of the three sand filters is inoperational because of short circuiting problems. The filters need to be serviced.

L. Photo waste from building 2145 is apparently being discharged to the sanitary sewer system through manhole 310 (site 5). This is a potentially large source of boron and cyanide that directly enters the STP since it bypasses the PTP.

M. The Transportation Shop and the Auto Hobby Shop have above ground waste oil storage tanks; however, the shops do not have the funds necessary to purchase a transfer system for the tanks. The Auto Hobby Shop is not able to use the tank because personnel do not have a means of pouring the waste oil into the tank. The Transportation Shop uses a forklift to raise the drum to the top of the tank in order to pour the oil into the tank. This process is difficult, messy and time consuming.

N. By utilizing good ideas from shop personnel the base has greatly reduced the amount of hazardous waste being generated. Ninety percent of the solvents and thinners used are being recovered rather than being disposed of as hazardous waste. Some shops have converted from PD-680 to Safety Kleen service. Lead-acid batteries are exchanged through a local contractor. Waste oils and fluids are collected in large quantities and sold to a contractor.

O. Currently, all hazardous wastes generated at Beale AFB are stored at building 1317, the Central Storage Facility (CSF), until DRMO at McClellan AFB arranges for the wastes to be picked up by a contractor. This facility is not large enough to accomodate all of the hazardous wastes. However, a new CSF is under construction at McClellan AFB. Upon completion of this facility (scheduled for June 1989), all hazardous wastes generated at Beale AFB will be transported to McClellan AFB for storage until a contract is arranged for pick-up. This new CSF will eliminate the need for a larger CSF at Beale AFB.

P. According to base personnel, the hazardous waste program had greatly improved in the six months prior to the survey. Shop personnel attributed this to the Hazardous Waste Specialist. As of 1 Oct 88, the Hazardous Waste Specialist position (a temporary position) will be vacant. The base appears to be at a pivotal point where the hazardous waste program can either progress or deteriorate. Shop personnel were very supportive of the program; however, they expressed a desire for continuity, i.e., a program that doesn't change every time the Hazardous Waste Specialist position is filled.

Q. Sandblasting operations were previously conducted at an area southwest of the FMS Accumulation Site. The waste sandblast grit was not removed when sandblasting operations ceased. Since sandblasting grit can contain hazardous metals the grit should be stored at the accumulation site until an analytical determination of its hazardous properties can be made.

R. Most accumulation site managers were aware of the inadequate conditions present at their accumulation sites. In fact, several of the managers expressed a desire to upgrade the sites, especially with fences and covers. This action would be beneficial for increased safety and necessary from a compliance standpoint.

S. The base has virtually no baseline chemical analysis to characterize wastestreams. The shops are responsible for identifying the wastes that go into waste containers. However, without a baseline chemical wastestream analysis, shop personnel may incorrectly identify a waste as either hazardous or nonhazardous waste.

T. The 9th RTS Precision Photo Lab is considering purchasing a photo chemical recovery unit. This would greatly reduce the amount of waste discharged to the PTP.

U. Wastewater characterization sampling results are not consistent with chemical discharges identified by the 9th RTS Precision Photo Lab. According to 9th RTS Precision Photo Lab personnel, the color film processing chemistry which contained a cyanide bleaching compound has been replaced by a new chemistry produced by KODAK which does not contain cyanide. Discussions with shop personnel revealed the only source of cyanide was the previously used (five years ago) color film chemicals. However, cyanide was detected in the photo wet well.

V. The NDI Shop is in the process of developing a method of recovering all chemicals which are disposed of down the drain. The chemicals will then be processed through the PTP. This procedure will decrease the amount of boron discharged directly to the STP.

W. Currently, shops which utilize an oil/water separator are solely responsible for the maintenance of the unit. This could result in improper oil/water separator maintenance and in some cases neglect since shop personnel are not trained to understand the principles of operation of an oil/water separator.

X. Currently, McClellan AFB performs all recovered product analysis at no cost to Beale AFB. If McClellan AFB begins to charge Beale AFB for the analysis it may become cost effective to dispose of the used products in lieu of recovery due to high analysis costs.

IV. RECOMMENDATIONS

A. Discharges of developers and fixers which contain high levels of boron to the sanitary sewer system should be discontinued. The disposal process being developed by the NDI Shop personnel should be pursued and expanded to include the Clinic and the base Audio Visual Facility.

B. Dilution of washrack soap solutions to as much as 15:1 water to soap should be implemented to control boron and surfactant discharges to the STP.

C. Further sampling should be accomplished to determine whether after source control treatment of the wastewater for boron is necessary to meet the permit limitations. The current control technology for boron treatment is limited at best. Ion exchange measures, using selective boron resins, and liquid/liquid extraction operations have been implemented and have demonstrated success for boron removal on a small scale but are expensive.

D. Cyanide waste discharges from base film developing operations and laundry detergent NSN 7930 00 985 6904, need to be minimized if the STP is to meet the NPDES permit limitations. Otherwise, a cyanide removal treatment process will have to be installed at the sewage treatment plant to lower cyanide concentrations to acceptable levels.

E. The possibility of photo wastes entering the sewer system through Manhole 310 should be investigated. If a connection is found it should be sealed or the process discontinued to prevent further discharge to the sewer system.

F. The use of laundry detergent (NSN 7930 00 985 6904) should be discontinued and a suitable alternative found.

G. The PTP filters need to be serviced to insure that all filtration units are functioning properly.

H. Ninety-day storage requirements are being exceeded at the Civil Engineering Accumulation Site. These drums should be sampled (if necessary) and removed from the site as soon as possible. Also, in the future a smaller portion of the fenced area should be used for hazardous waste accumulation.

I. The temporary Hazardous Waste Specialist position should be converted to a permanent position. This might encourage a greater number of qualified people to be interested in the job and also provide more continuity for the hazardous waste program.

J. The waste sandblast grit pile located at the southwest corner of the FMS accumulation site should be removed (possibly with a vacuum) and analyzed for hazardous waste characteristics. If the grit is determined to be hazardous, the soil at the site should also be analyzed and if necessary removed. If the grit is not hazardous, it can be disposed of in a landfill.

K. Used Speedy Dry and other materials used for spill cleanup can be reused until saturated, then drummed and disposed of as hazardous waste.

L. The current practice of disposing of ethylene glycol antifreeze as hazardous waste is unnecessary. The California Department of Health Services, Toxic Substances Control Division, recommends that the wastewater treatment plant be contacted to discuss the possibility of approving the disposal of waste antifreeze in the sanitary sewer system.

M. A means of transfering waste oil from barrels into the waste oil storage tanks located at the Transportation Shop and the Auto Hobby Shop should be provided.

N. The underground waste oil storage tank at the Auto Hobby Shop should be pumped out and removed. Also, the area surrounding the tank opening should be cleaned up.

O. Civil Engineering should take the responsibility for establishing a contract to maintain all oil/water separators on Beale AFB.

P. The water and sludge from the waterfall paint booth at Corrosion Control should be analyzed to determine its status as hazardous or nonhazardous.

Q. Spent Citrikleen should be analyzed for hazardous waste characteristics. If the waste is nonhazardous, it should be disposed of through the sanitary sewer system (Citrikleen has a very high BOD, and a schedule for entering the waste into the system may have to be devised).

R. Several shops (J-58 Intermediate Maintenance, Transportation Maintenance, as well as others) use aircraft cleaning soap for cleaning the floors. A milder soap should be used for this purpose.

S. Although not required by law, it would be advantageous to Beale AFB to upgrade the accumulation sites with, at a minimum, covers, locking fences, and impermeable, diked surfaces. These measures could help prevent the occurrence of environmental pollution incidents.

T. RCRA requires a waste analysis plan be developed to characterize the wastestreams. This plan should consist of: a complete listing of all known wastestreams 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 Table 10 for example). 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. A suggested list of wastestreams specific for Beale AFB is contained in Table 11.

The list presented in Table 11 contains both wastes which are placed in the waste oil storage tanks and wastes which are drummed. At the time of the survey, the hazardous waste management practices appeared to be prudent. From these observations, we recommend "user's knowledge" rather than analysis be used for identification of wastes being placed in the bulk waste oil storage tanks. A representative sample (such as a composite obtained from five depths) should be taken from the tanks before the contractor removes the wastes. This sample will provide documentation of whether or not waste generators are properly identifying and segregating their wastes. If further identification of the wastes is necessary, the wastes may be sampled at the generation points indicated in Table 11.

The base needs to purchase the necessary sampling equipment, e.g., disposable Coliwasas for waste drum sampling. A good reference on hazardous waste sampling is "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA-600/2-80-018, Jan 1980.

TABLE 10: WASTE ANALYSIS PLAN (EXAMPLE)

GENERATOR LOCATION	DESCRIPTION OF WASTE STREAM	WASTE STREAM CODE	BASELINE ANALYSIS DATE & RESULTS	*SAMPLING METHOD	*SAMPLING FREQUENCY	*PARAMETERS REQUIRED	*TEST METHOD	PROPER SHIPPING NAME & HAZARD CLASS	DISPOSAL METHOD	EPA HAZARDOUS WASTE #
Corrosion Control BLD 150	Paint sludge from paint booth	CC150-001	May 88 FP-H (70F) pH-NH RX-NH EP-H Cadmium Chromium	1 Grab sample	Every other drum	Flash Point Cadmium Chromium	1010 7130 7190	Waste Paint related material, mixture/FLAMMABLE LIQUID	DRMO	D001 D006 D007
Corrosion Control BLD 150	Rinsewater from waterfall paint booth	CC150-002	May 88 FP-NH pH-NH RX-NH TM-NH	Dipper	Every third cleanout of booth	Complete Analysis		N/A	Down Drain	
Corrosion Control BLD 150	Spent plastic bead blasting media	CC150-003	Aug 88 FP-NH pH-NA RX-NH EP-H Cadmium Chromium	1 Composite Sample	From every other drum	Cadmium Chromium	7130 7190	Hazardous waste solid (n.o.s.) (Cadmium & Chromium contaminated material)	DRMO	D006 D007
Vehicle Maint. BLD 100	Waste Motor oil	VM100-001	Jun 88 FP-H (100F) pH-NA RX-NH TM-H Arsenic Cadmium Chromium Lead Total Halogens	Coliwasa	Quarterly	Flash Point Arsenic Cadmium Chromium Lead Total Halogens	1010 7061 7130 7190 7421 8010	N/A	Sold to Contractor for Recycle	D001 D004 D006 D007 D008
Vehicle Maint. BLD 100	Neutralized Battery Acid	VM100-0002	Aug 88 FP-NH pH-NH RX-NH TM-NH Lead	Grab Sample from tank using dipper	Semiannual	Lead	7421	N/A	Down Drain	D008

Legend: FP - Flash Point; EP - EP Toxicity; TM - Total Metals; RX - Reactivity; NA - Not Applicable; H - Hazardous; NH - Non-Hazardous

Table 11. Suggested Wastestreams for Beale AFB

Shop	Wastestream	Frequency	Sampling Method
General & Special Purpose Maint	PD-680 Tank	Each Drum Semiannually	Coliwasa
	Oils and Fluids	Every 4th Drum	Coliwasa
	Diesel Fuel	Annually	Coliwasa
	Antifreeze	Annually (if drummed)	Coliwasa
Allied Trades	Paints & Thinners	Semiannually	Coliwasa
Fire Truck Maint	PD-680 Tank	Every Change Out	Coliwasa
	Oils & Fluids	Every 4th Drum	Coliwasa
	Antifreeze	Semiannually (if drummed)	Coliwasa
Refueling Maint	Oil	Every other Drum	Coliwasa
Auto Hobby	Oils & Fluids	Quarterly (if accumulated in drums)	Coliwasa
		Before disposal (if accumulated in AGT)	Teflon Bailer or from a tap on the tank
Power Production	Oil	Every 4th Drum	Coliwasa
	Diesel	Every 4th Drum	Coliwasa
	Antifreeze	Semiannually (if drummed)	Coliwasa

Table 11 Cont'd

Shop	Wastestream	Frequency	Sampling Method
Precision Photo	Photo Wastes	Semiannually	Composite
U2/TR-1 Phase Dock	Fluids	Annually	Coliwasa
TEB Maint	Oils & Fluids	Every 4th Drum	Coliwasa
KC-135 Phase Dock	Oils & Fluids	Semiannually	Coliwasa
T-38 Phase Dock	Oils & Fluids	Semiannually	Coliwasa
PAVE PAWS	Oils (UGT)	Before Disposal	Teflon Bailer or from a tap on the tank
	Diesel	Annually	Coliwasa
	Antifreeze	Semiannually	Coliwasa
Corrosion Control	Waterfall Paint Booth Water	Quarterly	Grab
	Waterfall Paint Booth Sludge	Quarterly	Grab
	Paint (liquid)	Quarterly	Coliwasa
	Bead Blast Media	Semiannually	Composite
NDI	All Chemical Tanks	Semiannually	Coliwasa
J-57 Intermediate Maint	Oils & Fluids	Every 4th Drum	Coliwasa
	JP-4	Annually	Coliwasa
	Bearing Room	Annually Each Tank	Grab

Table 11 Cont'd

Shop	Wastestream	Frequency	Sampling Method
J-58 Intermediate	JP-7	Annually	Coliwasa
Accessory Repair Fuel Room	PD-680 Tank	Each Change Out	Coliwasa
Wheel & Tire	Citrikleen Tank	Semiannually	Coliwasa
Pneudraulics	PD-680 Tanks	Semiannually Each Tank	Coliwasa
	Hydraulic Fluid	Annually	Grab
AGE	Citrikleen Tank	Each Drum of Waste	Coliwasa
	Oils & Fluids	Every 4th Drum	Coliwasa
	Fuels (if drummed)	Semiannually	Coliwasa
J-57/85 Test Cell	JP-4	Semiannually	Coliwasa
	Oil	Semiannually	Coliwasa
J-58 Test Cell	JP-7	Semiannually	Coliwasa
	1010 Oil	Semiannually	Coliwasa
Transportation	AGT	Before Each Disposal	Teflon Bailer or from a tap on the tank
OMS Accumulation Site	AGT	Before Each Disposal	Teflon Bailer or from a tap on the tank

REFERENCES

1. APHA, Standard Methods for the Examination of Water and Wastewater, 16th Ed., American Public Health Association, Washington DC, 1985.

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

3. USEPA, Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018, January 1980.

4. Eikelboom, D. H., Identification of filamentatous organisms in bulking activated sludge, Progress in Water Technology 8, 153-161, 1977.

5. Tansill, Barbara and John P. Butler eds., Bergey's Manual of Systematic Bacteriology, Volumes 1 and 2, Baltimore: Williams & Wilkins, 1986.

6. Herlacher, Martin F. and McGregor Robert F., "Part 2: Photozone Destruction of Cyanide Waste At Tinker Air Force Base," Hazardous Materials Control, July/August 1988.

7. United States Environmental Protection Agency, Treatability Manual Volume I, Treatability Data, EPA-600/8-80-042a, July 1980.

8. Chiesa, Steven C., Solvent Extraction of Boron From Wastewaters, USAFSAM/OEHL, Brooks AFB, 7 October 1988.

9. Nitrogen Control and Phosphorus Removal in Sewage Treatment, edited by D.J. De Renzo, 1978.

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APPENDIX A

State of California Notice of Violation

and Cease and Desist Order

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO.88-092

REQUIRING UNITED STATES AIR FORCE,
BEALE AIR FORCE BASE
WASTEWATER TREATMENT PLANT, YUBA COUNTY
TO CEASE AND DESIST FROM
DISCHARGING WASTE CONTRARY TO REQUIREMENTS

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds:

1. On 28 March 1986, the Board adopted Order No. 86-080 prescribing waste discharge requirements for United States Air Force, Beale Air Force Base, wastewater treatment plant (hereafter Discharger), Yuba County.

2. On 27 June 1986, the Regional Board adopted Special Order No. 86-124, amending waste discharge requirements to include revised Standard Provisions and Reporting Requirements.

3. The Discharger discharges treated combined domestic and industrial wastewater into Hutchinson Creek, thence Western Pacific Interceptor Drainage Canal, thence the Bear River, waters of the United States, at a point in Section 4, T14N, R5E, MDB&M (001) and to golf course irrigation in Section 35, T15N, R5E, MDB&M (002).

4. The beneficial uses of Hutchinson Creek, Western Pacific Interceptor Drainage Canal and Bear River are municipal supply; agricultural supply; recreation; esthetic enjoyment; ground water recharge; fresh water replenishment; and preservation and enhancement of fish, wildlife, and other aquatic resources.

5. The beneficial uses of the ground water in the area of the discharge are municipal, industrial, agricultural, and domestic supply.

6. The Report of Waste Discharge describes the discharge as follows:

   Average Flow: 1.1 million gallons per day (mgd)
   Design Flow: 5.0 mgd

7. The Discharger discharges effluent from the Base photographic wastewater treatment plant into the "main" or sanitary wastewater treatment plant. Chemical analyses indicate that the treated photo wastewater is nonhazardous and is compatible with the biologic treatment system used at the sanitary wastewater treatment plant.

8. EPA and the Regional Board have classified the discharge from the sanitary wastewater treatment plant as a "major discharge."

9. The waste discharge requirements provide, in part, as follows:

"A.1. The discharge of an effluent in excess of the following limits is prohibited (001 and 002):

Constituents	Units	30-Day Average	7-Day Average	Daily Maximum
****	****	****	****	****
Boron	mg/l	1.0	- - -	2.0
Total Cyanide	mg/l	0.0035	- - -	0.007

"E.2. The discharge shall not cause visible oil, grease, scum, foam, floating or suspended material in the receiving water or water courses.

"E.7. The discharge shall not cause the chlorine residual in Hutchinson Creek to exceed 0.1 mg/l."

10. Inspections by Regional Board staff and self-monitoring reports submitted by the Discharger indicate that the Discharger has violated and threatens to violate the requirements listed in Finding 9.

11. During the 25 month period from March 1986 through March 1988, the Discharger exceeded the 30-day average effluent limitation for Cyanide for at least 11 months. The Base may have been in violation of effluent limitations for Cyanide for as many as 19 months, given the use of inappropriate detection limits for effluent analysis.

12. During the period from April 1987 through February 1988, the Discharger violated the 30-day average effluent limitation for Boron for each month inclusive.

13. During the period from March 1986 through March 1988, the Discharger violated the daily maximum limitation for Chlorine Residual in the receiving water during 9 months.

14. During a 24 March 1987 and 14 April 1988 inspection of the Discharger's facilities, staff noted foam in the discharge to Hutchinson Creek.

15. By letter of 15 June 1987, staff notified the Discharger that it was in violation of effluent and receiving water limitations under Order No. 86-080. The Discharger was requested to provide a time schedule by 31 July 1987 for bringing the discharge into compliance with Board requirements.

16. By letter of 17 August 1987, the Discharger notified staff of efforts taken/to be taken to alleviate violations of effluent limitations for cyanide and receiving water limitations for foam and chlorine residual.

17. Violations of waste discharge requirements continued subsequent to the letter of 17 August 1987.

18. By letter of 11 April 1988, the Discharger presented a description of tasks and a time schedule for identification/evaluation of sources of ongoing violations of limitations for boron, cyanide, and foam in the discharge. The Discharger proposed to complete investigation efforts by 1 June 1989.

19. On 20 May 1988, in Sacramento, California, after due notice to the Discharger and all other affected persons, the Board conducted a public hearing at which the Discharger appeared and evidence was received concerning the discharge.

20. Issuance of this Order is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.), in accordance with Section 15321(a)(2), Title 14, Chapter 3, California Code of Regulations.

IT IS HEREBY ORDERED THAT:

1. United States Air Force, Beale Air Force Base wastewater treatment plant, shall cease and desist from discharging wastes contrary to Effluent Limitation A.1. and Receiving Water Limitations E.2. and E.7. of Order No. 86-080, as listed in Finding No. 9 above, by 1 August 1988.

2. Pursuant to Section 13267 of the California Water Code, United States Air Force, Beale Air Force Base wastewater treatment plant shall submit a technical report, by 31 January 1989, for the review and approval of the Executive Officer, describing the results and findings of efforts taken to identify and resolve source(s) of violations of waste discharge requirements.

3. Pursuant to Section 13267 of the California Water Code, United States Air Force, Beale Air Force Base wastewater treatment plant shall submit monthly reports to the Regional Board, describing efforts taken and progress toward identification and elimination of causes of violations of effluent and receiving water limitations. Reports shall be due by the first Monday of the second week following issuance of this Order and every month thereafter until such time as the Executive Officer determines that such reports are no longer necessary. Reports shall describe progress made toward adoption of necessary management policies/procedures to control possible sources of pollutants to the sanitary sewer system.

4. If, in the opinion of the Executive Officer, the United States Air Force. Beale Air Force Base, wastewater treatment plant fails to comply with the provisions of this Order, the Executive Officer may request the Attorney General to take appropriate enforcement action against the Discharger, including injunctive and civil monetary remedies, if appropriate or issue an ACL.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 20 May 1988.

WILLIAM H. CROOKS, Executive Officer

MPF/mm:4/27/88

Amended: 20 May 1988

APPENDIX B

Sewage Treatment Plant Unit Operations

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Treatment Plant Unit Operations

1. Grit Chamber. The primary function of the grit chamber is to remove large pieces of trash and particulate matter before the wastewater enters the primary clarifier.

2. Primary Clarifier. The primary clarifier has a surface area of 7,854 square feet (sq ft) and a design volume of 102,102 cubic feet (cu ft) (763,823 gallons). The average daily flow to the treatment plant is 1 MGD with a detention time in the primary clarifier of 18 hours (hrs). The effluent flows over a weir and proceeds to two trickling filters. The settled sludge in the primary clarifier is pumped to one of two anaerobic digesters.

3. Trickling Filters. The plant has two trickling filters for the biodegradation of organic solids. The filters have a total area of 15,708 sq ft and a total volume of stone of 78,540 cu ft. The recirculation rate is 3 MGD (3 to 1 ratio with the plant influent design flow) to give a total flow through the trickling filters of 4 MGD. From the trickling filters the flow enters the secondary clarifier.

4. Secondary Clarifier. The secondary clarifier has a surface area of 7,854 sq ft and a design volume of 102,102 cu ft (763,823 gallons). The average flow to the clarifier is 4 MGD with a detention time in the secondary clarifier of 4.6 hours. The effluent flows over a weir and into the chlorine contact basin. The settled sludge from the secondary clarifier is pumped to the head of the treatment plant.

5. Anaerobic Digesters. The plant has two 49,087 cu ft (367,223 gallon) anaerobic digesters operating in series. The sludge is received from the primary clarifier. The design detention time for the digesters is 30 days.

6. Chlorine Contact Basin. The effluent from the secondary clarifier flows through the chlorine contact basin. The basin has an average detention time of five minutes based on an average flow of 1 MGD. The effluent from the basin enters an aeration pond.

7. Aeration Pond. The aeration pond is designed to both equalize and aerate the effluent prior to entering Hutchinson Creek. However, during times of low flow to the creek, a major portion of the effluent from the treatment plant is diverted to the golf course equalization pond.

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APPENDIX C

Wastewater Characterization Analytical Results

and Flow Data

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Wastewater Characterization Analytical Results

SITE	Boron (mg/L)	Cyanide (mg/L)	MBAS (mg/L)
1	.5	.009	53.3
2	.8	.012	1.4
3	.8	.032	< .1
4	.4	.008	7.2
5	2.7	.068	.3
6	.4	.015	.4
7	.7	.010	.5
8	.4	< .005	.2
9	.2	< .005	< .1
10	.7	.012	3.7
11	.3	.005	.1
12	.8	.030	.2
13	.9	.005	3.6
14	1.3	.038	327.9
15	2.9	.028	2.0
16	1.9	.032	160.0
17	3.2	< .005	9300.0
18	5.8	.027	.2
19	4.0	.040	4.1
20	5.5	.256	.2
21	1.1	.02	220.0
22	<.2	< .005	NR
23	.9	.01	NR

NOTE: NR = not reported

EPA 200.7 Results:

Parameter ** mg/L **	Sites 20	23
arsenic	< .1	< .<
barium	< .1	6.093
cadmium	< .1	< .1
chromium	< .1	.851
copper	< .1	< .1
iron	.282	148.2
lead	< .02	< .02
manganese	< .1	7.153
mercury	< .001	.0015
silver	.052	< .005
zinc	< .1	4.505
magnesium	12.2	40.3
sodium	34.8	52.
beryllium	< .1	< .1
aluminum	.288	25.2
cobalt	< .1	.121
molybdenum	< .1	< .1
titanium	< .1	< .1
vanadium	< .1	.751

Boron and Cyanide Concentrations in Soaps and Photographic Chemicals

Compound	Boron (mg/L)	Cyanide (mg/L)
soap NSN 7930 00068 1669	6.5	< .04
soap NSN 7930 00177 5217	4.5	< .03
soap NSN 7930 00958 6033	3.7	< .04
soap NSN 7930 00985 6904	40 mg/gm	2.5 µg/gm
soap NSN 6850 01184 3182	21	< .03
Precision Photo Lab Chemicals:		
HTA Developer	3,000	< .005
Fultron Developer	3,000	< .02
Fixer	1,750	< .02
Stop Bath	1.7	< .02
NDI Developer	230	< .005
NDI Fixer	950	< .005
Hosp. X-ray Developer	970	< .03
Hosp. X-ray Fixer	5,000	< .03
Audio Visual B&W Developer	1,900	< .03
Audio Visual B&W Fixer	1,700	< .03

EPA Method 624 (µg/L)

Parameter	Site 20	Site 23
chloromethane	< 10	< 10
bromomethane	< 10	< 10
vinyl chloride	< 10	< 10
chloroethane	< 10	< 10
methylene chloride	< 5	< 5
acetone	< 10	25
carbon disulfide	< 5	< 5
1,1-dichloroethene	< 5	< 5
1,1-dichloroethane	< 5	< 5
1,2-dichloroethene (total)	< 5	< 5
chloroform	< 5	< 5
1,2-dichloroethane	< 5	< 5
2-butanone	< 10	< 10
1,1,1-trichloroethane	< 5	< 5
carbon tetrachloride	< 5	< 5
vinyl acetate	< 10	< 10
bromodichloromethane	< 5	< 5
1,2-dichloropropane	< 5	< 5
cis-1,3-dichloropropene	< 5	< 5
trichloroethene	< 5	< 5
dibromochloromethane	< 5	< 5
1,1,2-trichloroethane	< 5	< 5
benzene	< 5	< 5
trans-1,3-dichloropropene	< 5	< 5
bromoform	< 5	< 5
2-hexanone	< 10	< 10
4-methyl-2-pentanone	< 10	< 10
tetrachlorethene	< 5	< 5
1,1,2,2-tetrachloroethane	< 5	< 5
toluene	< 5	< 5
chlorobenzene	< 5	< 5
ethylbenzene	< 5	< 5
styrene	< 5	< 5
total xylenes	< 5	< 5
2-chloroethylvinyl ether	< 5	< 5
1,2-dichlorobenzene	< 5	< 5
1,3-dichlorobenzene	< 5	< 5
1,4-dichlorobenzene	< 5	< 5
trichlorofluoromethane	< 5	< 5

EPA Method 625 (µg/L)

parameter	Site 20	Site 23
phenol	< 10	< 10
bis(2-chloroethyl)ether	< 10	< 10
2-chlorophenol	< 10	< 10
1,3-dichlorobenzene	< 10	< 10
1,4-dichlorobenzene	< 10	< 10
benzyl alcohol	< 10	< 10
1,2-dichlorobenzene	< 10	< 10
2-methylphenol	< 10	< 10
bis(2-chloroisopropyl)ether	< 10	< 10
4-methylphenol	< 10	< 10
N-nitroso-Di-n-propylamine	< 10	< 10
hexachloroethane	< 10	< 10
nitrobenzene	< 10	< 10
isophorone	< 10	< 10
2-nitrophenol	< 10	< 10
2,4-dimethylphenol	< 10	< 10
Benzoic acid	< 50	< 50
bis(2-chloroethoxy)methane	< 10	< 10
2,4-dichlorophenol	< 10	< 10
1,2,4-trichlorobenzene	< 10	< 10
naphthalene	< 10	< 10
4-chloroaniline	< 10	< 10
hexachlorobutadiene	< 10	< 10
4-chloro-3-methylphenol	< 10	< 10
2-methylnaphthalene	< 10	< 10
hexachlorocyclopentadiene	< 10	< 10
2,4,6-trichlorophenol	< 10	< 10
2,4,5-trichlorophenol	< 50	< 50
2-chloronaphthalene	< 10	< 10
2-nitroaniline	< 50	< 50
dimethyl phthalate	< 10	< 10
acenaphthylene	< 10	< 10
2,6-dinitrotoluene	< 10	< 10
3-nitroaniline	< 50	< 50
acenaphthene	< 10	< 10
2,4-dinitrophenol	< 50	< 50
4-nitrophenol	< 50	< 50

EPA Method 625, (µg/L) (cont'd)

parameter	Site 20	23
dibenzofuran	< 10	< 10
2,4-dinitrotoluene	< 10	< 10
diethylphthalate	< 10	< 10
4-chlorophenyl-phenylether	< 10	< 10
fluorene	< 10	< 10
4-nitroaniline	< 50	< 50
4,6-dinitro-2-methylphenol	< 50	< 50
N-nitrosodiphenylamine[1]	< 10	< 10
4-bromophenyl-phenylether	< 10	< 10
hexachlorobenzene	< 10	< 10
pentachlorophenol	< 50	< 50
phenanthrene	< 10	< 10
anthracene	< 10	< 10
di-n-butylphthalate	< 10	< 10
fluoranthene	< 10	< 10
pyrene	< 10	< 10
butylbenzylphthalate	< 10	< 10
3,3'-dichlorobenzidine	< 20	< 20
benzo(a)anthracene	< 10	< 10
chrysene	< 10	< 10
bis(2-ethylhexyl)phthalate	< 10	< 10
Di-n-octyl phthalate	< 10	< 10
benzyl(b)fluoranthene	< 10	< 10
benzo(k)fluoranthene	< 10	< 10
benzo(a)pyrene	< 10	< 10
ideno(1,2,3-cd)pyrene	< 10	< 10
dibenz(a,h)anthracene	< 10	< 10
benzo(G,h,i)perylene	< 10	< 10

[1] = cannot be separated from diphenylamine

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APPENDIX D

Chemical Waste Disposal Survey Form

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PLEASE HAVE THIS FORM READY FOR PICKUP BY:

SHOP: BLDG:

CONTACT: AUTOVON:

Please fill out this form as accurately and completely as possible. If you have any questions on filling it out, please call Major Ng or Lt Hedgecock at X-2284.

Examples:

	Tank Capacity	Change Out Frequency	Method of Disposal
PD-680 used in tank	60 gal	4/year	55-gal drum

Comments: 1/2 gal of MEK per month is used as a wipe on/wipe off process for parts cleaning. None is disposed of.

OILS & FLUIDS

	Amt of Waste	Disposal Method
Brake Fluid	6 gal	placed in
Transmission Fluid	10 gal	same 600-gal
Hydraulic Fluid	3 gal	bowser
Motor Oil	50 gal	500-gal UGT
Synthetic Oil	8 gal	55-gal drum

OILS AND FLUIDS

	Amt. of Waste Generated/month	Disposal Method
Brake Fluid		
Transmission Fluid		
Hydraulic Fluid		
Motor Oil		
Synthetic Oil		
Other		
Comments		

SOLVENTS/DEGREASANTS

Name of Chemical	Amt. of Waste generated/mo.	OR Tank Size	Change Out Freq	Disposal Method
Carbon Remover				
PD-680 used in tank				
Pd-680 used on washrack				
Other:				
Comments				

PHOTO CHEMICALS

Name of Chemical	Manufacturer	Amt/mo	OR Tank Size	Change Out freq	Disposal Method

Comments

ACIDS

Name of Acid	Manufacturer	Amount of Waste generated/month	Method of Disposal

Comments

BATTERIES

Type of Battery	#/Month	Neutralized in Shop or Turned in Wet

Comments:

SOAPS/CLEANERS

Name of Soap	Dilution Ratio	National Stock#	Amt Used / month	Disposal Method

Comments

PAINT WASTE AND THINNERS

PAINTS	Amount of Waste generated/month	Disposal Method
Latex		
Polyurathane		
Enamel		
Other		

Comments

THINNERS (list below)

Comments

STRIPPERS

Name of Stripper	National Stock #	Amount of Waste per Month	OR	Tank Size	Change Out Freq

QUESTIONS: If question does not apply to this shop put "N/A" beside it.

1. Does this shop have any underground storage tanks?__________

If yes: How many?______________________________

Capacity?______________________________

What is stored in the tank?________________

____

How often is it cleaned out?______________

Has it ever been leak-tested?______________

2. Do the floor drains of the shop lead to an oil/water separator?______________________

If yes: How often is it cleaned out?______________

3. Does the shop have any Safety Kleen units?______________

If yes: How many?______________________________

Tank capacity?__________________________

How often are they serviced?______________

4. What does the shop do with dirty rags?________________

____

5. What does the shop do with used "Speedy Dry"?__________

____

6. Describe shop activities and responsibilities below:

OTHER CHEMICALS

Name of Chemical	Manufacturer	National Stock #	Tank Size	Change Out Freq	Disposal Method

Signature of person filling out this form____________________

APPENDIX E

STP Wastewater Characterization Analytical Results

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Temperature, pH, Alkalinity, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) Results.

Site	Date	Temp C	pH	Alkalinity (mg/L)	TSS (mg/L)	TDS (mg/L)	BOD (mg/L)	COD (mg/L)
24	15 SEP	7	7.4	200	120	203	111.3	340
24	16 SEP	13	6.8	160	86	306	NR	190
24	17 SEP	13	7.0	164	110	412	157.5	250
24	20 SEP	14	6.8	202	70	272	NR	300
24	21 SEP	11	7.3	162	132	318	155.0	320
24	AVERAGE	12	7.1	178	104	302	141.3	280
25	15 SEP	9	7.4	250	12	303	17.8	70
25	16 SEP	11	7.1	130	47	305	NR	125
25	17 SEP	7	7.0	126	15	297	33.3	80
25	20 SEP	17	6.8	82	14	315	NR	70
26	21 SEP	8	7.2	124	8	338	48.8	70
25	AVERAGE	10	7.1	142	19	312	33.3	83
26	15 SEP	6	7.3	70	14	77	14.8	65
26	16 SEP	10	6.8	80	16	372	NR	75
26	17 SEP	10	6.9	80	11	371	14.9	60
26	20 SEP	17	6.7	72	10	342	NR	70
26	21 SEP	11	7.3	162	5	372	20.4	NR
26	AVERAGE	11	7.0	93	11	307	16.7	67.5
27	15 SEP	5	7.4	52	7	312	NR	50
27	16 SEP	10	7.5	80	6	343	NR	82
27	17 SEP	8	6.9	84	9	352	20.7	50
27	20 SEP	17	6.0	60	5	322	NR	50
27	21 SEP	7	7.0	88	5	358	9.0	50
27	AVERAGE	9	7.0	73	6	337	14.9	56.4
28	15 SEP	7	7.5	20	17	262	6.9	55
28	16 SEP	8	7.5	80	15	337	NR	70
28	17 SEP	11	6.9	80	17	352	15.2	85
28	20 SEP	10	7.1	86	11	359	NR	45
28	21 SEP	8	7.1	88	10	362	18.4	50
28	AVERAGE	9	7.2	71	14	334	13.5	61
29	15 SEP	8	7.5	130	2	943	3.7	31
29	16 SEP	9	7.0	70	2	944	NR	25
29	17 SEP	7	6.9	100	1	988	8.0	20
29	20 SEP	8	7.0	94	1	973	NR	20
29	21 SEP	8	7.2	100	2	1003	10.0	10
29	AVERAGE	8	7.1	99	2	970	7.2	21.4

NR indicates no results due to quality control checks

Boron, Cyanide, Ammonia, Total Kjeldahl Nitrogen (TKN), Nitrate and Nitrite Results (mg/L)

Site	Date	Boron	Cyanide	Ammonia	TKN	Nitrate	Nitrite
24	15 SEP	0.70	0.010	16.50	27.4	< 0.1	0.03
24	16 SEP	0.70	0.005	15.00	26.0	< 0.1	0.02
24	17 SEP	0.80	0.005	14.00	26.8	< 0.1	0.02
24	20 SEP	1.00	0.010	17.00	25.6	< 0.1	0.02
24	21 SEP	0.70	0.010	17.60	28.8	< 0.1	0.02
24	AVERAGE	0.78	0.008	16.02	26.9	< 0.1	0.02
28	15 SEP	2.70	0.005	0.44	3.3	7.2	0.04
28	16 SEP	2.80	0.010	0.34	3.4	11.6	0.05
28	17 SEP	3.00	0.020	0.30	5.2	11.6	0.07
28	20 SEP	3.10	0.010	0.74	4.0	10.4	0.06
28	21 SEP	2.80	0.010	0.60	3.9	10.8	0.08
28	AVERAGE	2.88	0.011	0.48	3.96	10.3	0.06
29	15 SEP	9.30	0.010	50.00	50.00	< 0.1	< 0.02
29	16 SEP	9.20	0.010	50.00	48.00	< 0.1	< 0.02
29	17 SEP	9.30	0.010	47.00	48.00	< 0.1	< 0.02
29	20 SEP	9.40	0.010	48.00	48.00	< 0.1	< 0.02
29	21 SEP	10.00	0.010	49.00	49.00	< 0.1	< 0.02
29	AVERAGE	9.44	0.010	48.80	48.60	< 0.1	< 0.02

Oils and Grease, Surfactants (MBAS), Phosphorus, Sulfate, Sulfide and Phenols Results (mg/L)

Site	Date	Oils & Grease	MBAS	Phosphorus	Sulfate	Sulfide	Phenols
1	15 SEP	28.0	20.0	6.00	25.0	1.10	0.012
1	16 SEP	2.2	0.5	9.20	32.0	0.90	0.015
1	17 SEP	1.9	0.3	5.40	32.0	0.10	0.011
1	20 SEP	8.3*	3.5	5.40	46.0	0.70	0.010
1	21 SEP	11.8	5.4	6.70	41.0	1.30	0.010
1	AVERAGE	10.5	5.9	6.54	35.2	0.82	0.012
5	15 SEP	< 0.3	0.3	5.40	18.0	< 0.10	< 0.010
5	16 SEP	< 0.3	0.2	5.40	23.0	0.10	< 0.010
5	17 SEP	< 0.3	0.3	6.20	25.0	< 0.10	< 0.010
5	20 SEP	< 0.3	0.3	6.10	41.0	< 0.10	< 0.010
5	21 SEP	0.5	0.4	NR	39.0	0.50	< 0.010
5	AVERAGE	< 0.3	0.3	5.78	29.2	0.18	< 0.010
6	15 SEP	NR	0.2	< 0.10	50.0	< 0.10	0.054
6	16 SEP	NR	NR	0.12	620.0	0.50	0.031
6	17 SEP	NR	NR	< 0.10	640.0	< 0.10	0.027
6	20 SEP	NR	0.2	< 0.10	610.0	0.50	0.025
6	21 SEP	NR	0.2	< 0.10	550.0	0.50	0.037
6	AVERAGE	NR	0.2	< 0.10	494.0	0.34	0.035

* additional sample taken later in the day showed a 5000 mg/L concentration

Volatile Halocarbons, EPA Method 601 Detectable Analytical Results ($\mu g/L$) *

Site Parameter	24 15 SEP	28 15 SEP	24 21 SEP	28 21 SEP
Benzyl Chloride	-	-	-	-
Bromobenzene	-	-	-	-
Bromodichloromethane	-	-	-	-
Bromoform	-	-	-	-
Bromomethane	-	-	-	-
Carbon Tetrachloride	-	-	-	-
Chlorobenzene	-	-	-	-
Chloroethane	-	-	-	-
2-Chloroethylvinyl Ether	-	-	-	-
Chloroform	-	0.4	-	0.6
Chlorohexane	-	-	-	-
Chloromethane	-	-	-	-
Chlorotoluene	-	-	-	-
Dibromochloromethane	-	-	-	-
Dibromomethane	-	-	-	-
1,1,2-Dichlorobenzene	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-
1,4-Dichlorobenzene	-	-	1.2	-
Dichlorodifluoromethane	-	-	-	-
1,1-Dichloroethane	-	-	-	-
1,2-Dichloroethane	-	-	-	-
1,1-Dichloroethylene	-	-	-	-
(trans) 1,2-Dichloroethylene	-	-	-	-
Dichloromethane	-	-	-	-
1,2-Dichloropropane	-	-	-	-
(cis) 1,3-Dichloropropene	-	-	-	-
(trans) 1,3-Dichloropropene	-	-	-	-
1,1,1,2-Tetrachloroethane	-	-	-	-
1,1,2,2-Tetrachloroethane	-	-	-	-
Tetrachloroethylene	-	-	-	-
1,1,1-Trichloroethane	-	-	-	-
1,1,2-Trichloroethane	-	-	-	-
Trichloroethylene	-	-	-	-
Trichlorofluoromethane	-	-	-	-
Trichloropropane	-	-	-	-
Vinyl Chloride	-	-	-	-

* Dashes indicate none detected (e.g., less than 0.1)

Volatile Aromatics, EPA Method 602 Detectable Analytical Results (µg/L) *

Site Parameter	24 15 SEP	28 15 SEP	24 21 SEP	28 21 SEP
Benzene	-	-	-	-
Chlorobenzene	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-
1,4-Dichlorobenzene	-	-	10.0	-
Ethylbenzene	-	-	0.2	-
Toluene	-	-	-	-
P-Xylene	-	-	-	-
M-Xylene	-	-	-	-
O-Xylene	-	-	-	-

* Dashes indicate none detected (e.g., less than 0.2)

ICP Metals Screen, EPA Method 200.7 (µg/L) *

Parameter	Site Detection limit	24 Average	24 High	24 Low	28 Average	28 High	28 Low
aluminum	100	486	1079	269	184	232	155
Arsenic	100	-	-		-		-
Barium	100	-	111	-	-	-	-
Berylium	100	-	-	-	-	-	-
Cadmium	100	-	-	-	-	-	-
Chromium	100	-	-	-	-	-	-
Cobalt	100	-	-	-	-	-	-
Copper	100	-	-	-	-	-	-
Iron	100	560	905	339	125	222	-
Lead	20	30	65	-	-	-	-
Manganese	100	108	141	-	-	-	-
Mercury	1	-	-	-	-	-	-
Molybdenum	100	-	-	-	-	-	-
Silver	10	-	-	-	-	-	-
Titanium	100	-	-	-	-	-	-
Zinc	100	110	138	-	-	-	-
Chromium (+6)	50	-	-	-	-	-	-

ICP Metals Screen, EPA Method 200.7 (μg/L) * (cont'd)

Parameter	Site Detection limit	29 Average	29 High	29 Low	30**	31
Aluminum	100	305	402	251	271	950,000
Arsenic	100	-	-	-	<10	-
Barium	100	-	-	-	72	466
Beryllium	100	-	-	-	<10	-
Cadmium	100	-	-	-	<10	-
Chromium	100	-	-	-	15	6,560
Cobalt	100	-	-	-	<10	-
Copper	100	-	-	-	48	-
Iron	100	809	1445	609	595	54,380
Lead	20	-	-	-	<2	-
Manganese	100	206	251	181	57	732
Mercury	1	-	-	-	<.1	2
Molybdenum	100	-	-	-	<10	651
Silver	10	-	-	-	<.5	52
Titanium	100	-	-	-	<10	-
Vanadium	100	-	-	-	<10	4,320
Zinc	100	-	-	-	66	1,121
Chromium (+6)	50	-	-	-	<50	-

* Dashes indicate none detected (e.g., less than the detection limit)
** results for site 30 are reported in μg/g

Additional Boron Results (December 1988) *

	Result (mg/L)
Influent	0.2
Influent	0.3
Grit Chamber	0.5
Effluent, Primary Clarifier	2.7
Effluent, Trickling Filters	2.9
Effluent, Secondary Clarifier	2.8
Effluent, Chlorine Contact Basin	2.8
Effluent	2.8
Sludge, Anerobic Digesters	2.8
Supernatant, Anerobic Digesters	2.8
Sludge, Primary Clarifer	4.0
Sludge, Secondary Clarifier	2.8
Concrete from the Chlorine Contact Basin	3.1 **

* Additional boron samples were taken by the Beale AFB BEE shop
** A 50 g concrete sample was crushed and shaken in 100 ml of influent water for 24 hours yielding a net result of 3.1 mg/L for leechable boron in the concrete.

Settleable Matter (SM), Chlorine Residual (CR) and Total Coliform (TC) Results.

Site	Date	SM (ml/L)	CR (mg/L)	TC (colonies/ml)
28	15 SEP	0.1	< 0.01	0
28	16 SEP	< 0.1	0.36	0
28	17 SEP	0.1	< 0.01	0
28	20 SEP	< 0.1	< 0.01	0
28	21 SEP	< 0.1	< 0.01	2

EPA Method 624 (μg/L)

Parameter	Site 24	Site 28	Site 31
chloromethane	<17	<10	<63
bromomethane	<17	<10	<63
vinyl chloride	<17	<10	<63
chloroethane	<17	<10	<63
methylene chloride	<8	<5	<31
acetone	290	25	1000
carbon disulfide	<8	<5	190
1,1-dichloroethene	<8	<5	<31
1,1-dichloroethane	<8	<5	<31
1,2-dichloroethene (total)	<8	<5	<31
chloroform	<8	<5	<31
1,2-dichloroethane	<8	<5	<31
2-butanone	<17	<10	<63
1,1,1-trichloroethane	<8	<5	<31
carbon tetrachloride	<8	<5	<31
vinyl acetate	<17	<10	<63
bromodichloromethane	<8	<5	<31
1,2-dichloropropane	<8	<5	<31
cis-1,3-dichloropropene	<8	<5	<31
trichloroethene	<8	<5	<31
dibromochloromethane	<8	<5	<31
1,1,2-trichloroethane	<8	<5	<31
benzene	<8	<5	<31
trans-1,3-dichloropropene	<8	<5	<31
bromoform	<8	<5	<31
2-hexanone	<17	<10	<63
4-methyl-2-pentanone	<17	<10	<63
tetrachlorethene	<8	<5	<31
1,1,2,2-tetrachloroethane	<8	<5	<31
toluene	<8	<5	<31
chlorobenzene	<8	<5	<31
ethylbenzene	<8	<5	<31
styrene	<8	<5	<31
total xylenes	<8	<5	<31
2-chloroethylvinyl ether	<8	<5	<31
1,2-dichlorobenzene	<8	<5	<31
1,3-dichlorobenzene	<8	<5	<31
1,4-dichlorobenzene	2	<5	<31
trichlorofluoromethane	<5	<5	<31

EPA Method 625 (µg/L)

parameter	Site 24	Site 28	Site 30	Site 31
phenol	<10	<10	<11000	<10
bis(2-chloroethyl)ether	<10	<10	<11000	<10
2-chlorophenol	<10	<10	<11000	<10
1,3-dichlorobenzene	<10	<10	<11000	<10
1,4-dichlorobenzene	<10	<10	<11000	<10
benzyl alcohol	<10	<10	<11000	<10
1,2-dichlorobenzene	<10	<10	<11000	<10
2-methylphenol	<10	<10	<11000	<10
bis(2-chloroisopropyl)ether	<10	<10	<11000	<10
4-methylphenol	<10	<10	<11000	<10
N-nitroso-Di-n-propylamine	<10	<10	<11000	<10
hexachloroethane	<10	<10	<11000	<10
nitrobenzene	<10	<10	<11000	<10
isophorone	<10	<10	<11000	<10
2-nitrophenol	<10	<10	<11000	<10
2,4-dimethylphenol	<10	<10	<11000	<10
Benzoic acid	<50	<50	<53000	<50
bis(2-chloroethoxy)methane	<10	<10	<11000	<10
2,4-dichlorophenol	<10	<10	<11000	<10
1,2,4-trichlorobenzene	<10	<10	<11000	<10
naphthalene	<10	<10	<11000	<10
4-chloroaniline	<10	<10	<11000	<10
hexachlorobutadiene	<10	<10	<11000	<10
2-methylnaphthalene	<10	<10	<11000	<10
hexachlorocyclopentadiene	<10	<10	<11000	<10
2,4,6-trichlorophenol	<10	<10	<11000	<10
2,4,5-trichlorophenol	<50	<50	<53000	<50
2-chloronaphthalene	<10	<10	<11000	<10
2-nitroaniline	<50	<50	<53000	<50
dimethyl phthalate	<10	<10	<11000	<10
acenaphthylene	<10	<10	<11000	<10

EPA Method 625 (µg/L) (cont'd)

	Site			
parameter	24	28	30	31
2,6-dinitrotoluene	<10	<10	<11000	<10
3-nitroaniline	<50	<50	<53000	<50
acenaphthene	<10	<10	<11000	<10
2,4-dinitrophenol	<50	<50	<53000	<10
4-nitrophenol	<50	<50	<53000	<10
dibenzofuran	<10	<10	<11000	<10
2,4-dinitrotoluene	<10	<10	<11000	<10
diethylphthalate	<10	<10	<11000	<10
4-chlorophenyl-phenylether	<10	<10	<11000	<10
fluorene	<10	<10	<11000	<10
4-nitroaniline	<50	<50	<53000	<50
4,6-dinitro-2-methylphenol	<50	<50	<53000	<50
N-nitrosodiphenylamine[1]	<10	<10	<11000	<10
4-bromophenyl-phenylether	<10	<10	<11000	<10
hexachlorobenzene	<10	<10	<11000	<50
pentachlorophenol	<50	<50	<53000	<10
phenanthrene	<10	<10	<11000	<10
anthracene	<10	<10	<11000	<10
di-n-butylphthalate	<10	<10	<11000	<10
fluoranthene	<10	<10	<11000	<10
pyrene	<10	<10	<11000	<10
butylbenzylphthalate	<10	<10	<11000	<20
3,3'-dichlorobenzidine	<20	<20	<22000	<10
benzo(a)anthracene	<10	<10	<11000	<10
chrysene	<10	<10	<11000	<10
bis(2-ethylhexyl)phthalate	<10	10	<11000	<10
benzo(b)fluoranthene	<10	<10	<11000	<10
benzo(k)fluoranthene	<10	<10	<11000	<10
benzo(a)pyrene	<10	<10	<11000	<10
ideno(1,2,3-cd)pyrene	<10	<10	<11000	<10
dibenz(a,h)anthracene	<10	<10	<11000	<10
benzo(G,h,i)perylene	<10	<10	<11000	<10

[1] = cannot be separated from diphenylamine

APPENDIX F

SUMMARY OF WASTE DISPOSAL PRACTICES FOR EACH WASTE CATEGORY

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SUMMARY OF WASTE DISPOSAL PRACTICES FOR EACH WASTE CATEGORY

Rags

SHOP	WASTE	DISPOSAL
9th RTS Precision Photo	Rags	SBC
AGE (Powered and Nonpowered)	Rags	BL
9th OMS KC-135 Phase Dock	Rags	SBC
Gen and Spec Purpose Maint	Rags	BL
9th TRANS Fire Truck Maint	Rags	SBC
9th FMS Corrosion Control	Rags	BL
9th OMS Washrack	Rags	BL
Power Pro/Special Facility	Rags	SBC
9th TRANS Allied Trades	Rags	T
J-57 Intermediate Maint	Rags	BL
PAVE PAWS	Rags	BL
U-2/TR1 Phase Dock	Rags	BL
9th OMS T-38 Phase Dock	Rags	BL
9th FMS Wheel and Tire	Rags	BL
9th CSG Auto Hobby Shop	Rags	BL
9th FMS NDI	Rags	SBC

Speedy Dry

SHOP	WASTE	DISPOSAL
9th OMS T-38 Phase Dock	Speedy Dry	T
U-2/TR1 Phase Dock	Speedy Dry	D
PAVE PAWS	Speedy Dry	D
9th CSG Auto Hobby Shop	Speedy Dry	T
J-57 Intermediate Maint	Speedy Dry	D
9th OMS KC-135 Phase Dock	Speedy Dry	T
Power Pro/Special Facility	Speedy Dry	T
9th OMS Washrack	Speedy Dry	D
AGE (Powered and Nonpowered)	Speedy Dry	T
Gen and Spec Purpose Maint	Speedy Dry	T

Paint and Thinners

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
9th FMS Corrosion Control	Enamel Paint	60	D
9th FMS Corrosion Control	Polyurethane Paint	330	D
9th TRANS Allied Trades	Enamel	90	D
PAVE PAWS	Dope & Lacquer	12	D
9th FMS Corrosion Control	Xylene	12	RC
9th FMS Wheel and Tire	Lacquer	60	D
9th FMS Wheel and Tire	Polyurethane	60	D
9th TRANS Allied Trades	Polyurethane	180	D
9th FMS Corrosion Control	Toluene	360	RC
9th FMS Corrosion Control	Polyurethane Thinner	48	RC
9th FMS Corrosion Control	MEK	360	RC
		TOTAL: 1572	

Strippers

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
9th FMS Wheel and Tire	Acrylic-Nitrocellulose	330	D
9th FMS Corrosion Control	Turco 5351	12	D
9th FMS Corrosion Control	Cee Bee Stripper	12	UIP
9th FMS Corrosion Control	B&B Stripper	120	D
		TOTAL: 474	

Acid

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
9th RTS Precision Photo	Acetic	11760	DD
PAVE PAWS	Sulfuric Acid	60	UIP
9th FMS Corrosion Control	Phosphoric Acid	NQ	NDD
9th FMS Corrosion Control	Chromium Trioxide	NQ	NDD
9th FMS Corrosion Control	Alodine 1200	NQ	NDD
9th FMS Corrosion Control	Calcium Sulfate	NQ	NDD
		TOTAL: 11820	

Batteries

SHOP	WASTE	QTY(#/YR)	DISPOSAL
9th FMS Battery Shop	Lead-Acid	200	DRMO
9th FMS Battery Shop	Ni-Cad	400	DRMO
9th CES Power Production	Batteries	120	DRMO
		TOTAL: 720	

Soap

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
9th OMS Washrack	Pen Air M-5572	1200	OWS
PAVE PAWS	Aircraft Cleaning	120	OWS
9th TRANS Fire Truck Maint	Aircraft Cleaning	60	DD
9th OMS Washrack	Safety Kleen	60	OWS
9th OMS Washrack	Exterior Aircraft Cleaning Comp	1200	OWS
Gen and Spec Purpose Maint	Aircraft Cleaning	220	DD
9th OMS Washrack	655 Super Strength Concentrate	120	OWS
J-57 Intermediate Maint	Citrikleen	60	OWS
9th CSG Auto Hobby Shop	Break Up Soap	12	DD
9th OMS T-38 Phase Dock	Aircraft Cleaning	60	OWS
U-2/TR1 Phase Dock	Pan-Dandy	60	D
		TOTAL: 3172	

Oils and Fluids

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
AGE (Powered and Nonpowered)	Steam Turbine Oil	240	AGT
9th CSG Auto Hobby Shop	Motor Oil	1200	UGT
9th CES Power Production	Motor Oil	2100	AGT
Gen and Spec Purpose Maint	10W X 30W Oil	220	AGT
AGE (Powered and Nonpowered)	Synthetic Oil 7808	1320	AGT
AGE (Powered and Nonpowered)	Motor Oil	1320	AGT
Gen and Spec Purpose Maint	30W Oil	220	AGT
AGE (Powered and Nonpowered)	Hydraulic Fluid 832-82	60	AGT
9th CSG Auto Hobby Shop	Brake Fluid	2	UGT
Gen and Spec Purpose Maint	10W Oil	55	AGT
AGE	Hydraulic Fluid 2760A	660	AGT
PAVE PAWS	Hydraulic Fluid	6	AGT
9th TRANS Fire Truck Maint	Transmission Fluid	12	AGT
Gen and Spec Purpose Maint	Transmission Fluid	55	AGT
PAVE PAWS	Motor Oil	1200	UGT
AGE	Hydraulic Fluid 5606	300	AGT
J-58 Test Cell	Oil	330	AGT
9th TRANS Fire Truck Maint	Motor Oil	120	AGT
Gen and Spec Purpose Maint	Brake Fluid	12	AGT
AGE	ATF Transmision Fluid	120	AGT
J-57 Intermediate Maint	Hydraulic Fluid 5606	24	ABT
U-2/TR1 Phase Dock	Brake Fluid	30	AGT
9th OMS TEB	Hydraulic Fluid and Oil	660	AGT
J57-85 Test Cell	Synthetic Oil 7808	220	AGT
9th OMS KC-135 Phase Dock	Hydraulic Fluid	48	AGT
9th OMS KC-135 Phase Dock	Synthetic Oil	48	AGT
J57-85 Test Cell	JP-4	220	AGT
9th TRANS Fire Truck Maint	Brake Fluid	3	DD
U-2/TR1 Phase Dock	Hydraulic Fluid	30	AGT
Power Pro/Special Facility	Motor Oil	1200	AGT
9th OMS T-38 Phase Dock	Synthetic Oil	12	AGT
9th FMS Pneudraulics	Hydraulic Fluid	30	AGT
9th TRANS Refueling Maint	Motor Oil	220	AGT
9th CSG Auto Hobby Shop	Transmission Fluid	60	UGT
9th OMS T-38 Phase Dock	Hydraulic Fluid	60	AGT
J-57 Intermediate Maint	Synthetic Oil 7808	660	AGT
	TOTAL:	13077	

Solvents and Degreasers

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
AGE (Powered and Nonpowered)	Citrikleen	180	D
9th FMS Pneudraulics	PD-680	600	D
9th FMS Wheel and Tire	PD-680	660	D
J-57 Intermediate Maint	Carbon Remover	10	D
AGE (Powered and Nonpowered)	MEK	18	UIP
9th FMS Wheel and Tire	Citrikleen	330	D
J-57 Intermediate Maint	PD-680	20	UIP
9th CSG Auto Hobby Shop	Safe-Way	600	SBC
PAVE PAWS	Carbon Remover	60	UIP
U-2/TR1 Phase Dock	PD-680	3	UIP
Gen and Spec Purpose Maint	Type II 8011	200	D
9th OMS T-38 Phase Dock	PD-680	36	OWS
9th FMS NDI	Industrial Grade Alcohol	24	D
9th OMS Washrack	PD-680	1800	OWS
	TOTAL:	4541	

Photo & NDI Chemicals

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
9th RTS Precision Photo	Stabilizer	96	PTP
9th FMS NDI	Fixer	100	D
9th RTS Precision Photo	Activator	96	PTP
9th FMS NDI	Developer	100	D
9th RTS Precision Photo	Fixer	3840	PTP
9th RTS Precision Photo	Conditioner	72	PTP
9th RTS Precision Photo	Bleach	108	PTP
9th RTS Precision Photo	Reversal Bath	72	PTP
9th RTS Precision Photo	Developer	15240	PTP
9th FMS NDI	SKC/ZC-7B Parts Cleaner	NQ	UIP
9th FMS NDI	Penetrant Remover	NQ	UIP
9th FMS NDI	Emulsifier	110	D
9th FMS NDI	Developer	110	D
9th FMS NDI	Dye Penetrant	110	D
	TOTAL:	20054	

Fuel

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
Gen and Spec Purpose Maint	Diesel	110	D
J-58 Intermediate Maint	JP-7 and TEB	110	D
AGE (Powered and Nonpowered)	Diesel	120	D
J-57 Intermediate Maint	JP-4	220	D
AGE (Powered and Nonpowered)	MoGas	120	D
J-58 Test Cell	P-7	990	D
9th OMS KC-135 Phase Dock	JP-4	192	B
PAVE PAWS	Diesel	60	D
AGE (Powered and Nonpowered)	JP-4	120	FTP
9th CES Power Production	Diesel	2100	D
J-57-85 Test Cell	JP-4	220	D
		TOTAL: 4462	

Miscellaneous Chemicals

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
PAVE PAWS	NALCO-2590	220	UIP
PAVE PAWS	NALCO-2532	220	UIP
Power Pro/Special Facility	Biocide	96	UIP
PAVE PAWS	NALCO-2805	220	UIP
PAVE PAWS	NALCO-2527-T	220	UIP
9th CES Power Production	Antifreeze	2100	D
PAVE PAWS	NALCO-2575	220	UIP
PAVE PAWS	NALCO-2536	220	UIP
Power Pro/Special Facility	Scale Inhibitor	180	UIP
Power Pro/Special Facility	Chlorine	96	UIP
Gen and Spec Purpose Maint	Antifreeze	220	D
		TOTAL: 4012	

LEGEND:
DRMO - Defense Reutilization and Marketing Office
PTP - Photographic Waste Treatment Plant
NDD - Neutralized then Down Drain
SBC - Serviced by Contractor
UIP - Used in Process
FTP - Fire Training Pit
AGT - Above Ground Tank
UGT - Underground Tank
DD - Down the Drain
NQ - Not Quantified
BL - Base Laundry
RC - Recycled
D - Drummed
T - Trash

APPENDIX G

SUMMARY OF DRUMMED WASTE DISPOSAL FOR EACH WASTE CATEGORY

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Wastes Generated and Drummed at Beale AFB

Speedy Dry

SHOP	BLDG	PRODUCT
U-2/TR1 Phase Dock	1075	Speedy Dry
9th OMS Washrack	1083	Speedy Dry
J-57 Intermediate Maint	1086	Speedy Dry
PAVE PAWS	5761	Speedy Dry

Paint and Thinners

SHOP	BLDG	PRODUCT	QTY(GAL/ YR)
PAVE PAWS	5761	Dope & Lacquer	12
9th FMS Corrosion Control	1071	Enamel Paint	60
9th TRANS Allied Trades	2489	Polyurethane P & T	180
9th TRANS Allied Trades	2489	Enamel P & T	90
9th FMS Wheel and Tire	1086	Lacquer P & T	60
9th FMS Wheel and Tire	1086	Polyurethane P & T	60
9th FMS Corrosion Control	1071	Polyurethane Paint	330
		TOTAL:	792

Stripper

SHOP	BLDG	PRODUCT	QTY(GAL/YR)
9th FMS Wheel and Tire	1086	Acrylic-Nitrocellulose	330
9th FMS Corrosion Control	1071	B&B Stripper	120
9th FMS Corrosion Cotrol	1071	Turco 5351	12
		TOTAL:	462

Soaps

SHOP	BLDG	PRODUCT	QTY/GALLONS
U-2/TR1 Phase Dock	1075	Pan-Dandy	60
		TOTAL:	60

Solvents and Degreasers

SHOP	BLDG	PRODUCT	QTY(GAL/YR)
9th FMS Pneudraulics	1086	PD-680	600
J-57 Intermediate Maint	1086	Carbon Remover	10
9th FMS Wheel and Tire	1086	Citrikleen	330
AGE (Powered and Nonpowered)	1225	Citrikleen	180
9th FMS Wheel and Tire	1086	PD-680	660
9th FMS NDI	1243	Industrial Grade Alcohol	24
Gen and Spec Purpose Maint	2496	Type II 8011	200
			TOTAL: 2004

Photo & NDI Chemicals

SHOP	BLDG	PRODUCT	QTY GAL/YR)
9th FMS NDI	1243	Developer	100
9th FMS NDI	1243	Fixer	100
9th FMS NDI	1243	Emulsifier	110
9th FMS NDI	1243	Developer	110
9th FMS NDI	1243	Dye Penetrant	110
			TOTAL: 530

Fuels

SHOP	BLDG	PRODUCT	QTY/GALLONS
AGE (Powered and Nonpowered)	1225	MoGas	120
AGE (Powered and Nonpowered)	1225	Diesel	120
J-58 Intermediate Maint	1025	JP-7 and TEB	110
PAVE PAWS	5761	Diesel	60
9th CES Power Production	2541	Diesel	2100
J-58 Test Cell	1152	JP-7	990
Gen and Spec Purpose Maint	2496	Diesel	110
J-57 Intermediate Maint	1086	JP-4	220
J57-85 Test Cell	1247	JP-4	220
9th OMS KC-135 Phase Dock	1076	JP-4	192
			TOTAL: 4242

Antifreeze

SHOP	BLD	PRODUCT	QTY/GALLONS
General and Special Purpose Maint	2496	Antifreeze	220
9th CES Power Production	2541	Antifreeze	2100
		TOTAL:	2320

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APPENDIX H

SUMMARY OF WASTE DISPOSAL PRACTICES BY SHOP

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9th RTS Precision Photo Lab, Building 2145

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Bleach	108	PTP
Conditioner	72	PTP
Stabilizer	96	PTP
Activator	96	PTP
Developer	5240	PTP
Fixer	3840	PTP
Acetic	1760	DD
Reversal Bath	72	PTP
Rags	NQ	SBC

TOTAL: 31284

9th CES Power Production Shop, Building 2541

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Batteries	120	DRMO
antifreeze	2100	D
Motor Oil	2100	D
Diesel	2100	D

TOTAL: 6420

9th CSG Auto Hobby Shop, Building 2427

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Transmission Fluid	60	UGT
Motor Oil	1200	UGT
Speedy Dry	NQ	T
Brake Fluid	2	UGT
Rags	NQ	BL
Safe-Way Degreaser	600	SBC
Break Up Floor Cleaner	12	DD

TOTAL: 1874

9th FMS Battery Shop, Building 1086

WASTE PRODUCT	QTY(/YR)	DISPOSAL
Lead-Acid Batteries	200	DRMO
Ni-Cad Batteries	400	DRMO
	TOTAL: 600	

9th FMS Corrosion Control Shop, Building 1071

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Calcium Sulfate	NQ	NDD
Cee Bee Stripper	12	UIP
Phosphoric Acid	NQ	NDD
Chromium Trioxide	NQ	NDD
Alodine 1200	NQ	NDD
B&B Stripper	120	D
MEK	360	RC
Toluene	360	RC
Polyurethane Thinner	48	RC
Xylene	12	RC
Polyurethane Paint	330	D
Rags	NQ	BL
Turco 5351	12	D
Enamel Paint	60	D
	TOTAL: 1314	

FMS NDI Shop, Building 1243

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Industrial Grade Alcohol	24	D
Rags	NQ	SBC
Fixer	100	D
Emulsifier	110	D
Developer	100	D
SKC/ZC-7B Parts Cleaner	NQ	UIP
Penetrant Remover	NQ	UIP
Dye Penetrant	110	D
Developer	110	D
	TOTAL: 554	

9th FMS Pneudraulics Shop, Building: 1086

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
PD-680	600	D
Hydraulic Fluid	30	D
	TOTAL: 630	

9th FMS Wheel and Tire Shop, Building 1086

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	BL
Polyurethane	60	D
Lacquer	60	D
PD-680	660	D
Acrylic-Nitrocellulose	330	D
Citrikleen	330	D
	TOTAL: 1440	

9th OMS KC-135 Phase Dock, Building 1076

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Speedy Dry	NQ	T
Synthetic Oil	48	D
Hydraulic Fluid	48	D
JP-4	192	B
Rags	NQ	SBC
	TOTAL: 288	

9th OMS T-38 Phase Dock, Building 1243

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
PD-680	36	OWS
Aircraft Cleaning Soap	60	OWS
Speedy Dry	NQ	T
Synthetic Oil	12	D
Hydraulic Fluid	60	D
Rags	NQ	BL
	TOTAL: 168	

9th OMS TEB Shop, Building 1230

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Hydraulic Fluid and Oil	660	D
	TOTAL: 660	

9th OMS Washrack, Building 1083

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	BL
Safety Kleen	60	OWS
Pen Air M-5572	1200	OWS
PD-680	1800	OWS
Exterior Aircraft Cleaning Compound	1200	OWS
Speedy Dry	NQ	D
655 Super Strength Concentrate Soap	120	OWS
	TOTAL: 4380	

9th TRANS Allied Trades, Building 2489

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Enamel Paint & Thinner	90	D
Polyurethane Paint & Thinner	180	D
Rags	NQ	T
	TOTAL: 270	

9th TRANS Fire Truck Maintenance Shop, Building 1086

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Brake Fluid	3	DD
Rags	NQ	SBC
Aircraft Cleaning Soap	60	DD
Transmission Fluid	12	AGT
Motor Oil	120	AGT
	TOTAL: 195	

9th TRANS Refueling Maintenance Shop, Building 1073

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Motor Oil	220	AGT
	TOTAL: 220	

AGE (Powered and Nonpowered) Shop, Building 1225

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
MEK	18	UIP
Hydraulic Fluid 832-82	60	AGT
Diesel	120	D
Speedy Dry	NQ	T
Steam Turbine Oil	240	AGT
Hydraulic Fluid 5606	300	AGT
Hydraulic Fluid 27601A	660	RC
ATF Transmission Fluid	120	AGT
Motor Oil	1320	AGT
JP-4	120	FTP
Synthetic Oil 7808	1320	AGT
Citrikleen	180	D
Rags	NQ	BL
MoGas	120	D
	TOTAL: 4578	

General and Special Purpose Maintenance Shop, Building 2496

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
10W X 30W Motor Oil	220	AGT
Diesel	110	D
Speedy Dry	NQ	T
30W Motor Oil	220	AGT
Brake Fluid	12	D
Type II 8011	200	D
Transmission Fluid	55	D
Rags	NQ	BL
10W Motor Oil	55	AGT
Antifreeze	220	D
Aircraft Cleaning Soap	220	DD
	TOTAL: 1312	

J-57 Intermediate Maintenance Shop, Building 1086

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Carbon Remover	10	D
JP-4	220	D
Speedy Dry	NQ	D
Rags	NQ	BL
Citrikleen	60	OWS
Hydraulic Fluid 5606	24	AGT
Synthetic Oil 7808	660	AGT
PD-680	20	UIP
	TOTAL: 994	

J-58 Intermediate Maintenance Shop, Building 1025

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
JP-7 and TEB	110	D
	TOTAL: 110	

J-58 Test Cell Shop, Building 1152

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
JP-7	990	D
Oil	330	AGT
	TOTAL: 1320	

J57-85 Test Cell Shop, Building 1247

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Synthetic Oil 7808	220	AGT
JP-4	220	D
	TOTAL: 440	

PAVE PAWS, Building 5761

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
NALCO-2575	220	UIP
Rags	NQ	BL
NALCO-2590	220	UIP
Hydraulic Fluid	6	D
Speedy Dry	NQ	D
NALCO-2805	220	UIP
Motor Oil	1200	UGT
Dope & Lacquer	12	D
Diesel	60	D
Carbon Remover	60	UIP
NALCO-2527-T	220	UIP
NALCO-2532	220	UIP
Sulfuric Acid	60	UIP
NALCO-2536	220	UIP
Aircraft Cleaning Soap	120	OWS
	TOTAL: 2838	

Power Production/Special Facility Shop, Building 2145

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Chlorine	96	UIP
Rags	NQ	SBC
Biocide	96	UIP
Scale Inhibitor	180	UIP
Motor Oil	1200	D
Speedy Dry	NQ	T
	TOTAL: 1572	

U-2/TR1 Phase Dock, Building 1075

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Hydraulic Fluid	30	AGT
Brake Fluid	30	SGT
PD-680	3	UIP
Rags	NQ	BL
Speedy Dry	NQ	D
Pan-Dandy Soap	60	D
	TOTAL: 123	

LEGEND:

DRMO - Defense Reutilization and Marketing Office
PTP - Photographic Waste Treatment Plant
NDD - Neutralized then Down Drain
SBC - Serviced by Contractor
FTP - Fire Training Pit
AGT - Above Ground Tank
UGT - Underground Tank
UIP - Used in Process
DD - Down Drain
BL - Base Laundry
RC - Recycled
NQ - Not Quantified
D - Drummed
T - Trash

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USAF Occupational and Environmental Health
Laboratory (USAFOEHL)
HUMAN SYSTEMS DIVISION (AFSC)
Brooks AFB TX 78235-5501

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300