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USAFOEHL REPORT

88-075EQ0190FHH

HAZARDOUS WASTE TECHNICAL ASSISTANCE SURVEY, TRAVIS AFB CA

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June 1988

Final Report

USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY N/A	3. DISTRIBUTION / AVAILABILITY OF REPORT Distribution unlimited; approved for public release
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFOEHL Report 88-075EQ0190FHH	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION USAF Occupational and Environmental Health Laboratory 6b. OFFICE SYMBOL (*If applicable*) ECQ	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (*City, State, and ZIP Code*) Brooks AFB TX 78235-5501	7b. ADDRESS (*City, State, and ZIP Code*)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION Same as 6a 8b. OFFICE SYMBOL (*If applicable*)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (*City, State, and ZIP Code*)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE (*Include Security Classification*) Hazardous Waste Technical Assistance Survey, Travis AFB CA	
12. PERSONAL AUTHOR(S) Elliot K. Ng, Maj, USAF, BSC; Mary M. Daly, Capt, USAF, BSC	
13a. TYPE OF REPORT Final 13b. TIME COVERED FROM 13 Oct TO 23 Oct 87	14. DATE OF REPORT (*Year, Month, Day*) June 1988 15. PAGE COUNT 94
16. SUPPLEMENTARY NOTATION	
17. COSATI CODES FIELD / GROUP / SUB-GROUP	18. SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*) Waste reduction hazardous waste waste minimization Travis AFB

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

At the request of HQ MAC/SGPB, the USAFOEHL conducted a hazardous waste technical assistance survey at Travis AFB (TAFB) from 13-23 Oct 87. The scope of this survey was to address hazardous waste management practices, establish a waste sampling strategy, and explore opportunities for hazardous waste minimization. The survey team performed a shop-by-shop evaluation of chemical waste management practices as well as met with hazardous waste managers and engineers to discuss the hazardous waste program. The results of our survey showed that TAFB needs to formalize their hazardous waste management structure. With 60 ABG/DEEV severely undermanned, the base needs to formally delegate some of the hazardous waste management responsibilities to the major organizations (i.e., maintenance, civil engineering and transportation) generating hazardous wastes. Recommendations include: (1) instigation of an education and training program to support a formalized hazardous waste program and to strengthen communication between managers and

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20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a NAME OF RESPONSIBLE INDIVIDUAL Maj Elliot K. Ng	22b. TELEPHONE (*Include Area Code*) (512) 536-2891 22c OFFICE SYMBOL ECQ

(Continued from block #19)

shop personnel; (2) update the accumulation site and manager listing; (3) consolidate existing work orders to upgrade accumulation sites; (4) develop a waste analysis plan to characterize wastestreams; (5) consider leak testing the underground tank at the Auto Hobby Shop and removing the underground tank at the 1901 Tracals Maintenance Complex; (6) explore the possibility of recycling used oil; (7) cleanup and improve the management of Building 1365; (8) consider using alternative solvents, solvent leasing, or solvent recovery to minimize waste PD-680.

ACKNOWLEDGMENT

The authors greatly appreciate the technical expertise and hardwork provided by TSgt Michael J. Wantland during this survey. We also wish to thank the personnel at Travis AFB who provided information and logistic support during our visit. 2Lt Kerri Davis, David Grant USAF Medical Center/SGPB; MSgt Williams, 60 MAW/LGT/SE; TSgt Wruble, 60 MAW/MASE; and TSgt Morris 60 ABG/DEO/Safety were especially supportive of the mission both during and after the field survey.

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I. INTRODUCTION

HQ MAC/SGPB requested the Occupational and Environmental Health Laboratory, Consultant Services Division, Environmental Quality Branch (USAFOEHL/ECQ) to accomplish a Hazardous Waste Technical Assistance survey at Travis AFB CA (see Appendix A). The scope of the survey was to address hazardous waste management practices, establish a waste sampling strategy, and explore opportunities for hazardous waste minimization.

The survey was conducted by Maj Elliot K. Ng, Capt Mary M. Daly, and TSgt Michael J. Wantland on 13-23 Oct 87.

II. BACKGROUND

A. Base Description

Travis Air Force Base (TAFB) is located in Solano County California, midway between Sacramento and San Francisco. The base is situated off Interstate 80, approximately six miles southeast of Fairfield CA. The base is the home of the 60th Military Airlift Wing (MAW) and many tenants, including 22nd Air Force Headquarters, 349th Military Airlift Wing (Reserve) and David Grant USAF Medical Center (DGMC). The primary mission at TAFB is to provide rapid airlift with C-141 and C-5 aircraft to all locations.

B. Hazardous Waste Program

The hazardous waste program at Travis AFB manages chemical wastes primarily from a large centralized maintenance complex, the 60th Air Base Group (ABG) Civil Engineering Squadron, and the 60th MAW Transportation Squadron. The Environmental and Contract Planning Office in Civil Engineering, 60 ABG/DEEV, is responsible for the management of the entire program. The Defense Reutilization and Marketing Office (DRMO) is responsible for contractual removal of wastes. The Bioenvironmental Engineering (BEE) Shop helps to monitor the program through industrial shop surveys and is responsible for waste analysis.

Hazardous waste generated by a shop is taken to the nearest accumulation site and placed in a container. In most cases, the waste is collected in 55-gallon drums and temporarily stored for less than 90 days at an accumulation site located near the shop. Wastes not stored in 55-gallon drums are normally stored in underground tanks or bowsers. Each accumulation site has a manager responsible for assuring that the containers are properly marked, labeled and color coded. When waste drums at the accumulation sites are full, the drums are normally transferred to one of three permitted storage sites (Bldgs 1365, 956, or 552). Each shop is responsible for transporting the

waste to the storage facility using forklifts and government vehicles. Transportation is accomplished over government-owned roads within the base confines. The wastes are held at storage facilities which are permitted to allow for storage of waste for up to one year and are then removed by contractors to an approved disposal site. Building 1365 is the central hazardous waste storage facility for the base, Building 956 is a PCB storage facility, and Building 552 is a centralized hazardous waste storage site used by the Maintenance Squadron. In order to transfer drums to Bldgs 1365 and 956, DEEV must be contacted to arrange an appointment.

III. PROCEDURE

The method used to evaluate hazardous waste management practices and opportunities for waste minimization was to contact key personnel responsible for the program and to visit each of the major industrial shops generating chemical waste. The BEE Shop was contacted first to review industrial shop folders to determine which shops generate chemical wastes. This was followed by visits to shops to observe industrial operations, discuss chemical waste disposal practices with shop personnel, and hand out chemical disposal survey forms (see Appendix B). These forms, which were completed by shop personnel, were reviewed by the survey team and provided additional information for subsequent discussions with shop personnel. Also, each permitted storage site and hazardous waste accumulation site (12 total) was visited and an accumulation site survey form (see Appendix C) was filled out for each site. The following individuals were contacted to discuss their responsibility and involvement in the hazardous waste program:

Capt Karan Charisse Piercy, Chief, Bioenvironmental Engineering, SGPB, AUTOVON 837-8098

2Lt Kerri Davis, Bioenvironmental Engineering, SGPB, AUTOVON 837-8098

Mr Mark Sandy, Environmental Coordinator, DEEV, AUTOVON 837-2264

Mr Roger Waring, Chief, DRMO, AUTOVON 837-3137

MSgt Williams, Transportation Safety Officer, 60 MAW/2GT/SE, AUTOVON 837-5230

TSgt Wruble, Maintenance Safety Officer, 60 MAW/MASE, AUTOVON 837-2132

TSgt Morris, Civil Engineering Safety Officer, 60 ABG/DEO/Safety, AUTOVON 837-3448

Mr Davis, Fire Chief, 60 ABG/DEF, AUTOVON 837-3886

Based on the data from the completed chemical disposal survey forms, the annual forecasted quantities for 11 categories of waste were determined (see Table 1). From Table 1, Column 4 the majority of the wastes, 70.8%, consists of soaps, oils, fluids, PD-680 (categories 4, 5, 6, and 10 respectively). Forty-five percent of the total wastes are drummed, the major categories of drummed wastes (see column 6, Table 1) are oils, fluids, fuels and PD-680. Itemized listings of waste categories, shop, amount of waste, and disposal method are found in Appendix D for all wastes and in Appendix E for drummed wastes.

TABLE 1
ANNUAL FORECASTED QUANTITIES FOR WASTE CATEGORIES AT TRAVIS AFB

CATEGORY	PRODUCT	TOTAL (gal/yr)	% TOTAL	TOTAL DRUMMED (gal/yr)	% TOTAL DRUMMED
1	Paint and thinners	2052	2.5	2052	5.5
2	Strippers	510	0.6	30	0.08
3	Acids	2406	2.9	200	0.54
4	Soaps	14616	17.7	0	0
5	Oils	20857	25.3	14371	38.7
6	Fluids (hydraulic and transmission)	8792	10.8	3746	10.1
7	Fuels	5636	6.8	4796	12.9
8	Antifreeze	2814	3.4	2090	5.6
9	Solvents (non-PD-680)	8100	9.8	2194	5.9
10	PD-680	14100	17.1	6250	16.8
11	Miscellaneous	2580	3.1	1460	3.9
	TOTAL	82463		37189	

IV. DESCRIPTION OF INDUSTRIAL ACTIVITIES

A. Industrial Shops

Thirty-five industrial shops (Master Listing Contained in Appendix F) were surveyed and their chemical waste handling practice was documented. The shops are categorized organizationally: A. Maintenance (shop 1-18), B. Transportation (shop 19-24), C. Civil Engineering (shop 25-30), and D. Miscellaneous (shop 31-35). The findings for each industrial shop follow (See Appendix G for a shop-by-shop listing of waste disposal practices).

B. Maintenance

1. Gas Turbine Shop — Bldg: S-12
   Contact: MSgt Wood — AV: 837-2547

This shop repairs and tests gas turbine engines for the C-5 and C-141 aircraft. Chemical wastes include PD-680, engine oil, fuel, aircraft soap, and hydraulic fluid. Each waste is placed in a separate and designated 55-gallon drum, stored in the accumulation site outside Bldg S-12 (see Figure 1), and then transported to the central hazardous waste storage facility, Bldg 1365. The shop has a small (13 gallon) tank for PD-680 which is cleaned out every 30 days. Shop personnel are awaiting approval from the squadron Quality Assurance Section to use Citrakleen instead of PD-680. Under consideration is the higher cost of Citrakleen versus PD-680 and the possible corrosivity of Citrakleen to metal.

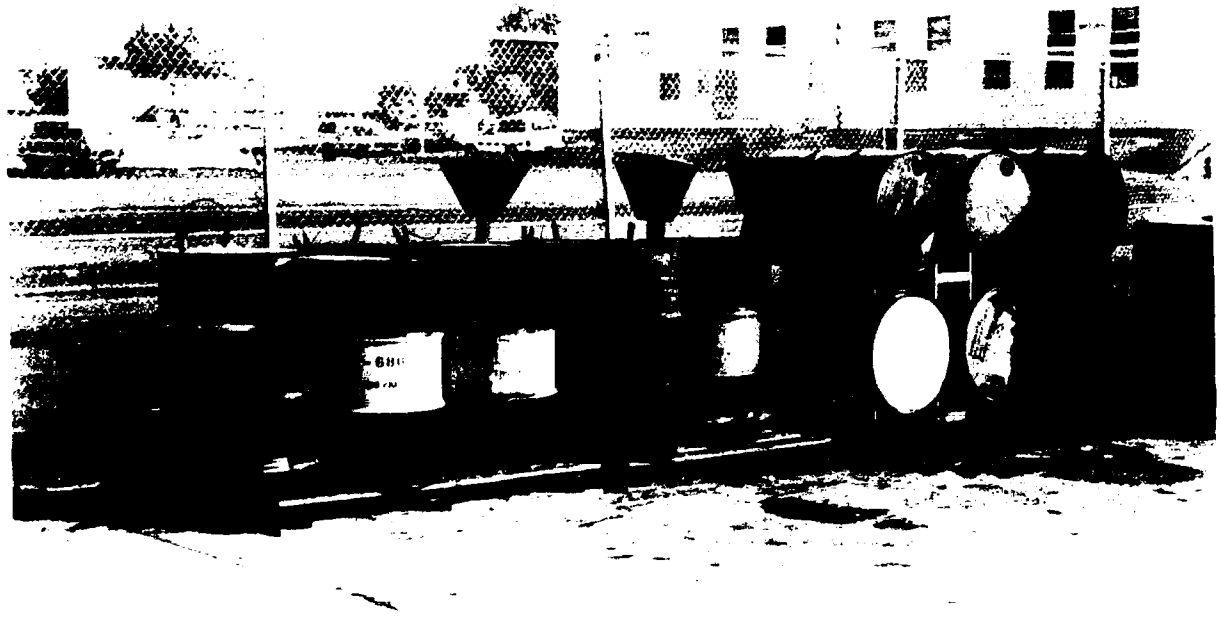

FIGURE 1: Gas Turbine Shop (Bldg S-12)

2. Modular Maintenance — Bldg: P-16
Contact: MSgt Paddock — AV: 837-3373

This shop is responsible for inspecting and cleaning engine bearings. The shop has five tanks (about 6 gallons each) containing engine oil, fingerprint remover, oil preservative, and PD-680 (two tanks). When necessary, personnel drain the spent chemicals from the tanks into a 55-gallon drum and store the waste drum at the accumulation site located outside the Chemical Process Cleaning Facility, Bldg P-18. The waste is eventually transferred to Bldg 1365 and disposed of as hazardous waste.

3. Chemical Process Cleaning Facility — Bldg: P-18
Contact: TSgt Tamasy — AV: 837-5728

Personnel clean jet engines and related parts by using assorted chemicals. The shop has a 30 to 40-gallon tank containing methyl ethyl ketone (MEK) that generates no waste MEK. MEK is just added to replenish the tank when necessary. There are 13 tanks in the shop containing cleaning solutions as follows: phosphoric acid, sodium hydroxide, cold carbon remover (methylene chloride), hot carbon remover (PC 111), alkaline descaling (potassium hydroxide), alkaline permanganate, nitric acid, cold water rinse, hot water rinse (two tanks), and a pressure, cold water rinse. These tanks have a total capacity of 2200-gallons and are half filled. Each part has a particular cleaning method and this dictates which cleaning tanks are employed. When the solutions are spent (about once or twice a year) they are neutralized (where applicable), and are pumped by a contractor or drummed by shop personnel. The optimum choice for the shop is to have the contractor pump the tanks (taking about three hours), since it takes about three days involving four people from the shop to drum the spent cleaning solutions. The shop personnel must drum the wastes when DEEV can't arrange a contract. The rinsewater tanks discharge down the drain to an oil/water separator. The shop is in the process of procuring a contract to pump both the rinse and cleaning tanks on a regular basis.

At the time of the visit, the shop had about 20 drums of alkaline descaling solution in storage outside Bldg P-18 for 8-9 months. Shop personnel wanted to return the drums to base supply for storage, but supply would not take the drums back. This could potentially be hazardous if these drums deteriorate and leak.

Eventually, the shop plans to use Citrakleen to replace the cold carbon remover, since the methylene chloride is very hazardous to personnel. They currently use Citrakleen on their washrack as a degreaser. They find the Citrakleen to be very effective and less hazardous to handle and dispose of. About 55 gallons of Citrakleen is used every two weeks at their washrack and is discharged down the drain to an oil/water separator.

Personnel in this shop are responsible for the accumulation site located adjacent to Bldg P-18, but they don't use it. The accumulation site is used by other shops (e.g., TF-39 Jet Engine Repair Shop, TF-39 Modular Maintenance, and Flight Line Jet Dispatch) and has designated 55-gallon drums for rags, jet fuel, hydraulic fluid, and contaminated fluids sitting on pallets. Drums at the site were left open, and the area is unsecured and not burmed; but, a work order to upgrade the shop includes upgrading the accumulation site.

4. 60 FMS Corrosion Control — Bldg: 550
   Contact: MSgt Melchert — AV: 837-5794

This shop is responsible for corrosion treatment and painting of C-5 and C-141 aircraft, associated aircraft parts, and support equipment. The paint area has two dry ventilation systems. Waste paints (polyurethane, enamel, lacquer), thinners, MEK, waste acids and stripping wastes are generated. Currently, no segregation of MEK, paints and thinners occurs. Wastes are stored in 55-gallon drums outside the shop in a permitted storage site, Bldg 552 (see Figure 2). This permitted storage site is also used by the corrosion control section located in Bldg 810 and shops located in the maintenance complex, Bldg 550. The accumulation site manager labels each drum numerically and logs the start and stop dates, the responsible shop, and the types of waste for each drum. This site is permitted to store waste drums for one year and is a pick-up point for the contractor. During the past 18 months, this site accumulated up to about 120 drums of waste before removal. In fact, several drums dated Nov 85 and Sep 86 were still stored at the site. Figure 3 is the accumulation site for the corrosion control section located in Bldg 810. When they have a full drum of waste, the drum is transferred to Bldg 552.

5. 60 FMS Fiberglass Shop — Bldg: 550
   Contact: Mr Foskett — AV: 837-5275

Personnel in this shop manufacture and repair fiberglass and plastic aircraft and ground equipment parts. Dust generated in the sanding area is placed in plastic bags and disposed of in the dumpster. Contaminated liquid resin (about 3-5 gallons/month) is placed in 55-gallon drums and transported by shop personnel to the permitted storage site at Bldg 552 for eventual disposal as hazardous waste. Solid pieces of resin are placed in 55-gallon drums and disposed of as solid waste.

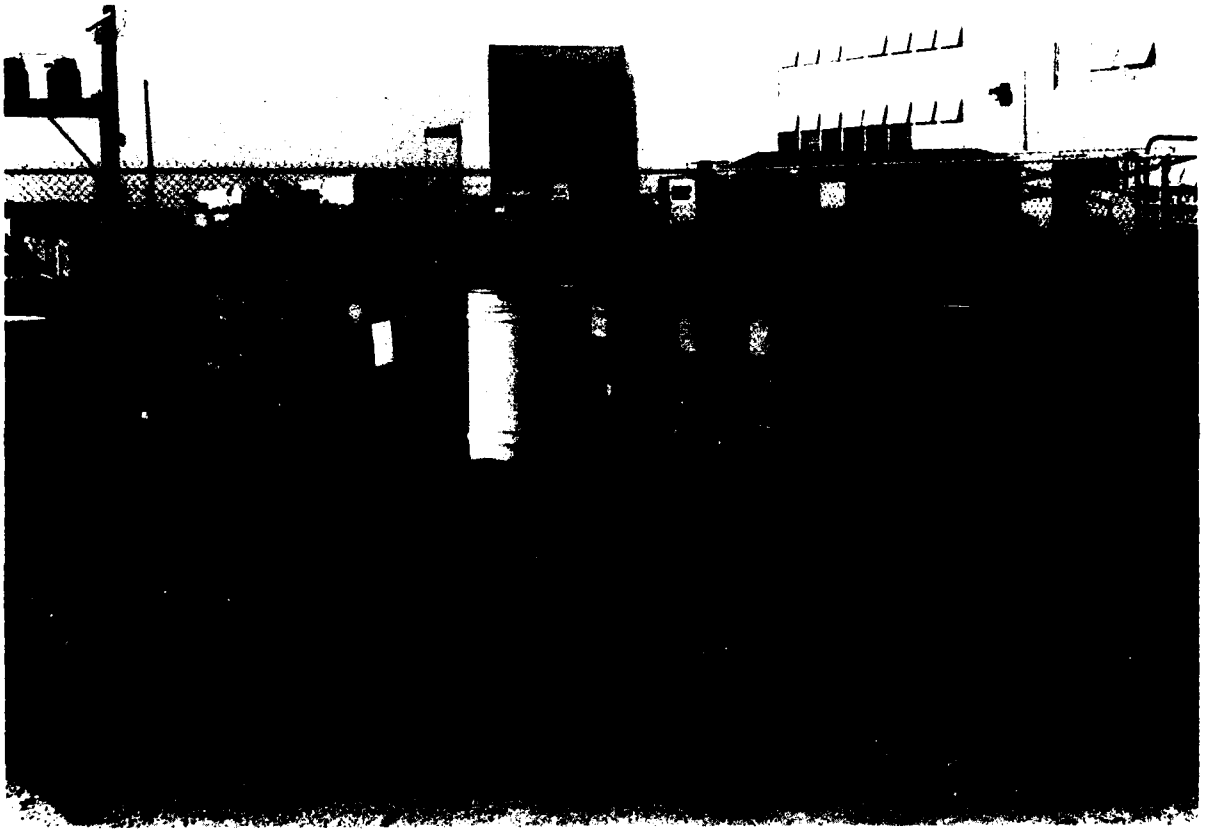

FIGURE 2: Corrosion Control (Bldg 552)

FIGURE 3: Corrosion Control (Bldg 810)

6. Metals Processing — Bldg: 550
   Contact: MSgt Thompson — AV: 837-5281

This shop repairs C-5, C-141 and aerospace ground equipment, and manufactures support equipment using welding and plating processes. The plating process consists of one plating tank (about 250 gallons capacity) and three rinse tanks (about 100 gallons each). Two to five pieces of equipment are processed per month and are placed first in the plating tank for 3-5 seconds and then dipped sequentially in each of the three rinse tanks. The plating solution must conform to the following specifications (ounces per total gallon of solution [oz/gal]):

cadmium oxide	3.5 oz/gal
cadmium metal	3-4 "
sodium cyanide	14 "
sodium hydroxide	1 "
sodium carbonate	1 "

Shop personnel do not recall emptying the plating and rinse tanks in at least 6-7 years. In fact, the rinse tanks are filled with water when necessary, but are never drained. The shop has a dated operating instruction (OI) on disposing the plating solution which states that the shop should contact the base environmental coordinator, place the waste solution in 55-gallon drums and ship the drums to McClellan AFB. They anticipate emptying the tanks within the coming year when new tanks are installed.

7. Nondestructive Inspection (NDI) — Bldg: 550
   Contact: MSgt Shelton / Mr Cross — AV: 837-5155/3011

This shop uses various procedures to inspect aircraft and engine components for defects. The penetrant inspection is an open system using a fluorescent penetrant, remover (90% water and 10% emulsifier), and chalk developer. Parts are sequentially dipped into the penetrant; removed and pre-rinsed; placed in the remover solution and rinsed; and allowed to drip dry. Then the part is sprayed with a chalk developer and allowed to drip dry before passing through a drying oven and final rinse. The rinsewater and spent developer are discharged down the drain. The penetrant and remover are drummed (about 10 drums per year) and stored in the permitted storage area, Bldg 552, before disposal as hazardous waste. The photo lab in the NDI shop uses fixers and developers. Used developer is discharged down the drain and used fixer is sent through a silver recovery unit before being discharged into the sewer system. Every 3-4 months, the silver is salvaged by contacting the Environmental Coordinator who arranges a contract through DRMO.

8. 60 FMS/MAFA Fuel System Shop — Bldg: 551 / Dock 808
   Contact: Mr Marando — AV: 837-2137

The Fuel System Shop does maintenance, repairs, functional checks and inspections of aircraft fuel system, tanks, components, and in-flight refueling systems. JP-4 fuel is bottom drained from the aircraft into two of three available bowsers (375 gallons each) resulting in about 2000 gallons of recycled fuel per month. This recycled fuel is taken to the Fuel Lab to determine if it is contaminated (e.g., hydraulic fluid). Contaminated fuel is transferred by the shop to 55-gallon drums and transported to Bldg 1365 for disposal as hazardous waste. During the past six months, two or three incidences of contaminated fuel have occurred.

Small amounts of solvents (e.g., MEK) are used to clean fuel cells. Everything associated with this cleaning procedure (rags and empty solvent cans) are disposed of as hazardous waste.

Flight line fuel spills are cleaned up by the Fire Department using absorbent pads. Afterward, these pads are placed in 85-gallon overpacks by the shop and disposed of as hazardous waste. In-shop fuel spills are washed down with water into an oil/water separator. Speedy Dry is used for hydraulic fluid spills and is disposed of in dumpsters. This shop plans to build a hazardous waste accumulation site, but a work order has not been submitted.

9. Electric Shop — Bldg: 755
   Contact: MSgt Coleman — AV: 837-2384

This shop is responsible for the disposal of all batteries for the base. Shop personnel neutralize about 70-100 lead-acid batteries per month by soaking batteries (about 14 batteries) of varying sizes in a 15-gallon tank using 100 pounds of baking soda. The neutralized acid is discharged down the drain to the sewage system and the battery casking is sent to salvage. The acid neutralization process does not have a treatment permit from the State of California. The most recent analysis of the neutralized solution revealed a lead concentration of 6 milligrams per liter (mg/l) which is in excess of the county and state regulations (1 mg/l and 5 mg/l, respectively).

The Electric Shop also cleans and tests constant speed drives (CSD). About 9 CSD units are processed each week, and each unit generates about 14 quarts of oil (7 quarts when initially drained and 7 quarts used during testing). Trichloroethane (about half a drum per month) is also used in the cleaning of generators and the spent trichloroethane is drummed and stored in an accumulation site outside Bldg 755 (see Figure 4) and later transported by shop personnel to Bldg 1365 upon coordination with DEEV. The outside accumulation site is an open area with drums on a trailer. During the survey, only one of the four drums on the trailer was labeled.

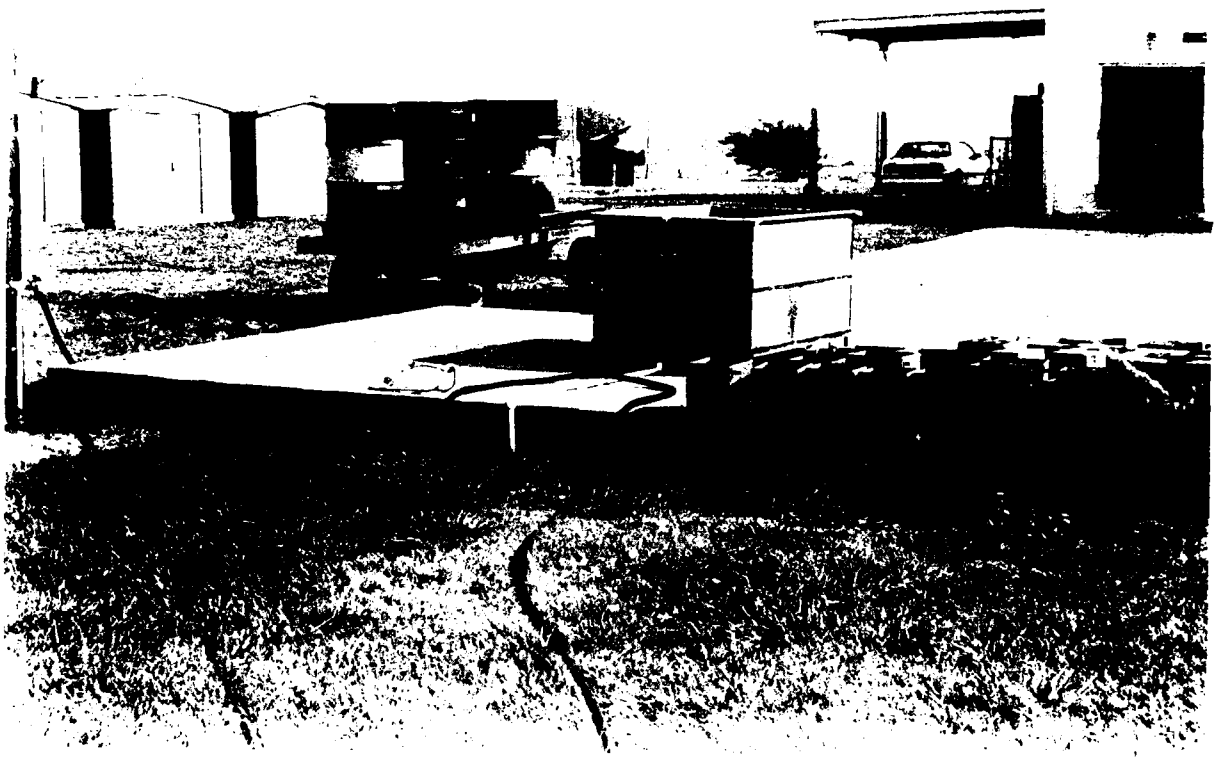

FIGURE 4: Electric Shop (Bldg 755)

10. 60 FMS Wheel and Tire — Bldg: 819
    Contact: Mr Hicks — AV: 837-5737

This shop is responsible for assembling, disassembling, and cleaning aircraft wheels and tires. The shop has 4 tanks containing PD-680 Type II where bearings are washed (agitated and submerged), soaked, and rinsed; and wheels are washed. These tanks are changed out every 4-6 weeks. Since this shop does not have an accumulation site, the wastes are drummed (about 6 drums), secured with cables, and stored outside Bldg 819 for a few days before being taken to Bldg 1365. A log is kept on the drums which are sent to Bldg 1365. Cleaning-out these tanks (PD-680 and waste sludge) and transporting the waste drums to Bldg 1365 is typically a two-man operation requiring about 23 man-hours.

11. 60 FMS Hydraulic Shop — Bldg: 819
Contact: SMSgt Sweeney — AV: 837-5070

This shop is responsible for aircraft hydraulic systems and component maintenance and operational checks. The shop has two PD-680 tanks to clean flight line components. These tanks with a capacity of about 15 and 165 gallons each are changed every 6 and 4 months respectively, and the contents are placed in a 55-gallon drum and taken to Bldg 1365. There are two test-stands (capacity of 35 and 100 gallons) containing hydraulic fluid that are changed only if contaminated; this has occurred once in two years. A carbon cleaner tank (about 60 gallons) and three trichloroethane tanks (about 6 gallons each) are used to clean aircraft hydraulic filters. The carbon cleaner tank is changed out once in six months and the trichloroethane tanks are changed out once every two to three weeks. The shop is getting an ultrasonic cleaner that will use soap and water. This will eliminate the need for carbon cleaner and trichloroethane. The shop is considering converting it's 165-gallon PD-680 tank to Citrakleen. All wastes are segregated, placed in 55-gallon designated drums and stored in an accumulation site outside Bldg 819 (see Figure 5). The shop has submitted a request to update this site. A log is maintained on the disposal rates of each waste generated.

FIGURE 5: Hydraulic Shop (Bldg 819)

12. TF 33 Engine Shop — Bldg: 839
Contact: SMSgt Nowling — AV: 837-3624/2888

This shop repairs and maintains TF-33 engines. A tank (12 gallon capacity) containing PD-680 is used to clean engine parts and is changed once per month. The spent PD-680 (about one drum per year), 7808 engine oil (about one drum per six months), and JP-4 (about one drum per year) are placed in 55-gallon drums, stored in the accumulation site outside Bldg 839 (see Figure 6), and finally transported by shop personnel to Bldg 1365. The accumulation site is an open area. About ten drums of mostly water with some contaminated oil is stored at the accumulation site awaiting disposal.

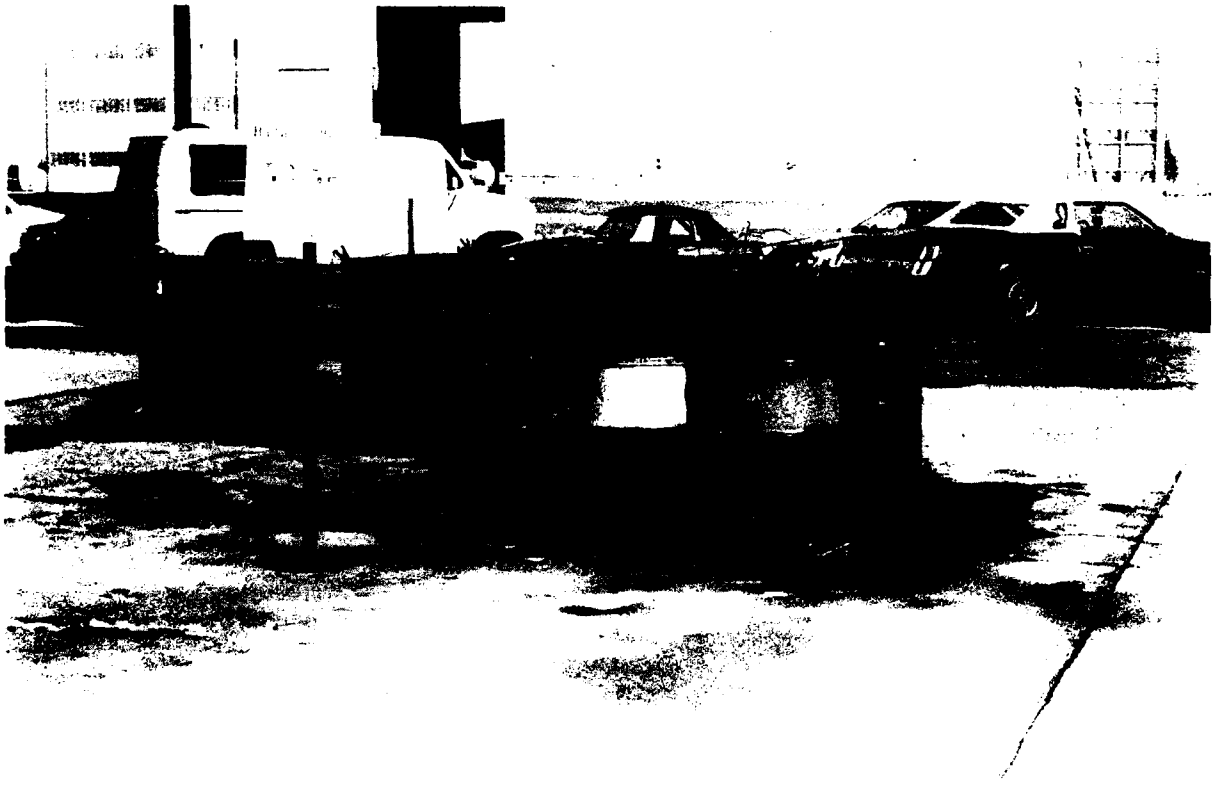

FIGURE 6. TF-33 Jet Engine (Bldg 839)

13. C-141 Isodocks — Bldg: 841
Contact: Mr Looney — AV: 837-5565

This shop inspects C-141 engines and changes oil and fluids as needed. Three squadrons work on the C-141 in this shop: OMS, FMS, and AMS. There is not an accumulation site designated for this shop. Waste engine oil is taken to the accumulation site outside Bldg 839 for disposal. Waste hydraulic fluid is transported in five-gallon cans to a 350-gallon bowser at Bldg 819. The accumulation sites at Bldgs 839 and 819 are not secured. JP-4 is collected in a 400-gallon bowser and approximately 3000 gallons of reusable fuel are recovered annually. When the bowser is half full, the bowser manager, SSgt Douglas (602 OMS/2 MAOI, AUTOVON 837-3655, formerly TSgt Clark) transports it to the Fuel Storage Shop, 60 MAW/LGSFS (AUTOVON 837-2219), Bldg 711. The Fuel Storage Shop performs a fuel analysis and if the fuel is not contaminated, they accept the fuel. If the fuel is contaminated, it is returned to SSgt Douglas for disposal. Each year two to four 55-gallon drums of contaminated fuel are generated. These drums are taken directly to Bldg 1365. The funnel to the fuel bowser is locked and the key is stored in Bldg 842 (all squadron personnel know where the key is located). The shop personnel have had difficulty arranging transportation of the drums to Bldg 1365.

14. Protective Coating — Bldg: 874
Mr Martinez — AV: 837-3964

This shop paints buildings (interior and exterior) and traffic markings on streets, parking lots, and airfield. Waste paints and thinners are generated (about half a drum per month). These wastes are segregated into three different waste drums (mixed solvents and thinners, mixed oil base paint, and latex water base paint), stored at an accumulation site outside Bldg 874 (see Figure 7), and then transported by shop personnel to Bldg 1365. Shop personnel have a problem getting a forklift to transport the wastes and arranging delivery of the waste drums to Bldg 1365.

15. 39 Test Cell — Bldg: 1001
Contact: MSgt Jones — AV: 837-3461

This shop is responsible for maintaining and testing TF-39 jet engines for the C-5 aircraft. Small quantities of waste oils (e.g., 7808 and 1010), fuels, hydraulic fluid (e.g., 5606), and Citrakleen are generated at this shop and collected in a 500-gallon underground tank that is pumped out by a contractor every two months. The contractor comes regularly and the shop does not have any problems with the present waste disposal procedure.

FIGURE 7: Protective Coating (Bldg 876)

16. PMEL — Bldg: 942
Contact: MSgt Moreland — AV: 837-3244

This shop calibrates all precision instruments on base. Freon (spray cans) and alcohol are used up in the process. Small quantities of mercury waste are sent to McClellan AFB. They have mercury spill kits on order.

17. AGE — Bldgs: S-11 & P-41
Contact: SMSgt Hynson — AV: 837-5140

The AGE Shop services, maintains, and dispatches flight line support equipment. The shop generates waste engine and synthetic oils, contaminated fluids, and PD-680. The waste oils and contaminated fluids are collected in 500-gallon bowsers, stored outside Bldg P-41 (see Figure 8), and are transported to Bldg 1365. Waste PD-680 from a degreasing tank (generated at a rate of about 17 gallons per month) is placed in 55-gallon drums, stored at the outside accumulation site, and transported to Bldg 1365 similar to the other wastes.

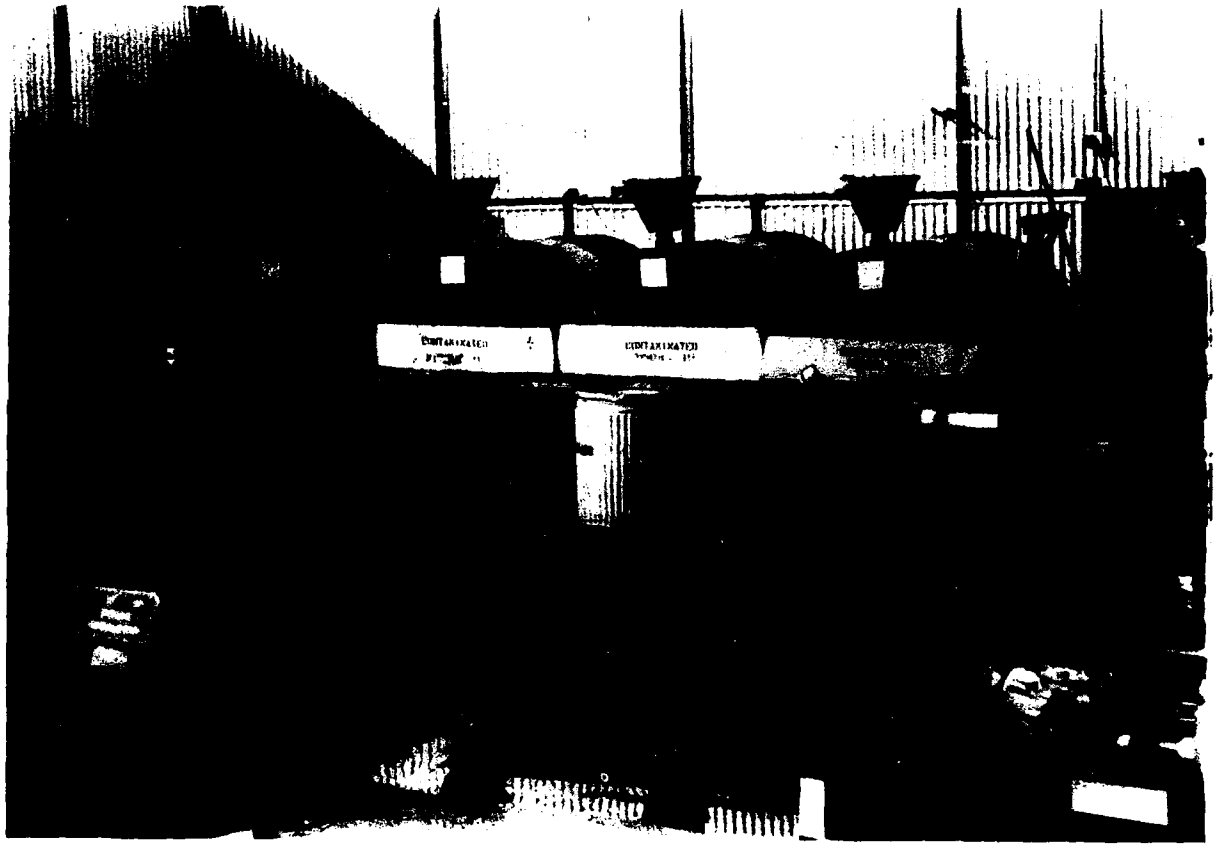

FIGURE 8: AGE Shop (Bldg P-14)

18. Civilian Washrack — Bldg: 811
Contact: Mr Hillstrom — AV: 837-3258

A civilian contractor, Galaxy 2000, washes, strips and pre-treats aircraft surfaces prior to painting. They process 600-700 parts and 35 aircraft per month. Wastes include acids, oils, Calla 800 aircraft soap, strippers, carbon remover,

antifreeze, and PD-680. All of their chemicals eventually are discharged into a 3-stage filtration, oil/water separator (6000 gallons) which is pumped out by contract every three months. In March 1987, PCB was found in the separator. As a result, the waste was drummed and is presently being stored at Bldg 956, a permitted PCB storage site. They have had serious problems with the operation of the separator and have requested Civil Engineering to evaluate the unit (work order dated 15 Sep 87). During the survey, the chemicals used in this shop were discharged through an overflow valve (designed to divert water in the event of a fire) to a pond.

B. Transportation

19. Fire Truck Maintenance — Bldg: 560
Contact: Mr Chitwood — AV: 837-3380

This shop maintains the fire fighting vehicle fleet on base. Waste engine oil, antifreeze, and transmission fluid are generated by the shop. Small amounts of waste antifreeze and transmission fluid are transferred to drums located at the motor pool, Bldg 139. The one Safety Kleen degreasing unit (20-gallon capacity) in the shop is serviced every three months. The engine oil is drummed (about half a drum per month) and taken to an accumulation site outside Bldg 560 (see Figure 9). The waste oil drums are eventually picked up and transferred to the permitted storage facility, Bldg 1365, by a designated individual within the Transportation Squadron responsible for transporting waste drums from all the accumulation sites managed by the squadron. The base BEE has sampled two drums containing unknown substances stored at the accumulation site to determine the disposal procedures for these drums.

20. General Purpose — Bldg: 139
Contact: Mr Higgins — AV: 837-5376

This shop maintains all military vehicles and generates waste oil (3 drums per month), antifreeze (1 drum every 7 months), transmission fluid (1 drum every month), and contaminated gas and diesel fuel (2-4 drums per month). These wastes are segregated and placed into designated 55-gallon drums, stored at an accumulation site outside Bldg 139 (see Figures 10 and 11), and transported to Bldg 1365 by the Transportation Squadron (one person transports all of the squadron's waste drums to Bldg 1365). They have 3 Safety Kleen units (30-gallon capaity) serviced once per month. The Bay Area Air Pollution Authority requires information on the quantity used and lost (e.g., evaporation) and the shop is having difficulties acquiring this information from the Safety Kleen Corporation. They also have two oil/water separators which are pumped out every 2-3 months. These separators serve as discharge points for aircraft cleaning compound used to scrub floors and by the engine steam cleaning unit.

FIGURE 9: Fire Truck Maintenance (Bldg 560)

FIGURE 10: General Purpose (View 1, Bldg 139)

FIGURE 11: General Purpose (View 2, Bldg 139)

21. Special Purpose — Bldg: 139
    Contact: TSgt Fahrendorf — AV: 837-5687

Special Purpose repairs all types of heavy equipment. This shop generates the same wastes as General Purpose, and the wastes are placed in drums, stored, and transported to Bldg 1365 in the same manner as General Purpose. They have one Safety Kleen unit.

22. Allied Trades — Bldg: 144
    Contact: MSgt Midkiff — AV: 837-5119

This shop is responsible for vehicle body work and painting. Waste paints and thinners are generated at a rate of one drum every three months and are not segregated. The wastes are stored at an accumulation site outside Bldg 144 (see Figure 12) and transported to Bldg 1365 by the Transportation Squadron. The waterfall paint booth for the painting operation is not working, and as a result, the workload is greatly diminished. Normally, 2-3 drums per month of waste paints and thinners would be generated.

This shop also services radiators by placing them in a cleaning tank containing solvent and then in a test tank containing water to check for leaks. The solvent tank (350-gallon capacity) becomes contaminated with ethylene glycol and is changed once or twice per year. The waste solvent is placed in 55-gallon drums and stored at an accumulation site outside Bldg 144 before transported to Bldg 1365. After the cleaning process, the radiators are placed in a test tank to check for leaks using water and a dye. This test tank (350-gallon capacity) is changed out every three months. In the past, the contents of the radiator test tank were emptied on the ground. This practice was stopped and tank waste is now drummed.

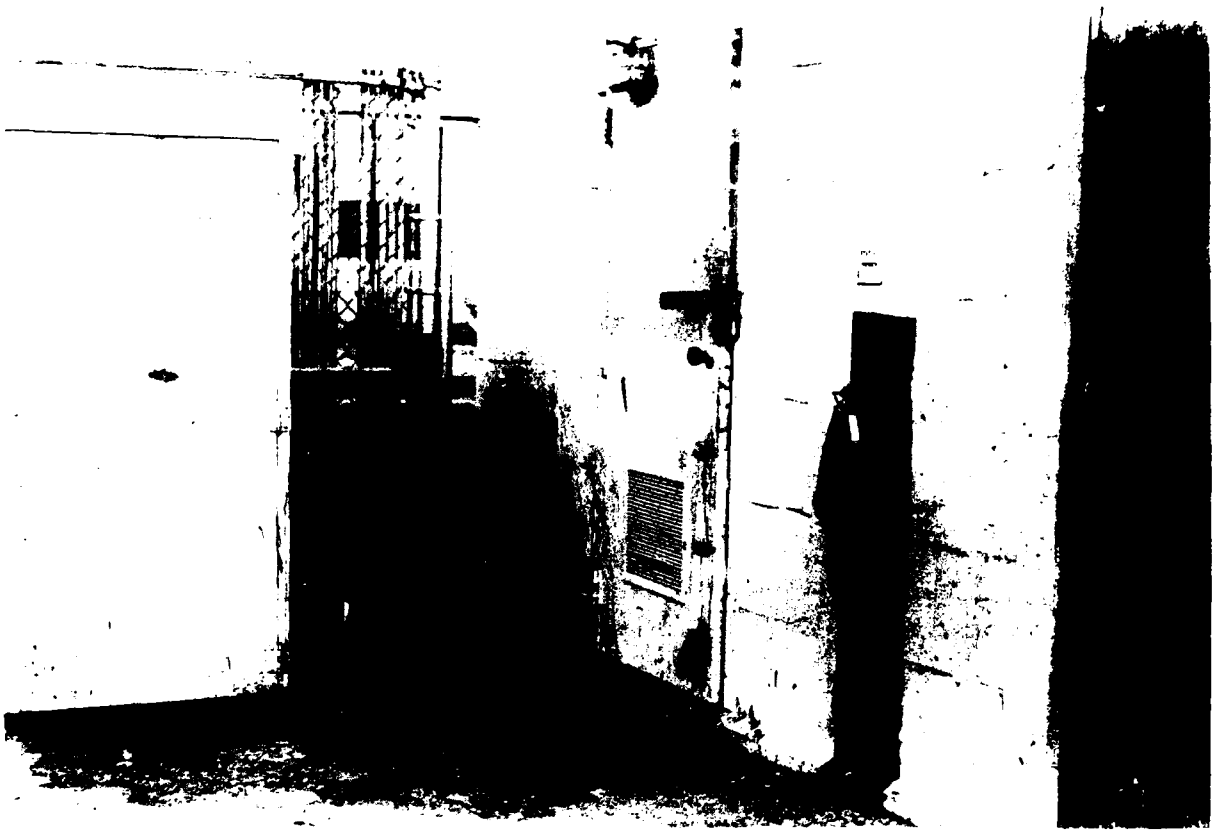

FIGURE 12: Allied Trades (Bldg 144)

23. 463 L/Material Handling Equipment (MHE — Bldg: 919
Contact: Mr Kidd — AV: 837-5494/2820

This shop services and repairs vehicles and generates waste antifreeze, contaminated gas and diesel, transmission fluid and waste oil. These wastes are placed in designated 55-gallon drums, stored in an accumulation area outside Bldg 919 (see Figures 13 and 14), and transported to Bldg 1365 by the Transportation Squadron. They have one Safety Kleen unit (15 gallon capacity) that is serviced once a month. They have one bowser for contaminated engine oil, but they are currently not using it because they think it requires a permit before use.

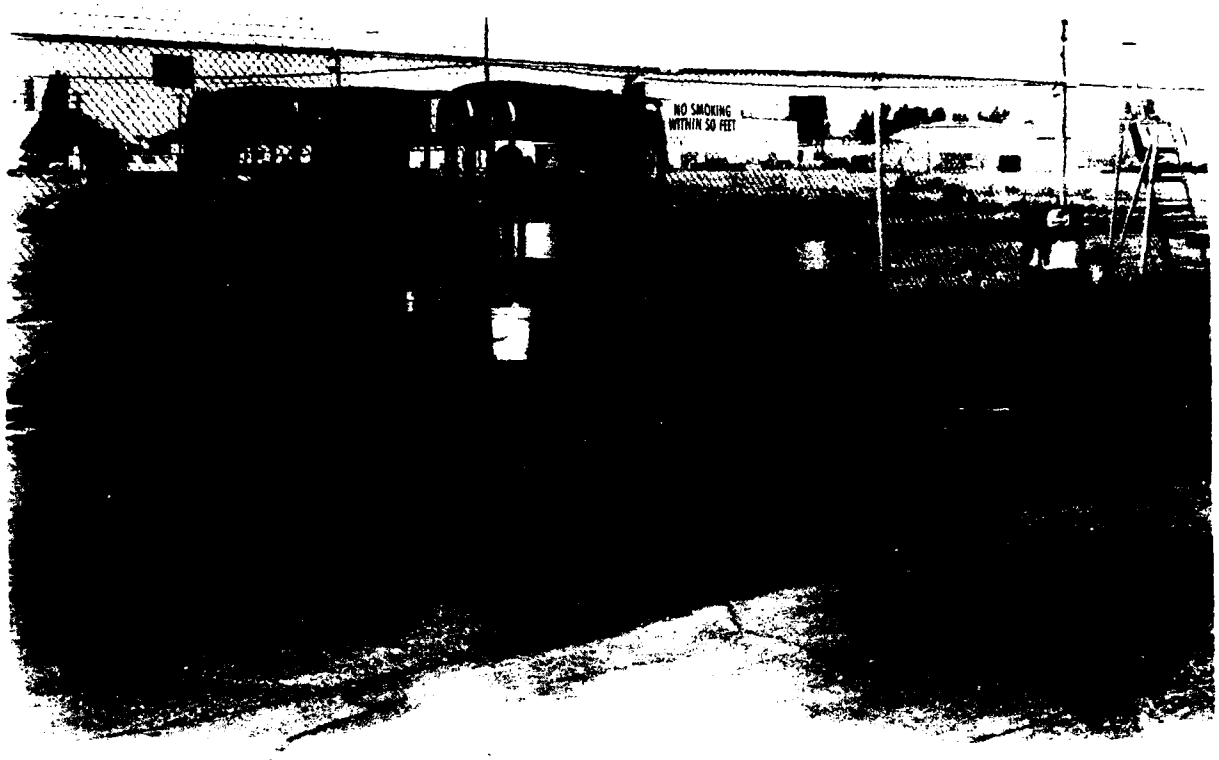

FIGURE 13: MHE (View 1, Bldg 919)

FIGURE 14: MHE (View 2, Bldg 919)

24. Refueling Vehicle Maintenance — Bldg: 1202
Contact: Mr Blankenship — AV: 837-5272

This shop repairs and maintains aircraft refueling equipment. They generate waste transmission fluid (1 drum/8 mo), JP-4 (500 gal/mo), engine oil (1 drum/4 mo), antifreeze (1 drum/yr), and PD-680 (26 gal/mo). These wastes are placed in 55-gallon drums, stored in an accumulation site outside Bldg 1202 (see Figure 15), and transported to Bldg 1365 by the Transportation Squadron. Soaps and large amounts of rinsewater are used to clean the floor (minor fuel spills - 1/2 pint). They are very particular about cleaning the floor due to the danger of sparks and the resultant fire hazard. The rinsewater is discharged to a 3-stage oil/water separator which is pumped out once a month. The separator has a valve such that a major spill could be diverted to an underground tank.

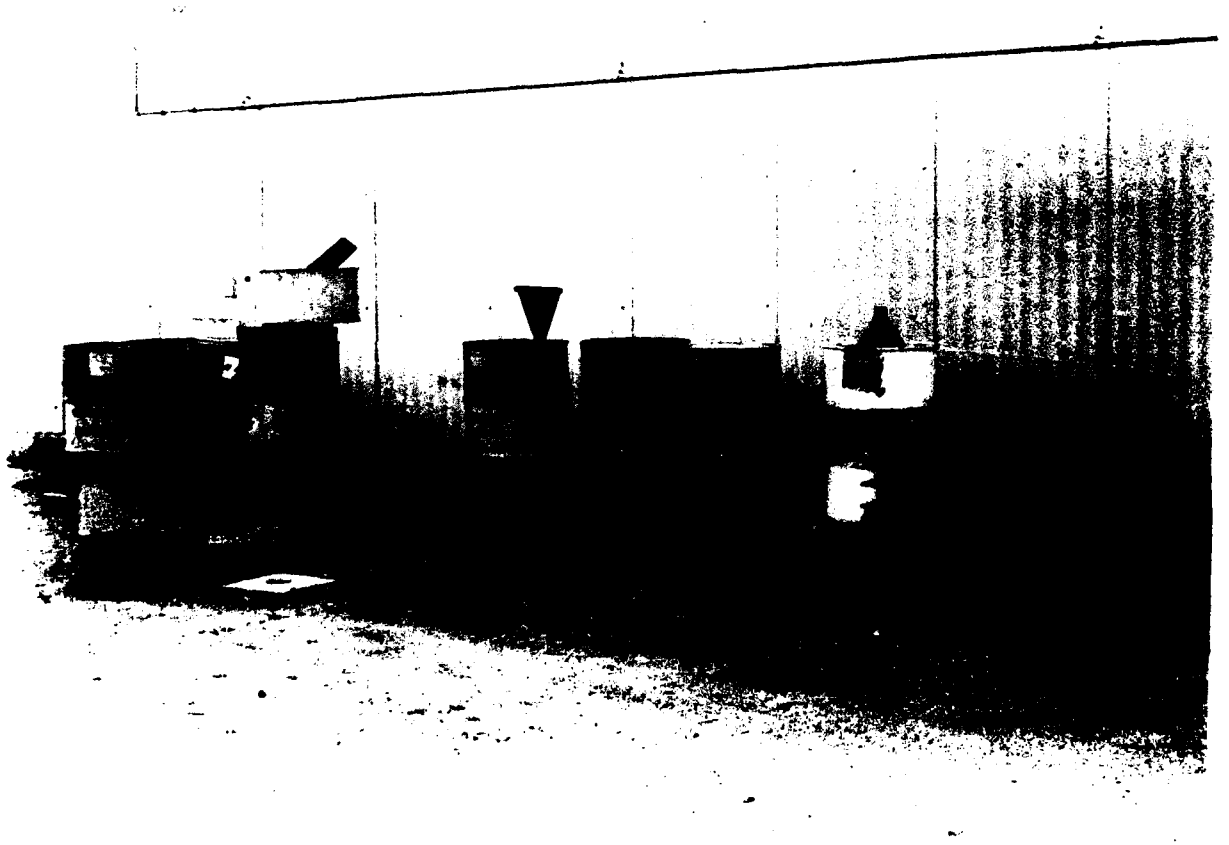

FIGURE 15: Refueling Vehicle Maintenance (Bldg 1202)

C. Civil Engineering

25. 60 CES Power Production — Bldg: 931
Contact: TSgt Leyser — AV: 837-2701

This shop operates and maintains 57 generators and 12 pump engines. This includes changing engine oil on each unit at least once per year. They generate small amounts of waste PD-680 (5-gallon capacity tank changed once every three months), engine oil, fuel and contaminated gas. These wastes are placed in 55-gallon drums, stored at an accumulation site outside Bldg 931 (see Figure 16), and transported to Bldg 1365. Shop personnel expressed having difficulties transporting the waste drums to Bldg 1365 due to limited manpower.

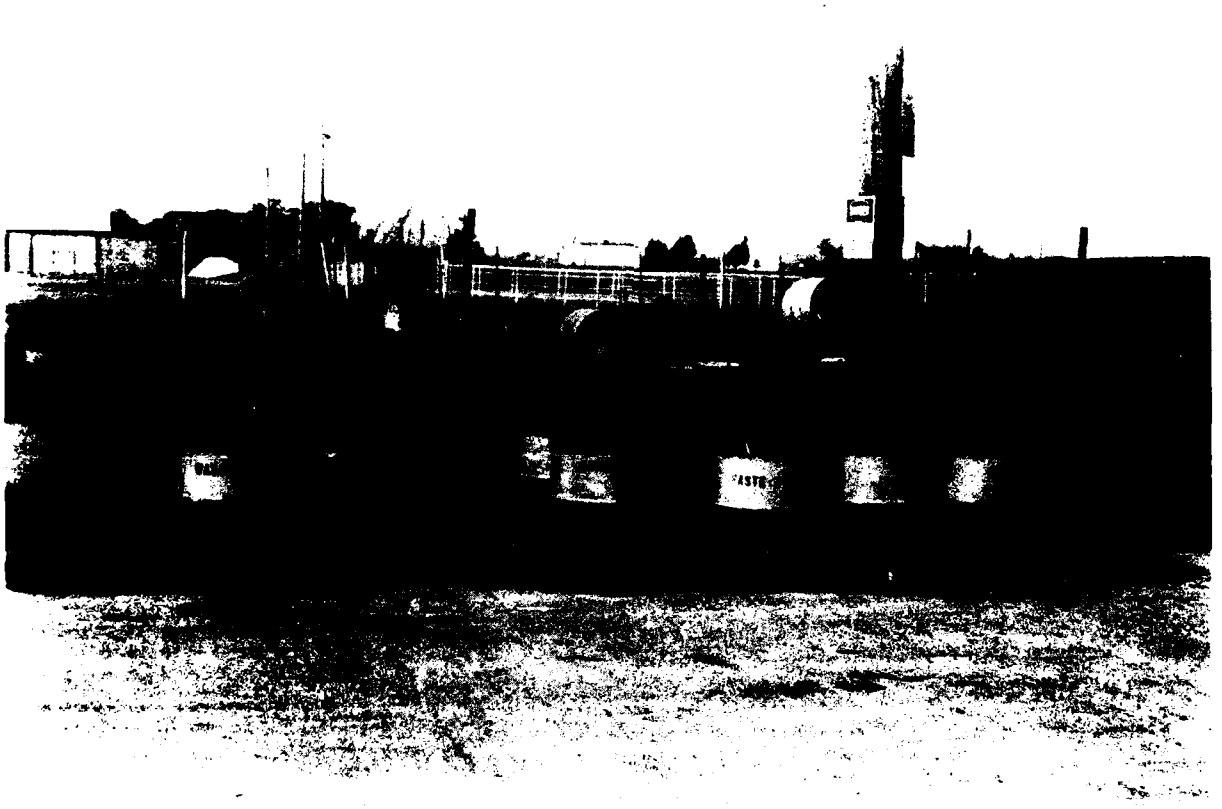

FIGURE 16: Power Production (Bldg 931)

26. Entomology — Bldg: 905
Contact: Mr Whalen — AV: 837-3033

Entomology Shop personnel apply pesticides on base. Unused pesticides are remixed and applied. During the survey, the shop did not triple rinsed pesticide containers. In the past, triple rinsing pesticide containers had been performed in the chemical mixing room in two sinks which drains into a 650-gallon tank located within another tank underground. The shop had just purchased a triple rinse-can crusher unit for five-gallon cans. The unit drains about two gallons of rinsewater per can, and the shop had planned to drain the rinsewater to the 650-gallon tank. During the survey, the triple rinse-can crusher was not in use. The DEEV was working to resolve some concerns including the management of the tank as an underground storage tank and the potential seepage of groundwater and rainwater into the tank. The County is concerned that the wooden piers will rot due to moisture (rainwater) in the pit, resulting in the tank rolling over and breaking. Meanwhile, pesticide containers are accumulating. Also, there are eight drums of unlabeled pesticides awaiting disposal outside the shop.

27. CES Heating Shop — Bldg: 32
Contact: MSgt Basco — AV: 837-3170

This shop provides heating and plumbing services for the base. They generate asbestos waste at a rate of about one garbage bag per month. Asbestos is triple bagged and then placed in 55-gallon drums. The shop holds the waste drums in the back of their shop until they contact DEEV to arrange an appointment to deliver the drums to Bldg 1365. They are the unofficial focal point for questions regarding asbestos handling, but they feel their training is inadequate for this responsibility. Their last educational training was 2 years ago.

28. Liquid Fuels Maintenance — Bldg: 908
Contact: Mr Leverett — AV: 837-5862

This shop generates an average of about 450 gallons of JP-4 fuel every 6 months. Waste fuel goes into two secured bowsers (450-gallons each) and when full, it is tested by the fuel laboratory. Uncontaminated fuel goes to the holding tanks located at the tank farm (Bldg 711) as reusable fuel. Contaminated fuel is taken to Bldg 1365. Drip pans and absorbant pads are available in the shop for routine spills, and the spill team would be notified if a serious leak occurred.

29. Exterior Electric — Bldg: 936
Contact: TSgt Beatty — AV: 837-3831

This shop maintains all of the transformers on base and tests transformer oil for polychlorinated biphenol (PCB). PCB contaminated transformers, soil, and soiled clothing are stored in the permitted storage facility, Bldg 956. The shop is planning on contracting out PCB testing of all transformers not already tested.

30. Interior Electric — Bldg: 873
Contact: Mr Greyson — AV: 837-3831

This shop is responsible for interior electric work on base. This shop has one 10-gallon solvent (PD-680) tank which has not been changed in the last 10 years. The tank is not used on a regular basis and shop personnel said they would like to eliminate it. Some PCBs still exist in old ballasts (which are marked), but they have not had a need to change them in many years. New ballasts do not contain PCBs. PCB wastes generated would be drummed and transported to Bldg 956.

D. Miscellaneous

31. Combat Arms Training — Bldg: 902
Contact: SSgt Johnson — AV: 837-2121

This shop is responsible for maintaining fire arms using PD-680. They generate small amounts of waste PD-680 at a rate of 2 gallons per year. The wastes are placed in a 55-gallon drum, stored at the accumulation site at the firing range, Bldg 1375, and transported to Bldg 1365. These wastes are accumulated over a five-year period.

32. Tracals — Bldg: 1185
Contact: MSgt Burney — AV: 837-2522

This shop is responsible for maintaining the radar and weather antennae facility. Waste transmission fluid is generated by this shop at a rate of 3 gallons per month. This waste is taken to the underground tank located at the Auto Hobby Shop. If a fuel spill occurred, spill pads are available. An underground tank (about 500-gallon capacity) containing contaminated fuel is no longer in use.

33. Power Support Systems (CEMIRT) — Bldg: 1205
Contact: Mr Rohac — AV: 837-5211

This shop maintains and overhauls generators (200 KW and above) for bases in seven western states and in PACAF. Waste paint and thinner, oil, antifreeze, and PD-680 are generated in this shop. These wastes are placed in

55-gallon drums, stored in an accumulation site outside Bldg 1205, and transported to Bldg 1365 by shop personnel. The shop has a forklift available and does not have any difficulty transporting the drums to Bldg 1365. Shop personnel do not segregate their wastes. They have three drums at the accumulation site: one drum for oil and solvent, a drum for antifreeze and PD-680, and one for paints and thinners. The shop has five drums of Citrakleen, but they have not used it yet. They plan to drum the spent Citrakleen.

34. Auto Hobby Shop — Bldg: 226
Contact: Mr Bizjak — AV: 837-5300

Base personnel service their personal vehicles at this shop. Waste oil and PD-680 are generated. The waste PD-680 is from a 155-gallon solvent tank that is changed out twice a year. The waste oil, PD-680, and all other wastes are dumped into a 600-gallon underground tank installed in the early 1950s. The wastes are poured into a pipe on the ground (See Figure 17) which is connected to the tank. This tank is pumped out about every six weeks by contract and the oil is recycled. The shop has a hot acid tank for cleaning engine parts. This acid tank is not normally emptied, and acid is added when necessary. After parts are soaked in the acid tank, they are rinsed and the rinsewater is discharged into an oil/water separator. The rinsewater from the steam cleaning unit also goes to the oil/water separator.

FIGURE 17: Auto Hobby Shop (Bldg 226)

35. DGMC Clinical Lab — Bldg: 375
Contact: Capt Eckert — AV: 837-8143

This laboratory performs all the clinical analysis for the Medical Center. All wastes (e.g., methanol, ethanol, toluene, acid, isotoner, and bleach), except Histoclear are discharged down the drain. Histoclear is drummed (15 gallons per week), stored in the lab, and transferred to Bldg 1365. Histoclear is treated as a hazardous waste because its ignitability is below the Environmental Protection Agency Standard of 140 degrees Fahrenheit.

E. Permitted Storage Sites

There are three storage sites at TAFB permitted for one year storage. These sites are located at Bldgs 956, 1365, and 552. Each one of these sites was visited and the findings follow.

1. Bldg 956

The storage bunker at Bldg 956 is permitted for PCB storage and contained 60 drums during the visit. Forty-five drums contained PCB contaminated waste from the oil/water separator at the Civilian Wash Rack (Bldg 811 - see shop 18 above) and 15 drums were unlabeled. Sixteen transformers were stored in this bunker. No log is kept on the wastes and there were no immediate plans to dispose of these wastes.

2. Bldg 1365

The Central Hazardous Waste Storage Facility for the base was built in 1945 and consists of 12 (six back-to-back, two openings per stall) stalls similar to an open garage. During the visit, each of the six stalls facing east (see Figure 18) contained drums marked:

Stall#	Waste
1	trichloroethane, epoxy, resins and oils - 18 drums
2	waste oils - 56 drums
3	engine oil and diesel - 56 drums
4	solvent, PD-680, diesel oil - 35 drums; and 8 ten-gallon drums of alcohol (histoclear from the hospital)
5	hydraulic fuel, diesel, kerosene, and antifreeze - 44 drums
6	oil and hazardous substances, mogas, and antifreeze - 42 drums

Two fire extinguishers were attached to partitions separating the stalls.

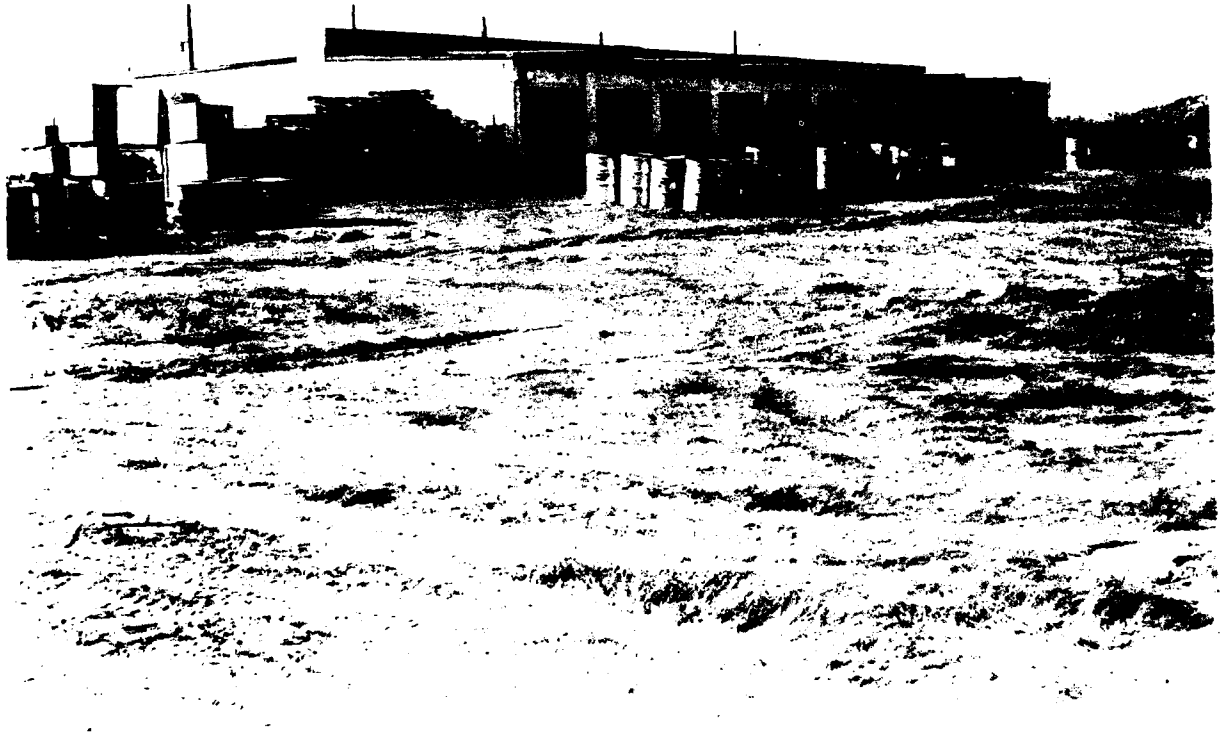

FIGURE 18: Storage Facility (East View, Bldg 1365)

In the six stalls on the west side (see Figure 19), three stalls were filled with 110 drums marked asbestos, but not dated. The remaining stalls contained 40 empty crates, 10 dumpsters, and one 500-gallon tank. Outside the covered area there were 11 overpacks; one trichloroethane drum; 33 hydraulic fluid, engine oil, and diesel fuel drums; 39 unlabeled drums; 40 deteriorated drums; and 14 asbestos crates. During our visit, the stall area was full and the outside area was about half-full. Mr Sandy, the Environmental Coordinator, said he was getting ready to arrange a pick-up through DRMO. This area was secured but the stalls or surroundings were not burmed. The drums outside the covered area (surroundings) were stored on a grass surface. No log is kept of the drums in this area.

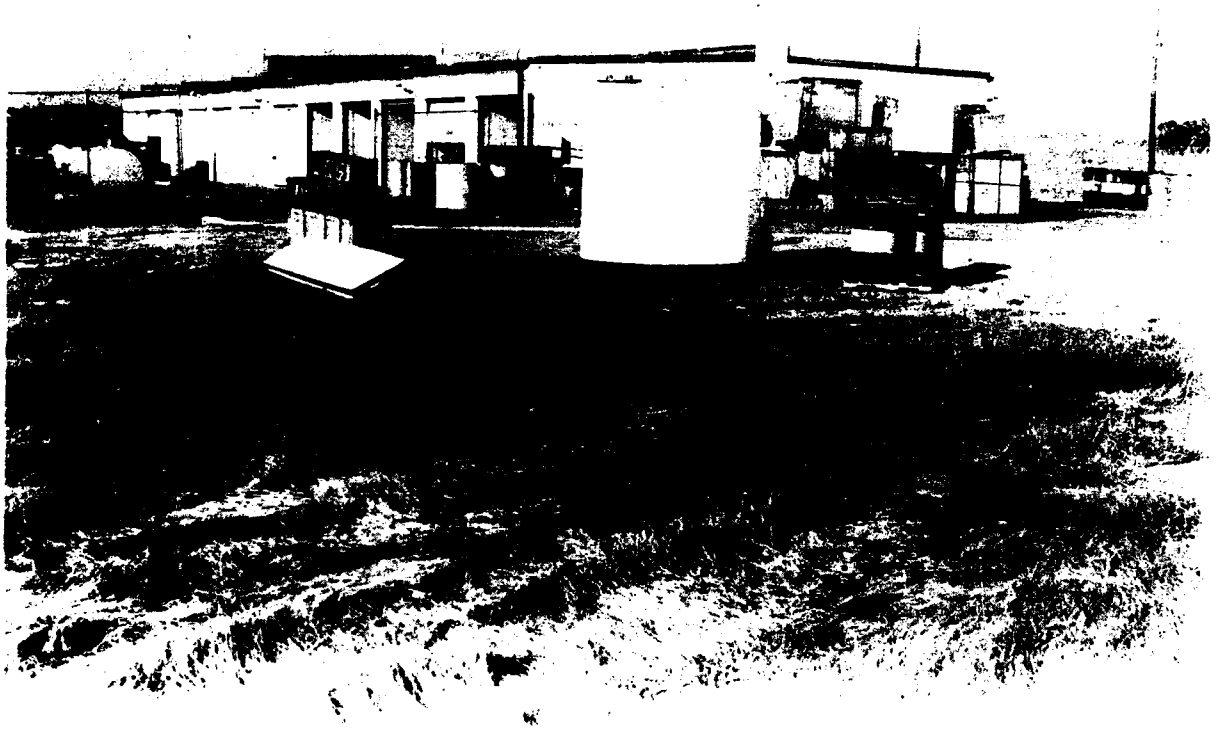

FIGURE 19. Storage Facility (West View, Bldg 1365)

3. Bldg 552

The storage area at Bldg 552 serves the maintenance shops in Bldgs 550 and 810. The site consists of 37 drums full of solvent and paint, one drum being filled and 13 empty drums, one oil/hydraulic waste drum, and two drums of penetrants and emulsifiers from NDI. There were drums dated Nov 85 and Sep 86. The area is secured with warning signs and burmed, but the floor is not impermeable (asphalt). A fire extinguisher and overpack are available, and in general, the condition of the drums was good. A detailed log is maintained on the drums contained at this site.

F. Accumulation Sites

Twelve accumulation sites were visited at Travis AFB and the conditions at each site are presented in Table 2. The 12 sites evaluated were:

SITE	LOCATION	BLDG
1	Electric Shop	755
2	Hydraulic Shop	819
3	TF-33 Jet Engine	839
4	Corrosion Control	810
5	Power Production	932
6	Protective Coating	876
7	Refueling Vehicle Maintenance	1202
8	Material Handling Equipment	919
9	General Purpose	139
10	AGE Shop	1918 (P-41)
11	Gas Turbine Shop	S-12
12	Chemical Process Cleaning Facility	P-18

Table 2 Conditions of Accumulation Site

	SITE NUMBER											
SITE	1	2	3	4	5	6	7	8	9	10	11	12
secure	N	N	N	N	N	Y	Y	N	N	N	N	N
gates locked	N	N	N	N	N	Y	Y	N	Y	N	N	N
warning sign	N	Y	Y	N	Y	N	N	N	N	Y	Y	Y
impermeable floor	N	N	N	N	N	N	N	N	N	N	N	N
diked/burmed	N	N	N	N	Y	N	N	N	N	N	N	N
valve in burm	N	N	N	N	N	N	N	N	N	N	N	N
SPILL EQUIPMENT												
overpack	N	N	N	N	N	N	N	N	N	O	N	N
spill supplies	N	O	O	Y	Y	N	Y	Y	Y	O	N	Y
extinguisher	N	N	O	Y	Y	Y	Y	Y	Y	N	Y	Y
CONTAINERS												
funnels in container	N	N	N	Y	N	Y	Y	N	Y	Y	Y	Y
container closed	Y	Y	N	Y	Y	N	Y	Y	Y	Y	N	Y
deteriorating	N	N	N	N	N	N	N	N	N	N	N	N
leaking	N	N	O	N	N	N	N	N	N	N	N	N
spills	N	N	N	N	N	N	N	N	N	N	N	N
labeled	I	Y	Y	Y	Y	Y	Y	I	I	O	O	O
dated	N	I	N	Y	I	N	Y	I	I	O	O	O
log maintained	O	O	N	Y	N	O	O	N	N	O	O	O

N = NO
Y = YES
I = INCOMPLETE
O = NOT OBSERVED

V. SUMMARY OF GENERAL WASTE DISPOSAL PRACTICES

General waste disposal practices for different categories of waste are summarized in this section. A summary of disposal practices for each waste category is contained in Appendix D.

1. Waste paints and thinners are placed in 55-gallon drums, stored at accumulation sites near the shop and then transported to the permitted storage facility, Bldg 1365. In general, the paint and thinner wastes are not segregated.

2. Most of the stripping wastes are generated at the Civilian Washrack, Bldg 811, and are rinsed to an oil/water separator. Stripping wastes from other shops are placed in 55-gallon drums, stored at accumulation sites, and then transported to Bldg 1365.

3. The largest generator of waste acids is the Electric Shop. The Electric Shop is responsible for the disposal of all batteries for the base. Lead-acid batteries are neutralized and discharged down the sanitary sewer. The Civilian Washrack rinses waste acids down an oil/water separator, the Chemical Process Cleaning Shop neutralizes acid and rinses it down to a storage tank, and the Corrosion Control places acid in 55-gallon drums for disposal as hazardous waste.

4. Soaps and cleaning compounds are rinsed down the drain, in some cases via oil/water separators

5. Waste oils are placed in 55-gallon drums, stored at accumulation sites, transported to the permitted storage facility, Bldg 1365 and disposed of as hazardous waste. In some cases, waste oil is discharged to oil/water separators or stored in underground tanks and periodically removed by contractors.

6. The largest generator of waste fluids is the AGE Shop. The AGE shop and Auto Hobby shop collect waste fluids in underground tanks that are periodically pumped out by contractors. Most of the shops generating waste fluids place the waste in 55-gallon drums, store the drums at an accumulation site and then transport the drums to Bldg 1365.

7. Waste fuels are either reused if uncontaminated, or placed in underground tanks or 55-gallon drums if contaminated. The underground tanks are pumped out periodically by contractors, while the drums are stored at accumulation sites near the shops and transferred to Bldg 1365 for disposal as hazardous waste. Some waste fuels are rinsed down the sanitary sewer.

8. Most shops place waste antifreeze in 55-gallon drums and transport the drums to the storage site, Bldg 1365. The Civilian Washrack and AGE shop rinse waste antifreeze down the drain.

9. Solvents (not including PD-680) are disposed of in 55-gallon drums or underground tanks. Some solvents are rinsed down the sanitary sewer.

10. The largest generator of waste PD-680 is the Civilian Washrack and they discharge it to an oil/water separator. The Chemical Process Cleaning Shop also discharges PD-680 to an oil/water separator. All other shops place PD-680 wastes in 55-gallon drums, store the drums at accumulation sites and eventually transport the waste to the storage facility, Bldg 1365.

VI. FINDINGS, OBSERVATIONS AND CONCLUSIONS

A. The hazardous waste program at Travis AFB is highly dependent on Mr Sandy, DEEV, who has a one-man shop responsible for all the environmental programs for the base. Management recognizes the manpower limitations and is exploring ways to address the problem. However, as a result of DEEV's limited manpower, the various organizations on base are attempting to manage their hazardous waste independently. Consequently, the program is informal and fragmented.

B. Unit safety monitors for each of the three organizations generating the majority of hazardous wastes have informally assumed much of the hazardous waste management responsibilities for their organization. In each case, the safety monitor has implemented practices to improve hazardous waste management within their organization. In maintenance, TSgt Wruble has: (1) established since Aug 87 a Maintenance Hazardous Waste Committee, (2) written a hazardous waste inspection checklist, (3) started writing a hazardous waste regulation, and (4) instructed accumulation site managers to log the start and full dates and to assign an internal number for each drum of waste. In Civil Engineering, TSgt Morris opens up Bldg 1365 so accumulation site managers in Civil Engineering can transfer waste to the permitted facility without having to schedule an appointment with Mr Sandy. Finally, MSgt Williams in the Transportation Squadron has designated a monitor within the squadron to inspect and transport waste drums from the squadron's accumulation sites to Bldg 1365 on a routine basis.

C. Many of the shops expressed difficulty scheduling an appointment with the Environmental Coordinator to transfer their waste drums to Bldg 1365. The Environmental Coordinator only scheduled a few appointments a month (every other Thursday) and some of the shops do not have easy access to a forklift.

D. At present, no hazardous waste education and training program exists and discussions with many of the shops indicate that it is desperately needed. Some of the shops suggested a newcomer's orientation briefing and an in-depth briefing for supervisors. It appears that questions on asbestos handling are being answered by the CES Heat Shop rather than by the Environmental Coordinator or Bioenvironmental

Engineer. Also, the Roads and Grounds Shop (base's spill team) would like more formalized training to deal with hazardous waste spills.

E. Many accumulation sites are not listed in the base hazardous waste management plan. In general, the accumulation sites on base were not secured, burmed or diked, covered, and were without a sign indicating the name and telephone number of the site manager. Some of the waste drums at these sites were unlabeled and uncapped. Unlabeled drums can result in unnecessary mixing of wastes. Uncapped or open drums can collect rainwater which increases the quantity of hazardous waste for disposal. Also, it allows the contents to be vaporized which can lead to discrepancies between analytical results and actual content.

F. Waste drums at the permitted accumulation site at Bldg 552 dated back to Nov 85 and Sep 86. Also, many empty drums stored at the site were prestenciled (50% MEK and thinner, 50% paint sludge). This practice may eventually result in discrepancies between actual content and the prestenciled drums.

G. The Transportation Squadron expressed frustration with getting the quantity loss information on their Safety Kleen units to meet the Bay Area Air Quality Management District reporting requirement. They suggested the contract be rewritten to require Safety Kleen to provide this information since Safety Kleen actually changes out the units.

H. The Electric Shop neutralized battery acid for all the lead-acid batteries on base. This operation currently does not operate under a permit by state or local agency and recent analysis showed levels of lead exceeding the county and state regulatory levels. The base is exploring the possibility of sending batteries to McClellan AFB for disposal (The shop mentioned that this is the current practice for Beale AFB) or locating a local contractor for battery disposal.

I. DRMO mentioned that the opportunity for recycling is limited because most of the wastes are drummed. They said the opportunity to recycle would increase substantially if the base would acquire several bulk storage tanks.

J. 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 waste as either hazardous or nonhazardous waste. A good reference on hazardous waste sampling is "Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018, Jan 1980.

K. There are about 200 underground storage tanks on base and the base has a contract ($360K) to identify and to develop a management program for underground tanks.

L. The hospital is in the process of writing a hazardous waste management plan. Currently, most of the liquid wastes in the hospital goes down the drain and only histoclear is turned over to the base for disposal. Our visit to the hospital indicates that the hospital generates only a small quantity of hazardous waste. Two references by the United States Army Environmental Hygiene Agency, may help in the writing of a hospital hazardous waste management plan: (1) "Infectious Hazardous Waste Handling And Disposal," Technical Guide No. 147, and (2) "Guidelines For The Preparation, Administration, And Disposal Of Cytotoxic Drugs," Technical Guide No. 149.

M. Speedy dry or dry rite used for soaking up spills is disposed of in the dumpsters.

N. The base "policy" on the disposal of used rags appears to be confusing. Multiple discussions with shop personnel indicated that the policy is not clearly understood.

O. Each PD-680 tank on base requires an air quality permit ($75 per year).

P. The base has three inactive landfills and one active landfill for construction materials.

Q. The storage facility at Bldg 1365 is filled. The stalls are not designated for particular wastes. The area is secure, but is not properly burmed, diked, and doesn't have an impermeable floor. There are items in storage (empty tanks and crates) which are unidentified. Likewise, Bldg 956 also contains unidentified drums. Bldg 552 is managed well but the floor is not impermeable and it's not burmed or diked. The site manager for Bldg 552 maintains a log of all the drums while the other site managers do not. These areas are permitted for up to one year, but this is not honored at all times, since there were drums labeled Nov 85, Sep 86 and Jun 86 at Bldg 552.

R. The Entomology Shop does not have capability to triple rinse pesticide containers, as a result, empty waste pesticide containers are accumulating outside the shop. Also, eight drums of unused pesticide are awaiting manufacturer's label before disposal.

VII. RECOMMENDATIONS

An outbriefing on recommendations was given on 22 Oct 87. Representatives from the Bioenvironmental Engineering Shop, Civil Engineering Squadron, Maintenance Squadron and Transporation Squadron attended.

A. TAFB needs to formalize the management structure to manage hazardous waste. With DEEV severely undermanned, they need to formally delegate some of the hazardous waste responsibilities to the major organizations (i.e., maintenance, civil engineering, and transportation) generating the bulk of the hazardous waste.

B. The unit safety monitors for maintenance, civil engineering, and transportation are already informally involved with managing hazardous waste within their respective organizations, but should be officially delegated by their respective commanders. This would give them the authority to act and to receive credit for their efforts. Likewise, the safety monitors should officially designate primary and alternate accumulation site managers for their organization. This formalized management structure would alleviate some of the work overload of the Environmental Coordinator.

C. Positive features from existing management practices within maintenance, civil engineering, and transportation should be implemented base-wide. These are as follows:

1. Designate a team (possibly two or three individuals) in maintenance, transportation, and civil engineering dedicated to inspect, pick up and deliver waste drums from accumulation sites to Bldg 1365 once a month. This would alleviate problems with forklift availability and reduce the number of people involved with transporting hazardous waste on base.

2. Each unit safety monitor should have access to a key to Bldg 1365 so they can allow more frequent transfer of waste to the permitted facility. This would alleviate the current scheduling problem.

3. Each accumulation site manager should document the activity at the site by maintaining a log to include: (1) a unique sequence number to identify which shop(s) generated the waste, (2) type of waste, and (3) start and stop dates of filling each drum. A uniform system for documentation should be used by all accumulation site managers on base.

D. An education and training program is desperately needed to support a formalized hazardous waste program and to strengthen communication between managers and shop personnel. The Environmental Coordinator, the Bioenvironmental Engineer, and the DRMO manager should provide the initial training and education on hazardous waste management and shop-specific hazards to the unit safety monitors and accumulation site managers. Eventually, the safety monitors can provide on-going training to the accumulation site managers. However, semiannual or regular scheduled meetings of those involved with hazardous waste management are necessary to ensure proper communication and resolution of problems.

E. An updated accumulation site and accumulation site manager listing should be compiled by the Environmental Coordinator. Furthermore, work orders to upgrade accumulation sites should be consolidated with the intent to reduce the number of sites. At some sites, smaller drums should be used to eliminate prolonged storage of waste (e.g., Interior Electric Shop, Power Production, Combat Area Training).

F. The BEE needs to develop a waste analysis plan 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 3 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 for the base is contained in Table 4. Also, the Bioenvironmental Engineering Shop needs to purchase the necessary sampling equipment, e.g., a COLIWASA for waste drum sampling.

G. Several wastestreams identified during the survey that needed additional chemical analyses to support disposal procedure are as follows:

1. *Histoclear from the DGMC Clinical Lab (ignitability based on one analysis),*

2. neutralized battery acid (sampling procedures must be consistent in order to determine lead levels from representative samples), and

3. unknown waste drum at the accumulation site for Fire Truck Maintenance.

H. The 10 waste drums stored at the accumulation site outside the TF-33 Jet Engine Repair shop contain probably 90% water and 10% hydraulic fluid. The hydraulic fluid could be skimmed off and disposed of as hazardous waste. A waste analysis of the water portion may possibly justify disposal as nonhazardous waste.

I. The operating instruction for the disposal of plating wastes from the Metals Processing Shop needs to be updated.

J. The Material Handling Equipment Shop should be notified that they do not need a permit in order to use a bowser to collect contaminated engine oil.

K. Civil Engineering should consider leak testing the underground tank at the Auto Hobby Shop. This underground tank dates back to the 1950s and is currently used for uncontrolled collection of oils, solvents and automatic transmission fluid.

TABLE 3. EXAMPLE OF WASTE ANALYSIS PLAN

SHOP (BUILDING)	DESCRIPTION OF WASTE STREAM	BASELINE ANALYSIS (DATE)	EPA NO.	ANALYSIS FREQUENCY	SAMPLING TECHNIQUE	PARAMETERS
317 Allied Trades (454)	PAINT SLUDGE FROM PAINT BOOTH	(DEC 84) FP-H (70 F) PH-NH, EP-NH RX-NH	D001	SEMIANNUALLY (EACH DRUM)	GRAB OF PAINT SLUDGE	FLASH POINT
TRANS/BATTERY SHOP (454)	NEUTRALIZED BATTERY ACID	(JAN 86) FP-NH, EP-NH PH-MH, RX-NH	NH	ANNUAL SPOT CHECK (EVERY OTHER DRUM)	COILWASA	LEAD CADMIUM
317 Allied Trades (454)	RINSEWATER FROM WATERFALL PAINTBOOTH	(JUN 85) FP-H (120 F) PH-NH (6.5) RX-NH, EP-H (CHROMIUM, CADMIUM)	D001 D007	QUARTERLY CLEANOUT	DIPPER	FLASH POINT, pH CHROMIUM, CADMIUM

LEGEND: FP - IGNITABILITY; PH - CORROSIVITY; RX - REACTIVITY; EP - EPTOXICITY;
H - HAZARDOUS; NH - NONHAZARDOUS

TABLE 4: Suggested Listing of Wastestreams

SHOP	WASTESTREAM
Modular Maintenance	Bearing Cleaning (Each Drum)
Chemical Process Cleaning	Each Tank
Corrosion Control	Painting Operation
Metal Processing	Plating Solution Rinse Tank (Each)
NDI	Each Tank
Electric Shop	Neutralization Tank
Wheel and Tire	Each PD-680 Tank
Hydraulic Shop	PD-680 Tank (Each Drum) Carbon Remover Tank Trichloroethane Tanks (Each Drum)
Engine Shop	PD-680, Oil, JP-4 (Each Drum)
Protective Coating	Paint Waste (Each Drum)
CEMIRT	Oil, Solvent, Antifreeze, PD-680 (Each Drum)
AGE	Oils, Fluids, PD-680 (Each Drum and Each Bowser)
General Purpose	Oil, Antifreeze, Transmission Fluid, Gas, Fuel (Each Drum)
Allied Trades	Radiator Cleaning Tank Radiator Test Tank Paint Waste (Each Drum)

L. The 1901 Tracals Maintenance Complex, Bldg 1185, has an underground tank (less than 500-gallon) with contaminated fuel that is no longer used. This tank should be pumped out and scheduled for removal.

M. The Interior Electric Shop has a 10-gallon PD-680 tank that is no longer needed. The tank should be emptied and the shop should consider using another type of solvent that may be disposed of as nonhazardous waste (e.g., Citrakleen) if the tank is used in the future.

N. Speedy dry and other materials used for spill cleanup should be disposed of as hazardous waste.

O. Large quantities of drums with new solvents should not be stored unprotected outdoor (e.g., at the Chemical Process Cleaning Facility). These solvents should be turned back to supply or a storage shed should be provided at the work site. If these drums deteriorate from weathering, leakage may result in unnecessary loss of product or in an environmental pollution
incidence.

P. The base should explore the possibility of recycling used oil by using a commercial filtration system. The AGE Shop is a large generator of used oil and may justify supporting a filtration system alone. Another candidate is the Electric Shop which generates a large quantity of "clean" used oil from testing constant speed drives.

Q. Building 1365 should be cleaned up and the existing wastes removed as soon as possible. Each stall should be designated (clearly marked) for particular waste and a forklift should be available at the site. A complete log should be kept on all waste received and improperly marked (or unmarked) drums should not be accepted.

R. The base should consider the suggestion by DRMO to acquire aboveground bulk storage tanks to enhance the potential for waste recycling or selling. Currently, potential recyclers are not interested because the wastes are in 55-gallon drums.

S. Rags should be reused until they are saturated and then disposed of as hazardous waste. Partially soiled rags may potentially be laundered (maintenance uses about 10 bundles of rags a month at a cost of $740). However, the laundering of rags with hardening substances may not be feasible.

T. Waste solvent minimization can be accomplished by using an alternative solvent such as Citrakleen which is more effective and less hazardous than PD-680, by using a solvent leasing program like the Safety Kleen units, or by purchasing a solvent recovery unit. Any cost analysis of these options should also include: (1) man-hours involved in drumming and transporting the waste, (2) cost of the drums, (3) cost of chemical analysis, and (4) possible local or state regulatory fees. Table 5 is a listing of

shops using PD-680 that the base should consider (some shops are already considering) for possible conversion to Citrakleen (or a similar type of solvent), Safety Kleen, or a solvent recovery unit.

TABLE 5: Alternates for Shops Using PD-680

SHOP	CITRAKLEEN	SAFETY KLEEN	RECOVERY UNIT
GTU	X		
Chemical Process Cleaning	X		
Wheel and Tire	X	X	X
Hydraulic Shop		X	
CEMIRT	X		
Civilian Washrack	X		
Refueling Maintenance	X		
Power Production	X		
Interior Electric	X		
Combat Arms Training	X		
Auto Hobby	X	X	

U. DEEV needs to make a decision to resolve the usage of an underground storage tank for storing rinsewater from triple rinsing pesticide containers. If management of an underground tank is to be avoided, then steps to provide an aboveground tank should be considered.

V. The current practice of disposing ethylene glycol antifreeze as hazardous waste may be unnecessary since it is readily biodegradable and is diluted during use. The California Department of Health Services, Toxic Substances Control Division, recommends that the local sewer district be contacted to discuss the possibility of approving the disposal of waste antifreeze in the sewer system.

References

1. Guidelines for the Preparation, Administration, and Disposal of Cytotoxic Drugs, Technical Guide No. 149, US Army Environmental Hygiene Agency, Aberdeen Proving Ground MD 21010-5422.

2. Infectious Hazardous Waste Handling and Disposal, Technical Guide No. 147, US Army Environmental Hygiene Agency, Aberdeen Proving Ground MD 21001-5422.

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

4. Travis Air Force Base, "Hazardous Waste Plan," 1 March 1984.

5. United States Environmental Protection Agency, "Identification and Listing of Hazardous Waste," 40 CFR 261.

APPENDIX A

Request Letter

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DEPARTMENT OF THE AIR FORCE
DAVID GRANT USAF MEDICAL CENTER (MAC)
TRAVIS AIR FORCE BASE, CALIFORNIA 94535-5300

FROM: SGPB (2Lt Davis, AV 837-8098) 29 July 1987

SUBJECT: Request for USAF OEHL Assistance

TO: DGMC/SGP
SG
HQ MAC/SGPB
USAF OEHL/ECQ
IN TURN

1. Request USAF Occupational and Environmental Health Laboratory assistance from the Environmental Quality Branch to address the hazardous waste sampling strategy at Travis AFB. Due to the complexity of this issue, we request assistance in identifying the testing and sampling requirements of a hazardous waste stream analysis.

2. Your support in this matter is greatly appreciated. If you have any questions, please contact this office at AV 837-8098.

KARAN CHARISSE-PIERCY, CAPT, USAF, BSC
Chief, Bioenvironmental Engineering

cc: 60 MAW/MA
60 MAW/LG
60 MAW/TR
60 ABG/DE
60 ABG/CC
1901 CG/CC

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APPENDIX B

Chemical Disposal Survey Form

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Shop: Building Number:
Shop Supervisor: Autovon:
Shop Duties:

CATAGORIES OF WASTE AND DISPOSAL METHODS

TYPE OF WASTE	DISPOSAL METHOD	AMOUNT GENERATED (per month)	COMMENTS
1. $ PAINT WASTE AND THINNERS			
2. $ STRIPPING WASTE			
3. $ WASTE ACIDS			
4. $ SOAPS/CLEANERS			
5. $ WASTE OIL			
6. $ WASTE FLUIDS			
7. $ WASTE FUELS			
8. USED ANTIFREEZE			
9. $ WASTE SOLVENTS OTHER THAN PD-680			
10. $ PD-680 a. USED FOR DEGREASING			
b. USED FOR EQUIPMENT CLEANING			
11. $ PHOTO WASTES			
12. $			

$ specify the types used on next page

Examples of disposal Practices:

D-DRUMMED RTT-RETURNED TO FUEL TANKS UIP-USED IN PROCESS

DD-DOWN DRAIN FTP-TAKEN TO FIRE TRAINING PIT PIT-PLACED IN TANK

NDD-NEUTRALIZED FIRST THEN PLACED DOWN DRAIN NA-NOT APPLICABLE

Chemical listing (cont.)

OILS/FLUIDS

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

SOLVENTS/DEGREASANTS

Name of Chemical	Manufacturer	Amt used/WEEK or Tank Cap.	Change out Freq.	National Stock Number
Carbon Remover				

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

PHOTO CHEMICALS

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

SPECIFIC CHEMICALS USED

PAINT WASTE AND THINNERS

Types	Waste Disposal Method	Amount of Waste Generated	Frequency of Disposal
Paints			
Latex			
Polyurethane			
Enamel			
Thinners (list)			

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

STRIPPERS

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

ACIDS

Name of Acid	Manufacturer	Amt used/wk	Disposal Method

SOAPS/CLEANERS

Name of Soap	Manufacturer	Amt used/WK	National Stock Number

Chemical listing (cont.)

MDI CHEMICALS

Name of Chemical	Manufacturer	Amt/wk or Tank Cap.	Change out Freq.	National Stock Number

Other Chemicals Not Listed

Name of Chemical	Manufacturer	Amt/wk or Tank Cap.	Change out Freq.	National Stock Number

SIGNATURE OF PERSON FILLING OUT THE FORM: _____

APPENIDX C

Accumulation Site Survey Form

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HAZARDOUS WASTE ACCUMULATION SITE

LOCATION: _____ DATE: _____
ACCUMULATION SITE MANAGER: _____ PHONE: _____

ITEM	CONDITIONS	STATUS YES	STATUS NO	COMMENTS
STORAGE SITE	Secure			
	Gates Locked			
	Warning Signs			
	Impermeable Floor			
	Diked/Burmed			
	Valve in Burm to drain water			
SPILL EQUIPMENT	Empty Overpack Container			
	Materials and Supplies			
FIRE PROTECTION	Extinguisher			
	Funnels in Containers			
STORAGE CONTAINERS	Containers Closed			
	Deteriorating			
	Leaking			
	Spills			

Overall Rating of Accumultion Site: _____

LISTING OF WASTES AT ACCUMULTION SITE

EPA WASTE NUMBER	NUMBER OF CONTAINERS	TYPE OF WASTE	ACCUMULATION START DATE	COMMENTS

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APPENDIX D

Summary of Waste Disposal Practices for Each Waste Category

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SUMMARY OF WASTE DISPOSAL PRACTICES FOR EACH WASTE CATEGORY

Type of Waste: paint and thinners

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Power Support Sys	1205	paint & thinner	330.000	d
Allied Trades	144	paint & thinners	180.000	d
C-141 Isodocks	841	paint and thinners	12.000	d
Protective Coating	874	paint & thinners	330.000	d
Corrosion Control	550	paint & thinner	1200.000	d
		TOTAL:	2052	

Type of Waste: strippers

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Civilian Washrack	811	stripping waste	480.000	ows
Corrosion Control	550	stripping waste	24.000	d
Allied Trades	144	stripping waste	6.000	d
		TOTAL:	510	

Type of Waste: acids

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Civilian Washrack	811	waste acids	6.000	ows
Corrosion Control	550	waste acids	200.000	d
Electric Shop	755	battery acid	1200.000	ndd
Chemical Process Cleaning	P-18	waste acids	500.000	ows
		TOTAL:	2406	

Type of Waste: soaps

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Refueling Maintenance	1202	soap	48.000	ows
GTU	S-12	aircraft soap	48.000	dd
AGE Servicing	S-11	cleaning cmpd	480.000	dd
463 L / MHE	919	soaps	3000.000	dd
C-141 Isodocks	841	general purpose soap	1440.000	dd
Civilian Wash Rack	811	soap Calla 800	9600.000	ows
		TOTAL:	14616	

Type of Waste: oils

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Fire Truck Maintenance	560	waste oil	300.000	d
39 Test Cell	1001	waste oil	6.000	ows
Power Support Sys	1205	waste oil	1320.000	d
Civilian Washrack	811	waste oil	120.000	ows
C-141 Isodocks	841	engine oil	2160.000	d
General Purpose	139	waste oil	1980.000	d
Special Purpose	139	waste oil	660.000	d
60 CES Power Production	931	waste oil	2640.000	d
TF33 Engine Shop	839	waste oil	96.000	d
463 L / MHE	919	waste oil	3600.000	d
GTU	S-12	waste oil	36.000	d
Refueling Maintenance	1202	waste oil	660.000	d
Electric Shop	755	waste oil	420.000	d
Chemical Process Cleaning	P-18	waste oil	720.000	ows
Modular Maintenance	P-16	waste oils	9.000	d
NDI	550	waste oils	490.000	d
Auto Hobby	226	waste oil	3000.000	pit
AGE Servicing	S-11	waste oil	2640.000	pit
		TOTAL:	20857	

Type of Waste: fluids

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Special Purpose	139	waste fluid	612.000	d
General Purpose	139	waste fluids	660.000	d
AGE Servicing	S-11	waste fluids	2640.000	pit
39 Test Cell	1001	waste fluids	6.000	ows
Fuel Systems	551	heptane	55.000	d
Auto Hobby	226	waste fluids	600.000	pit
463 L / MHE	919	waste fluids	1800.000	d
Chemical Process Cleaning	P-18	waste fluids	1800.000	ows
C-141 Isodocks	841	hydraulic fluid	480.000	d
GTU	S-12	waste fluids	36.000	d
Fire Truck Maintenance	560	waste fluid	20.000	d
Refueling Maintenance	1202	transmission fluid	83.000	d
		TOTAL:	8792	

Type of Waste: fuels

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Fuel Systems	551	contam fuels	275.000	d
463 L / MHE	919	waste fuels	120.000	d
60 CES Power Production	931	waste fuels	660.000	d
GTU	S-12	waste fuels	3.000	d
Chemical Process Cleaning	P-18	waste fuels	720.000	ows
AGE Servicing	S-11	waste fuels	1200.000	d
TF33 Engine Shop	839	waste fuels	48.000	d
General Purpose	139	waste fuels	1980.000	d
Special Purpose	139	waste fuel	360.000	d
C-141 Isodocks	841	waste fuel	150.000	d
39 Test Cell	1001	waste fuels	120.000	ows
		TOTAL:	5636	

Type of Waste: antifreeze

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
General Purpose	139	antifreeze	95.000	d
Special Purpose	139	antifreeze	360.000	d
Refueling Maintenance	1202	antifreeze	55.000	d
AGE Servicing	S-11	antifreeze	720.000	dd
Fire Truck Maintenance	560	antifreeze	50.000	d
463 L / MHE	919	antifreeze	1200.000	d
Civilian Washrack	811	antifreeze	4.000	ows
Power Support Sys	1205	antifreeze	330.000	d
		TOTAL:	2814	

Type of Waste: solvents (non-PD-680)

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Civilian Washrack	811	solvent Calla 459	1200.000	ows
GTU	S-12	citrakleen	96.000	dd
Allied Trades	144	radiator solvent	350.000	d
Chemical Process Cleaning	P-18	cold carbon remover	550.000	ows
Chemical Process Cleaning	P-18	hot carbon remover	1100.000	ows
Chemical Process Cleaning	P-18	sodium hydroxide	1100.000	ows
Chemical Process Cleaning	P-18	Citrakleen	1200.000	ows
Corrosion Control	550	MEK	1200.000	d
Battery Shop	755	trichloroethane	360.000	d
60 FMS Hydraulic Shop	819	carbon remover	80.000	d
60 FMS Hydraulic Shop	819	trichloroethane	168.000	d
Fuel Systems	551	4 part cleaner	12.000	d
39 Test Cell	1001	citrakleen	660.000	ows
Fuel Systems	551	MEK	24.000	d
		TOTAL:	8100	

Type of Waste: PD-680

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Power Support Sys	1205	PD-680	1320.000	d
Modular Maintenance	P-16	PD-680	156.000	d
TF33 Engine Shop	839	PD-680	144.000	d
60 FMS Wheel & Tire	819	PD-680	3960.000	d
Civilian Washrack	811	PD-680	7680.000	ows
60 FMS Hydraulic Shop	819	PD-680	444.000	d
60 CES Power Production	931	PD-680	20.000	d
Chemical Process Cleaning	P-18	PD-680	120.000	ows
GTU	S-12	PD-680	156.000	d
Refueling Maintenance	1202	PD-680	50.000	d
Auto Hobby	226	PD-680	50.000	pit
		TOTAL:	14100	

Type of Waste: miscellaneous

SHOP	BLDG	PRODUCT	QTY(GALLONS)	DISPOSAL
Plastics MAFF	550	epoxy resin	24.000	d
Plastics MAFF	550	polyester resin	36.000	d
NDI	550	photo fixer	20.000	ndd
Chemical Process Cleaning	P-18	alk descaling cmpd	550.000	ows
Chemical Process Cleaning	P-18	alk permanganate	550.000	ows
Allied Trades	144	test tank	1400.000	d
		TOTAL:	2580	

LEGEND:

d - DRUMMED
dd - DOWN DRAIN
ndd - NEUTRALIZED FIRST THEN PLACED DOWN DRAIN
ows - OIL/WATER SEPARATOR
pit - PLACED IN TANK

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APPENDIX E

Summary of Drummed Waste Disposal
For Each Waste Category

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SUMMARY OF DRUMMED WASTE DISPOSAL FOR EACH WASTE CATEGORY

Type of Waste: paint and thinners

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Allied Trades	144	paint & thinners	180.000
Protective Coating	874	paint & thinners	330.000
Corrosion Control	550	paint & thinners	1200.000
Power Support Sys	1205	paint & thinners	330.000
C-141 Isodocks	841	paint & thinners	12.000
		TOTAL:	2052

Type of Waste: strippers

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Allied Trades	144	stripping waste	6.000
Corrosion Control	550	stripping waste	24.000
		TOTAL:	30

Type of Waste: acids

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Corrosion Control	550	waste acids	200.000
		TOTAL:	200

Type of Waste: oils

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Fire Truck Maintenance	560	waste oil	300.000
Electric Shop	755	waste oil	420.000
GTU	S-12	waste oil	36.000
Modular Maintenance	P-16	waste oils	9.000
Refueling Maintenance	1202	waste oil	660.000
NDI	550	waste oils	490.000
463 L / MHE	919	waste oil	3600.000
Power Support Sys	1205	waste oil	1320.000
TF33 Engine Shop	839	waste oil	96.000
General Purpose	139	waste oil	1980.000
Special Purpose	139	waste oil	660.000
60 CES Power Production	931	waste oil	2640.000
C-141 Isodocks	841	engine oil	2160.000
		TOTAL:	14371

Type of Waste: fluids

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Fire Truck Maintenance	560	waste fluid	20.000
General Purpose	139	waste fluids	660.000
Special Purpose	139	waste fluid	612.000
C-141 Isodocks	841	hydraulic fluid	480.000
Fuel Systems	551	heptane	55.000
Refueling Maintenance	1202	transmission fluid	83.000
463 L / MHE	919	waste fluids	1800.000
GTU	S-12	waste fluids	36.000
		TOTAL:	3746

Type of Waste: waste fuels

SHOP	BLDG	PRODUCT	QTY(GALLONS)
GTU	S-12	waste fuels	3.000
463 L / MHE	919	waste fuels	120.000
Special Purpose	139	waste fuel	360.000
General Purpose	139	waste fuels	1980.000
AGE Servicing	S-11	waste fuels	1200.000
Fuel Systems	551	contam fuels	275.000
C-141 Isodocks	841	waste fuel	150.000
60 CES Power Production	931	waste fuels	660.000
TF33 Engine Shop	839	waste fuels	48.000
		TOTAL:	4796

Type of Waste: antifreeze

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Fire Truck Maintenance	560	antifreeze	50.000
Power Support Sys	1205	antifreeze	330.000
General Purpose	139	antifreeze	95.000
Refueling Maintenance	1202	antifreeze	55.000
Special Purpose	139	antifreeze	360.000
463 L / MHE	919	antifreeze	1200.000
		TOTAL:	2090

Type of Waste: solvents (non-PD-680)

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Allied Trades	144	radiator solvent	350.000
Corrosion Control	550	MEK	1200.000
Electric Shop	755	trichloroethane	360.000
Fuel Systems	551	MEK	24.000
Fuel Systems	551	4 part cleaner	12.000
60 FMS Hydraulic Shop	819	trichloroethane	168.000
60 FMS Hydraulic Shop	819	carbon remover	80.000
		TOTAL:	2194

Type of Waste: PD-680

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Refueling *Maintenance*	1202	PD-680	50.000
60 FMS Wheel & Tire	819	PD-680	3960.000
Modular Maintenance	P-16	PD-680	156.000
60 FMS Hydraulic Shop	819	PD-680	444.000
60 CES Power Production	931	PD-680	20.000
Power Support Sys	1205	PD-680	1320.000
TF33 Engine Shop	839	PD-680	144.000
GTU	S-12	PD-680	156.000
		TOTAL:	6250

Type of Waste: miscellaneous

SHOP	BLDG	PRODUCT	QTY(GALLONS)
Plastics MAFF	550	epoxy resin	24.000
Allied Trades	144	test tank	1400.000
Plastics MAFF	550	Polyester resin	36.000
		TOTAL:	1460

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APPENDIX F

Master List of Shops

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MASTER LIST OF SHOPS

SHOP	SUPERVISOR	BUILDING	EXTENSION
MAINTENANCE			
1. Gas Turbine Shop	MSgt Wood	S-12	2547
2. Modular Maintenance	MSgt Paddock	P-16	3373
3. Chemical Process Cleaning	TSgt Tamasy	P-18	5728
4. 60 FMS Corrosion Control	MSgt Melchert	550	5794
5. 60 FMS Fiberglass Shop	Mr Foskett	550	5275
6. 60 FMS Metals Processing	MSgt Thompson	550	5281
7. 60 FMS Nondestructive Inspection (NDI)	Mr Cross	550	3011
8. 60 FMS Fuel System Shop	Mr Marando	551	2137
9. 60 FMS Electric Shop	MSgt Coleman	755	2384
10. 60 FMS Wheel & Tire	Mr Hicks	819	5737
11. 60 FMS Hydraulic Shop	SMSgt Sweeney	819	5070
12. 60 FMS TF-33 Engine Shop	SMSgt Nowling	839	2888
13. C-141 Isodocks	Mr Looney	841	3659
14. Protective Coating	Mr Martinez	874	3964
15. 39 Test Cell	MSgt Jones	1001	3461
16. PMEL	MSgt Moreland	942	3244
17. AGE	SMSgt Hynson	S-11	5140
18. Civilian Wash Rack	Mr Hillstrom	811	3258
TRANSPORTATION			
19. Fire Truck Maintenance	Mr Chitwood	560	3380
20. General Purpose	Mr Higgins	139	5376
21. Special Purpose	TSgt Fahrendorf	139	5687
22. Allied Trades	MSgt Midkiff	144	5119
23. 463 L/MHE	Mr Kidd	919	5494
24. Refueling Vehicle Maintenance	Mr Blankenship	1202	5272
CIVIL ENGINEERING			
25. 60 CES Power Production	TSgt Leyser	931	2701
26. Entomology	Mr Whalen	905	3033
27. CES Heating Shop	MSgt Basco	32	3170
28. Liquid Fuels Maintenance	Mr Leverett	908	5862
29. Exterior Electric	TSgt Beatty	936	3831
30. Interior Electric	Mr Greyson	873	3831

MISCELLANEOUS

31. Combat Arms Trng	SSgt Johnson	902	2121
32. Tracals	MSgt Burney	1185	2522
33. Power Support Systems (CEMIRT)	Mr Rohac	1205	5211
34. Auto Hobby Shop	Mr Bizjak	226	5300
35. DGMC Clinical Lab	Capt Eckert	375	8143

APPENDIX G

Summary of Waste Disposal Practices by Shop

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WASTE DISPOSAL PRACTICES BY SHOP FOR TRAVIS AFB

Type of Shop: 39 Test Cell Building Number: 1001

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste oil	6.000	ows
waste fluids	6.000	ows
waste fuels	120.000	ows
citrakleen	660.000	ows
TOTAL:	792	

Type of Shop: Refueling Maintenance Building Number: 1202

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
soap	48.000	ows
transmission fluid	83.000	d
waste oil	660.000	d
antifreeze	55.000	d
JP-4	6000.000	rtt
PD-680	50.000	d
TOTAL:	6896	

Type of Shop: Power Support Sys Building Number: 1205

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
antifreeze	330.000	d
PD-680	1320.000	d
waste oil	1320.000	d
paint & thinner	330.000	d
TOTAL:	3300	

Type of Shop: General Purpose Building Number: 139

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
antifreeze	95.000	d
waste oil	1980.000	d
waste fluids	660.000	d
waste fuels	1980.000	d
TOTAL:	4715	

Type of Shop: Special Purpose Building Number: 139

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste oil	660.000	d
waste fluid	612.000	d
antifreeze	360.000	d
waste fuel	360.000	d
TOTAL:	1992	

Type of Shop: Allied Trades Building Number: 144

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
test tank	1400.000	d
stripping waste	6.000	d
paint & thinners	180.000	d
radiator solvent	350.000	d
TOTAL:	1936	

Type of Shop: Auto Hobby Building Number: 226

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste fluids	600.000	pit
waste oil	3000.000	pit
PD-680	50.000	pit
TOTAL:	3650	

Type of Shop: Corrosion Control Building Number: 550

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
MEK	1200.000	d
paint & thinner	1200.000	d
waste acids	200.000	d
stripping	24.000	d
TOTAL:	2624	

Type of Shop: NDI Building Number: 550

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
photo fixer	20.000	ndd
waste oils	490.000	d
TOTAL:	510	

Type of Shop: Plastics MAFF Building Number: 550

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
epoxy resin	24.000	d
Polyester resin	36.000	d
TOTAL:	60	

Type of Shop: Fuel Systems Building Number: 551

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
heptane	55.000	d
4part cleaner	12.000	d
contam fuels	275.000	d
MEK	24.000	d
recycle fuel	24000.000	rtt
TOTAL;	24366	

Type of Shop: Fire Truck Maintenance Building Number: 560

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
antifreeze	50.000	d
waste oiL	300.000	d
waste fluid	20.000	d
TOTAL:	370	

Type of Shop: Electric Shop Building Number: 755

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
battery acid	1200.000	ndd
waste oil	420.000	d
trichloroethane	360.000	d
TOTAL:	1980	

Type of Shop: Civilian Washrack Building Number: 811

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
PD-680	7680.000	ows
antifreeze	4.000	ows
waste oil	120.000	ows
solvent Calla 459	1200.000	ows
stripping waste	480.000	ows
waste acids	6.000	ows
soap Calla 800	9600.000	ows
TOTAL:	19090	

Type of Shop: 60 FMS Hydraulic Shop Building Number: 819

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
hydraulic fluid	1800.000	rtt
carbon remover	80.000	d
PD-680	444.000	d
trichloroethane	168.000	d
TOTAL:	2492	

Type of Shop: 60 FMS Wheel & Tire Building Number: 819

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
PD-680	3960.000	d
TOTAL:	3960	

Type of Shop: TF33 Engine Shop Building Number: 839

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
PD-680	144.000	d
waste oil	96.000	d
waste fuels	48.000	d
TOTAL:	288	

Type of Shop: C-141 Isodocks Building Number: 841

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
hydraulic fluid	480.000	d
waste fuel	150.000	d
engine oil	2160.000	d
general purpose soap	1440.000	dd
paint and thinners	12.000	d
fuel	3000.000	rtt
TOTAL:	7242	

Type of Shop: Protective Coating Building Number: 874

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
paint & thinners	330.000	d
TOTAL:	330	

Type of Shop: 463 L / MHE Building Number: 919

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
soaps	3000.000	dd
waste oil	3600.000	d
waste fluids	1800.000	d
antifreeze	1200.000	d
waste fuels	120.000	d
TOTAL:	9720	

Type of Shop: 60 CES Power Production Building Number: 931

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste oil	2640.000	d
PD-680	20.000	d
waste fuels	660.000	d
TOTAL:	3320	

Type of Shop: Modular Maintenance Building Number: P-16

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste oils	9.000	d
PD-680	156.000	d
TOTAL:	165	

Type of Shop: Chemical Process Cleaning Building Number: P-18

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
alk permanganate	550.000	ows
hot carbon remover	1100.000	ows
waste fuels	720.000	ows
waste fluids	1800.000	ows
alk descaling cmpd	550.000	ows
waste oil	720.000	ows
cold carbon remover	550.000	ows
waste acids	500.000	ows
sodium hydroxide	1100.000	ows
Citrakleen	1200.000	ows
PD-680	120.000	ows
TOTAL:	8910	

Type of Shop: AGE Servicing Building Number: S-11

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste fluids	2640.000	pit
waste fuels	1200.000	d
antifreeze	720.000	dd
cleaning cmpd	480.000	dd
waste oil	2640.000	pit
fuels	3600.000	rtt
TOTAL:	11280	

Type of Shop: GTU Building Number: S-12

WASTE PRODUCT	QTY(GALLONS)	DISPOSAL
waste oil	36.000	d
PD-680	156.000	d
waste fluids	36.000	d
aircraft soap	48.000	dd
waste fuels	3.000	d
citrakleen	96.000	dd
TOTAL:	375	

LEGEND:

d - DRUMMED
dd - DOWN DRAIN
rtt - RETURNED TO FUEL TANKS
ndd - NEUTRALIZED FIRST THEN PLACED DOWN DRAIN
ows - OIL/WATER SEPARATOR
pit - PLACED IN TANK

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