

HAZARDOUS WASTE TECHNICAL ASSISTANCE SURVEY, CARSWELL AFB TX

March 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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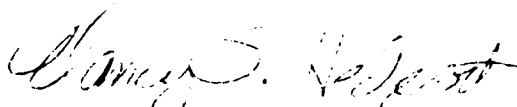
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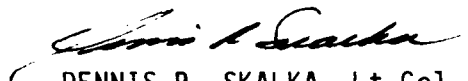
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NANCY S. HEDGECOCK, 2Lt, USAF, BSC
Consultant, Environmental Quality



DENNIS R. SKALKA, Lt Col, USAF, BSC
Chief, Consultant Services Division

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JAMES C. ROCK, Colonel, USAF, BSC
Commander

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19 ABSTRACT (Continue on reverse if necessary and identify by block number) At the request of Headquarters 7th Combat Support Group, 7 CSG/DEEV, the USAFOEHL conducted a hazardous waste technical assistance survey at Carswell AFB (CAFB) from 16-27 May 88. 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 CAFB needs to formalize the hazardous waste management program. Recommendations include: (1) develop a waste analysis plan to include a complete listing of all wastestreams, the results of a baseline waste analysis, the analytical parameters, the test and sampling methods, and the sampling frequency for each wastestream; (2) instigate an education and training program to support a formalized hazardous waste management program and to strengthen communication between managers and shop personnel; (3) leak test the underground tank at the Auto-(OVER)				
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Hobby Shop; (4) contact the Fort Worth Wastewater Treatment Plant to discuss the possibility of approving the disposal of waste antifreeze in the sanitary sewer system; (5) consolidate existing work orders to upgrade accumulation sites; (6) consider alternate solvents to minimize waste PD-680; (7) provide the Environmental Coordinator access to a government vehicle to facilitate more frequent inspections of accumulation sites located in controlled areas; (8) collect hazardous waste samples from drums using disposal coliwassas rather than a reusable coliwasa. Waste Management, 10/1/80

ACKNOWLEDGMENT

The authors greatly appreciate the technical assistance and hardwork provided by 1Lt Robert A. Tetla during the survey. Mr Raj Sheth, Environmental Coordinator, 7 CSG/DEEV; Capt Roger Bousum, Chief, Bioenvironmental Engineering, and the entire staff of the Bioenvironmental Engineering Section, USAF Regional Hospital Carswell/SGPB, provided essential information and assistance in order to accomplish this survey.

We also acknowledge the help that SMSgt Winter, 301 CAMS; SSgt Wedel, 7 FMS; and Sgt Witherspoon, 436 STS, provided us as points of contact during the field survey.



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I. INTRODUCTION

Headquarters 7th Combat Support Group, 7 CSG/DEEV requested the USAF Occupational and Environmental Health Laboratory, Consultant Services Division, Environmental Quality Branch, USAFOEHL/ECQ, to accomplish a Hazardous Waste Technical Assistance survey at Carswell AFB, TX (see Appendix A). The scope of the survey was to address a notice of violation, 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, 1Lt Robert A. Tetla, and 2Lt Nancy S. Hedgecock.

II. BACKGROUND

A. Base Description

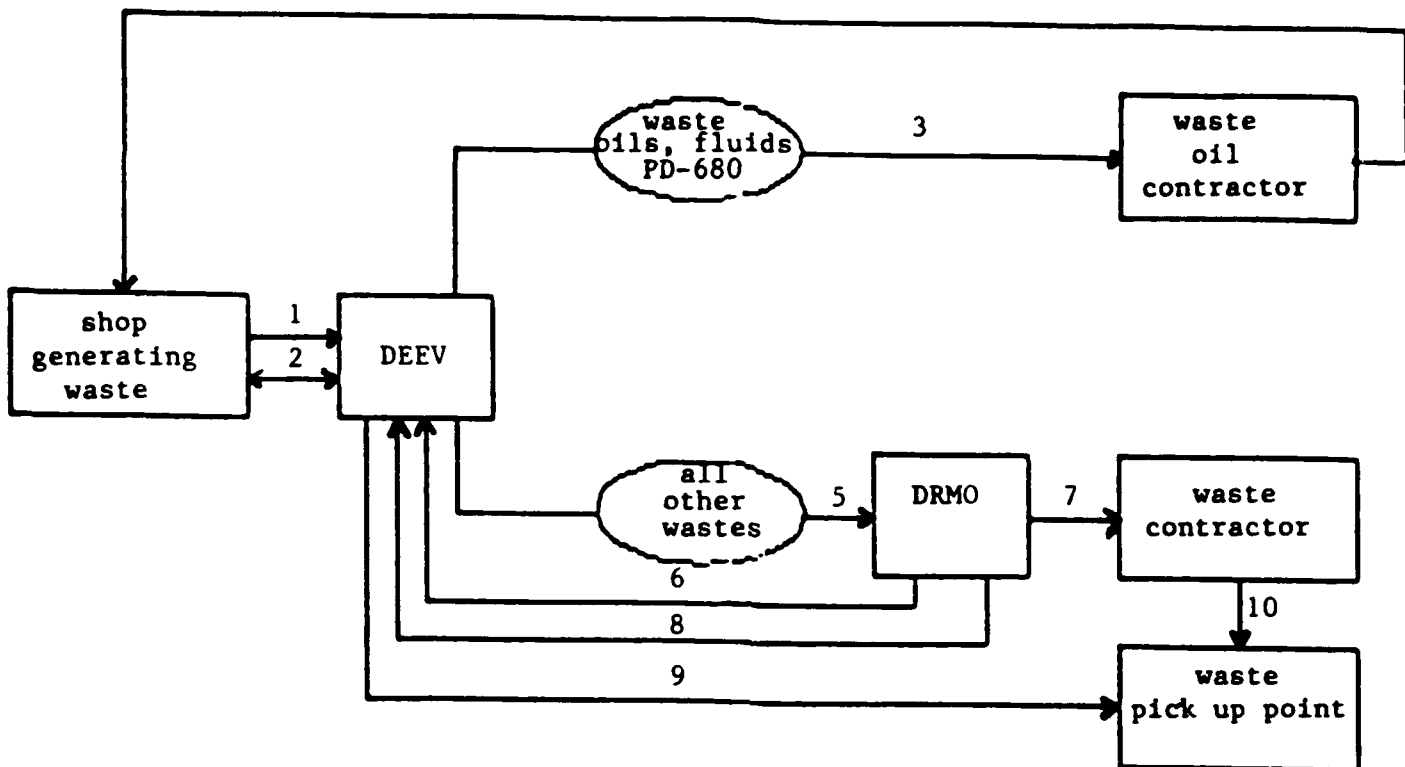
Carswell Air Force Base (CAFB) is located in west-central Tarrant County, Texas, six miles west of downtown Fort Worth. The base is the home of Strategic Air Command's (SAC) 7th Bombardment Wing and 19th Air Division. The base also provides support to the 301st Tactical Fighter Wing Reserve operations. The primary mission of CAFB is to maintain the capability to conduct long-range nuclear bombing and air refueling operations.

B. Hazardous Waste Program

The hazardous waste program at Carswell AFB has struggled along in the past two years with six different environmental coordinators. Mr Sheth, 7 CGS/DEEV, the current environmental coordinator, is conscientious; but, he is new to the Air Force. Mr Sheth has the responsibility of training shop personnel, inspecting accumulation sites, assisting accumulation site managers in completing the DD Form 1348-1 (See Figure 1) to turn in waste, and maintaining records.

The generating organizations identify, segregate, handle, package, label, and keep records of hazardous wastes stored at the accumulation sites. The shops also have the responsibility of appointing an accumulation site manager for each hazardous waste accumulation site.

DEEV is contacted whenever a shop needs to dispose of a waste. Depending on the type of waste to be disposed, DEEV either contacts a contractor or the Defense Reutilization Marketing Office (DRMO). According to Mr Sheth, waste PD-680, fluids, and oils are pumped directly out of the drums or tanks at each individual accumulation site (leaving the barrels or tanks at the site) by one of two waste oil contractors (ACE Oil Company or Recover Oil Services). All other types of hazardous wastes are disposed of through DRMO. DRMO is responsible for filling out the United States Environmental Protection Agency (EPA) uniform manifest; and, DEEV reviews the completed manifest before DRMO contacts a contractor. Currently, Carswell AFB does not have a permitted hazardous waste storage facility. A new facility, which will be operated by DRMO, is being constructed. DEEV has the responsibility of consolidating the



1. The accumulation site manager contacts the Environmental Coordinator (DEEV) when a drum or tank of waste needs to be disposed.
2. DEEV assists the accumulation site manager in filling out DD Form 1348-1.
3. If waste oils, fluids, or PD-680 needs to be disposed, DEEV contacts a waste oil contractor.
4. The waste oil contractor comes to each accumulation site and pumps the wastes directly out of the drums or tanks.
5. If any other type of waste needs to be disposed, DEEV contacts DRMO.
6. DRMO fills out the EPA uniform manifest and sends it to DEEV for review.
7. DRMO contacts the appropriate disposal contractor.
8. DRMO notifies DEEV of when the disposal contractor is coming to the base.
9. DEEV arranges to have the wastes transported to a designated waste pick up point.
10. The waste contractor comes to the waste pick up point and removes the wastes from the base.

Figure 2. Flowchart of Hazardous Waste Program

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 wastes. 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 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 hazardous waste accumulation site (14 total) was visited and the conditions of the accumulation site was documented (see Appendix C). The following individuals were contacted to discuss their responsibility and involvement in the hazardous waste program:

Capt Roger Bousum, Chief, Bioenvironmental Engineering, SGPB,
AUTOVON 739-7111
Mr Raj Sheth, Environmental Coordinator, DEEV, AUTOVON 739-6261
Mr Buddy Howe, Chief, DRMO, AUTOVON 739-5273

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 3, the majority of the wastes, 78.82%, consists of oils, fuels, PD-680, and photo chemicals. Forty-five percent of the total wastes are drummed and the major categories of drummed wastes (see Table 1, Column 5) are oils, 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 CARSWELL AFB

PRODUCT	TOTAL (gal/yr)	%TOTAL	TOTAL DRUMMED (gal/yr)	%TOTAL DRUMMED
Paint & Thinners	1155	2.39	1155	6.09
Strippers	982	2.04	922	4.86
Acids	853.5	1.77	0	0
Soaps	1068	2.21	120	0.63
Oils	9020	18.70	4820	25.43
Fluids (hydraulic and transmission)	1839	3.81	1671	8.82
Fuels	8348	17.30	3108	16.40
Antifreeze	1966	4.08	1966	10.37
Solvents (non-PD-680)	1064.5	2.21	360	1.90
PD-680	5953	12.34	4295	22.66
Photo Chemicals	9896	20.51	536	2.83
TOTAL: 42145			TOTAL: 18953	

IV. DESCRIPTION OF INDUSTRIAL ACTIVITIES

A. Industrial Shops/Accumulation Sites

Thirty-two industrial shops (Master List contained in Appendix F) were surveyed and their chemical waste management practices were documented. The shops are grouped by organization : 7th TRANS (shop 1-4), 436 STS (shop 5-7), 301 CAMS (shop 8-13), 7th FMS (shop 14-23), 7th CES (shop 24-27), Miscellaneous (shop 28-32). The findings for each industrial shop and the conditions of each accumulation site follow (see Appendix G for a shop-by-shop listing of waste disposal practices).

- | | |
|--|-------------------|
| 1. Shop: 7th TRANS Refueling Maintenance | Building: 1194 |
| Contact: SSgt Sherburne | AUTOVON: 739-7023 |

TRANS Refueling Maintenance Shop personnel maintain refueling and water servicing vehicles. Fuel drained from the vehicles is emptied into the floor drain which discharges to a fuel/water separator connected to the sewer. Waste fuels (420 gallons/month) separated in the separator enter a 2000-gallon underground storage tank. When full, the underground tank is pumped out by a contractor, and the waste fuel is taken to the fire training pit. Rinse water from rinsing the inside of the refueling vehicles discharges outside of the shop to a grassy area which leads to a ditch. Waste oils (20 gallons/month) are placed in a 300-gallon bowser located at the accumulation site (See Figure 3). Waste transmission fluid (2 gallons/month), antifreeze (5 gallons/month), and spent PD-680 (25 gallons/6 months) are drummed and placed at the accumulation site. A contractor comes to the accumulation site and pumps the waste oil, transmission fluid, and PD-680 out of the drums. Aircraft cleaning soap (10 gallons/month), used to clean the shop floors, is discharged to the sanitary sewer.

- | | |
|---|-------------------|
| 2. Shop: 7th TRANS Fire Truck Maintenance | Building: 1425 |
| Contact: TSgt Burns | AUTOVON: 739-7007 |

Fire Truck Maintenance personnel maintain fire fighting equipment. Maintenance includes safety inspections along with periodic lubrication and oil changes. This shop has a Safety Kleen degreasing unit (7 gallons) that is changed out monthly by the Safety Kleen Corporation. Waste oils and fluids (55 gallons/month) and waste antifreeze (10 gallons/month) are drummed and taken to the accumulation site at 7th TRANS Vehicle Maintenance (Bldg 1191) when the drums are full. Spent cleaning rags are kept in a 55-gallon drum and are turned in to the base laundry for exchange.

- | | |
|----------------------------------|-------------------|
| 3. Shop: 7th TRANS Allied Trades | Building: 1191 |
| Contact: SSgt Ford | AUTOVON: 739-7760 |

TRANS Allied Trades personnel are responsible for vehicle body work and painting. The painting (2 vehicles/month) is done in a dry paint booth. The filters are changed after every 10 paint jobs and thrown in the trash. Waste paints and thinners (10 gallons/month) are drummed and disposed of as hazardous wastes. The shop shares an accumulation site with 7th TRANS Vehicle Maintenance.

Figure 3. 7th Trans Refueling Maintenance, Bldg 1194

4. Shop: 7th TRANS Vehicle Maintenance
Contact: CMSgt Knifley

Building: 1191
AUTOVON: 739-5443

Vehicle Maintenance Shop personnel are responsible for the maintenance of government vehicles and heavy equipment. Waste oil (150 gallons/month), waste fuel (20 gallons/month), and waste antifreeze (50 gallons/month) are emptied from the vehicles into a pan which is then emptied into a designated 55-gallon drum. Each drum is on a rolling platform that can be moved from vehicle to vehicle. When full, the drum is taken to the accumulation site (See Figure 4). The waste oil is pumped out of the drums by a waste oil contractor at the accumulation site. The waste fuel is sent to DRMO for disposal. The waste antifreeze is currently being kept on site until approval to dispose of it into the sewer system is obtained from the City of Fort Worth Wastewater Treatment Plant. The shop has two Safety Kleen tanks (30 gallons and 20 gallons) which are changed out once every five weeks by the Safety Kleen Corporation. Spills are cleaned up with Speedy Dry; it is put back into a drum for reuse. None has ever been disposed. Spent rags are sent to linen exchange for clean ones. Used batteries (20-25/month) are sent to DRMO wet.



Figure 4. 7th Trans Vehicle Maintenance, Bldg 1191

5. Shop: 436 STS Paint Shop
Contact: Sgt Bloomingdale

Building: 1617
AUTOVON: 739-7186

Paint Shop personnel are responsible for the painting of B-52, KC-135, and FB-111 training units. Waste paints (polyurethane, 10 gallons/month; enamel, 5 gallons/month) and thinners (10 gallons/month) are the only wastes generated in this shop. The wastes are stored in a plastic drum at the shop's accumulation site (See Figure 5) and is disposed of as hazardous waste.

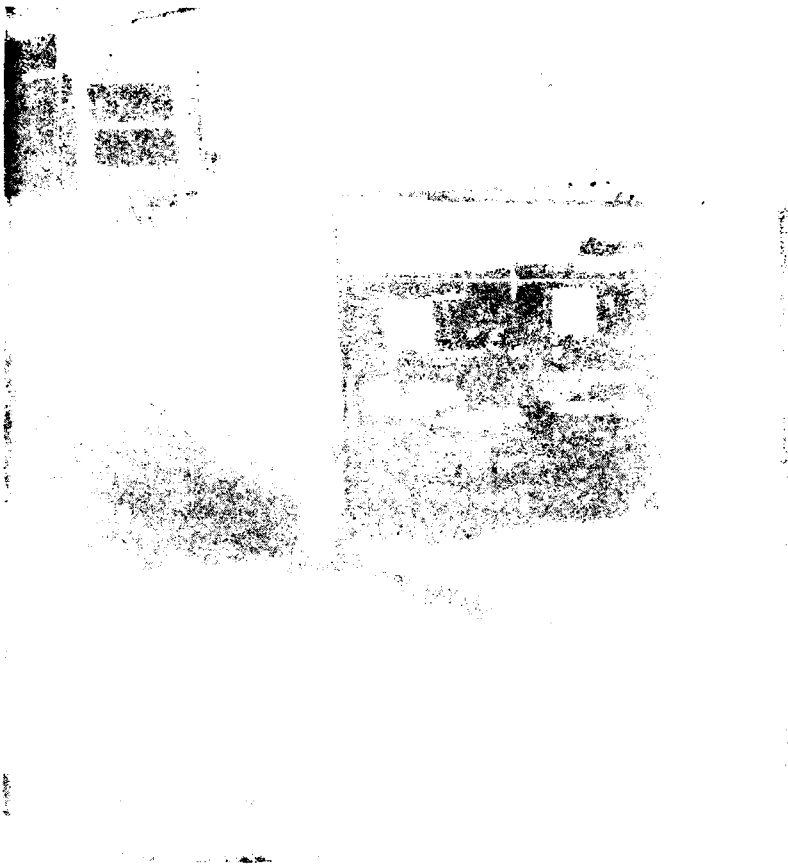


Figure 5: 436 STS Paint And Electronic Shop, Bldg 1617

6. Shop: 436 STS Electronic Shop
Contact: Sgt Vaden

Building: 1617
AUTOVON: 739-7378

Electronic Shop personnel are responsible for the production of printed circuit boards. The main process is etching which uses 0.5 gallons of sodium persulfate and 3.5 gallons of water (total amount of waste - 8 gallons/month). The solution is stored in a plastic drum at the 436 STS Paint Shop's accumulation site and is disposed of as hazardous waste. The process also uses a Kepro developing solution and a Kepro photosensitive stripping solution. The developing solution and the stripping solution have not been changed.

7. Shop: 436 STS Photo Shop
Contact: TSgt Yates

Building: 1615
AUTOVON: 739-5611

The function of the Photo Shop is to process Ektachrome film used to produce slides and film strips by Strategic Air Command Training Units. The seven-step process is done in one machine using seven chemicals. They are

E-6 AR first developer, reversal bath, color developer, conditioner, bleach, fixer, and stabilizer. Each step uses an average of 15 gallons/week of chemical concentrate. All of the chemicals are discharged to the sewer system.

8. Shop: 301 CAMS Phase Dock
Contact: SMSgt Winter

Building: 1643
AUTOVON: 739-5302

The Phase Dock personnel are responsible for inspecting the F-4E aircraft for the 301 Tactical Fighter Wing. Waste PD-680 (55 gallons/quarter), waste fuel (50 gallons/month) and waste oil (1 gallon/month) are drummed and stored at the accumulation site (See Figure 6) until a contractor comes to pump it out. MEK is used as a wipe on/wipe off process. No waste is generated. Carbon remover is used on the washrack to clean exhaust tracks on the aircraft. It is also used as a wipe on/wipe off process for cleaning parts. Aircraft are washed with Mean Green Soap (1 gallon/month). The drains at the washrack are connected to an oil/water separator which discharges to the sewer. Speedy Dry is thrown in the trash after use. Dirty rags are thrown away; personnel were not satisfied with the linen exchange because the rags were not clean enough for use.



Figure 6. 301 CAMS Phase Dock, Bldg 1643

9. Shop: 301 CAMS Pneudraulics
Contact: MSgt Seifert

Building: 1643
AUTOVON: 739-7885

Pneudraulics personnel are responsible for inspecting, servicing, repairing, overhauling, and bench checking hydraulic and pneumatic components on the F-4E aircraft. They are also responsible for inspecting, servicing, repairing, and overhauling components and equipment of the liquid oxygen system and gaseous oxygen system on the F-4E aircraft. Spent PD-680 (25 gallons/quarter) and waste hydraulic fluid (15 gallons/month) are drummed separately and stored at the accumulation site until a contractor comes and pumps out the drums. The shop shares an accumulation site with the 301 CAMS Phase Dock, Bldg 1643.

10. Shop: 301 CAMS Aerorepair
Contact: MSgt Zimmerman

Building: 1643
AUTOVON: 739-5679

Wheel and Tire Shop personnel tear down, clean, and rebuild main and nose wheels of F-4E aircraft. This shop has a 135-gallon and a 30-gallon PD-680 degreasing tank that is changed out on a quarterly basis. Waste PD-680 is placed in 55-gallon drums and taken to the 301 CAMS Phase Dock accumulation site, Bldg 1643, where it is pumped out by the waste oil contractor. The shop uses 25 gallons of stripper (NSN 8010-01-040-1059) every quarter. It is drummed and disposed of as hazardous waste. Spray paint is used for touch-up painting; large jobs are sent to 301 CAMS Corrosion Control. Empty spray paint cans are thrown in the trash.

11. Shop: 301 CAMS Corrosion Control
Contact: Mr Griffin

Building: 1628
AUTOVON: 739-5546

Personnel of the 301 CAMS Corrosion Control treat the F-4E aircraft and associated parts for corrosion (partial stripping and painting). Waste paints and thinners (10 gallons/month) are drummed and disposed of as hazardous waste. The shop has a stripping tank (110-gallon capacity) that has never been changed. After stripping, parts are rinsed; the rinse water runs into a drain which is connected to an oil/water separator. The shop has a dry paint booth. Filters are changed two to three times per week and thrown in the trash. Hazardous wastes are stored at the 301 CAMS AGE accumulation site, Bldg 1628.

12. Shop: 301 CAMS AGE
Contact: Mr Beard

Building: 1628
AUTOVON: 739-7168

The AGE Shop services, maintains, and dispatches flight line support equipment. The shop has a 55-gallon PD-680 tank that is changed every quarter. Waste oils and fluids are collected in a 500-gallon bowser. Waste synthetic oil is collected in a designated 55-gallon drum. PD-680 (25 gallons/month) and soap (10 gallons/month) are used to wash the AGE equipment; the rinsewater goes to an oil/water separator and then to the sanitary sewer. MEK (1 gallon/month) is used up in process for surface preparation. Empty spray paint cans are thrown in the trash. Batteries (3-6/month) are turned in to DRMO wet. Waste antifreeze (5 gallons/month) is drummed and stored at the accumulation site (See Figure 7). Waste paints and thinners (1 gallon/month) are collected in a 10-gallon drum and stored at the shop's accumulation site.

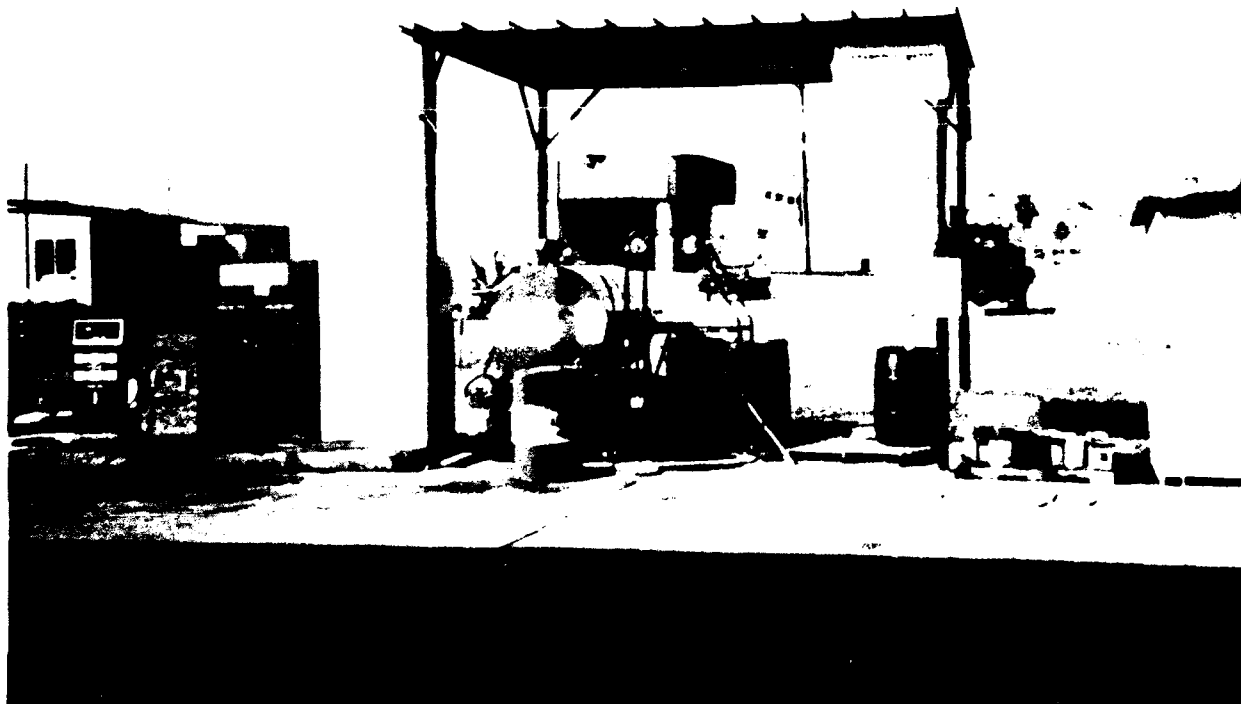


Figure 7. 301 CAMS AGE Shop, Bldg 1628

13. Shop: 301 CAMS Propulsion
Contact: Mr Luther

Building: 1602
AUTOVON: 739-7895

This shop is responsible for the build-up and repair of jet engines for the 301 Tactical Fighter Wing and is divided into two sections, the teardown section and the afterburner section. The teardown section generates waste JP-4 (7 gallons/month) and 7808 oil (7 gallons/month). Both wastes are caught in pans and drummed separately. Large oil spills from leaks go down the drain to an oil/water separator; small oil spills are cleaned up with either Speedy Dry or rags. Both spent Speedy Dry and used rags are thrown in the trash. The afterburner section uses PD-680 in a brush on operation for parts cleaning. The waste PD-680 (5 gallons/month) is drummed and stored at the accumulation site (See Figure 8).

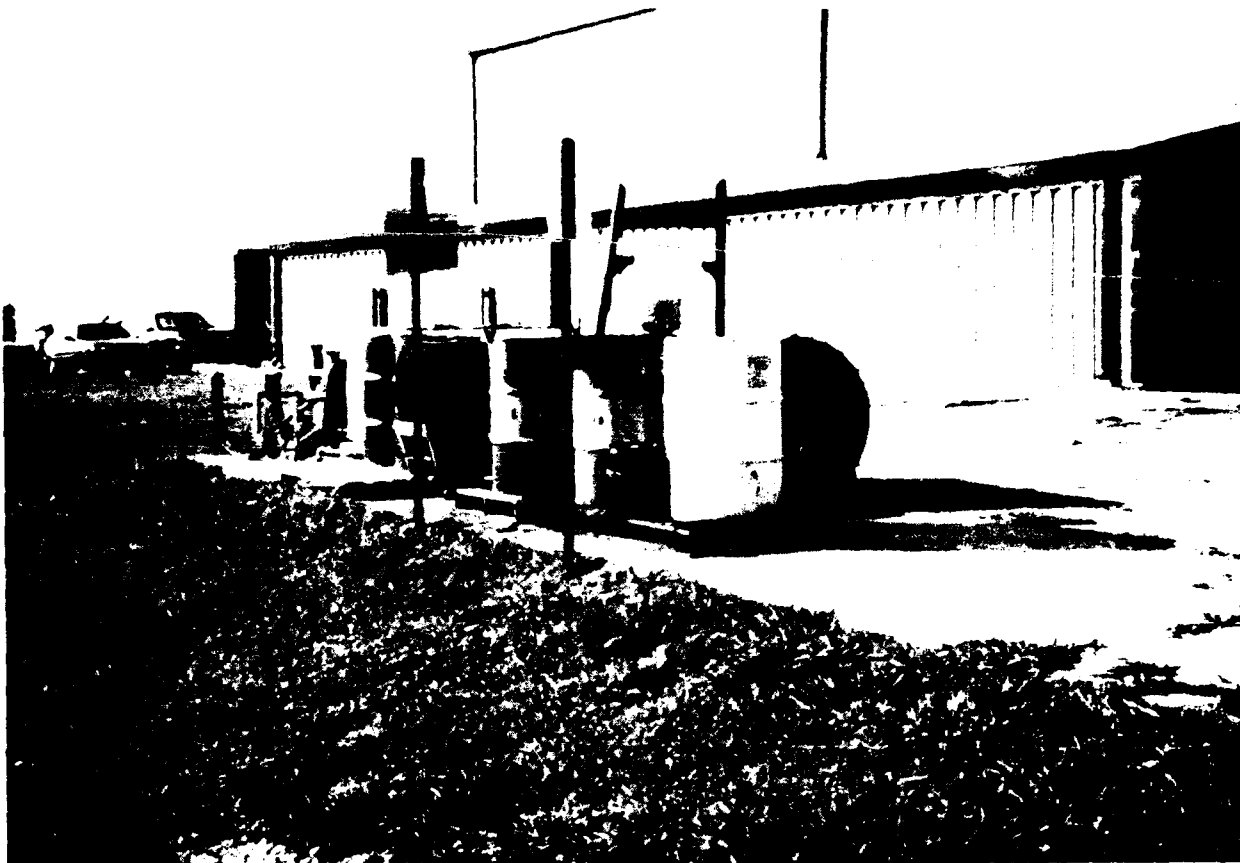


Figure 8: 301 CAMS Propulsion Shop, Bldg 1602

14. Shop: 7th FMS Corrosion Control
Contact: TSgt Back

Building: 1060
AUTOVON: 739-5481

Shop personnel are responsible for corrosion treatment and painting of B-52 and KC-135 aircraft, associated aircraft parts, and support equipment. The shop has a dry paint booth and a stripping room. The chemical stripping process has a hot stripping tank, a soap tank, and a rinse area. The hot stripping tank (160 gallons) is changed quarterly and the soap tank (200 gallons) is changed two to three times per year. Both wastes are drummed and disposed of as hazardous waste. The rinse water flows down the drain. The liquid stripping process has been minimized by the addition of a plastic bead blasting unit. The shop is collecting the spent plastic bead blasting media in a 55-gallon drum and is planning to dispose of it as hazardous waste. Large parts are put on barrier paper before the chemical stripper is brushed on. After stripping, the part and the barrier paper is rinsed with water. The rinse water is discharged down the drain, and the paper is thrown in the trash. Rags contaminated with polyurethane paint are drummed and disposed of as hazardous waste. Waste polyurethane paint (50 gallons/month)

is drummed and disposed of as hazardous waste. The accumulation site is located on an impermeable pad and surrounded by a fence with a locking gate (See Figure 9).

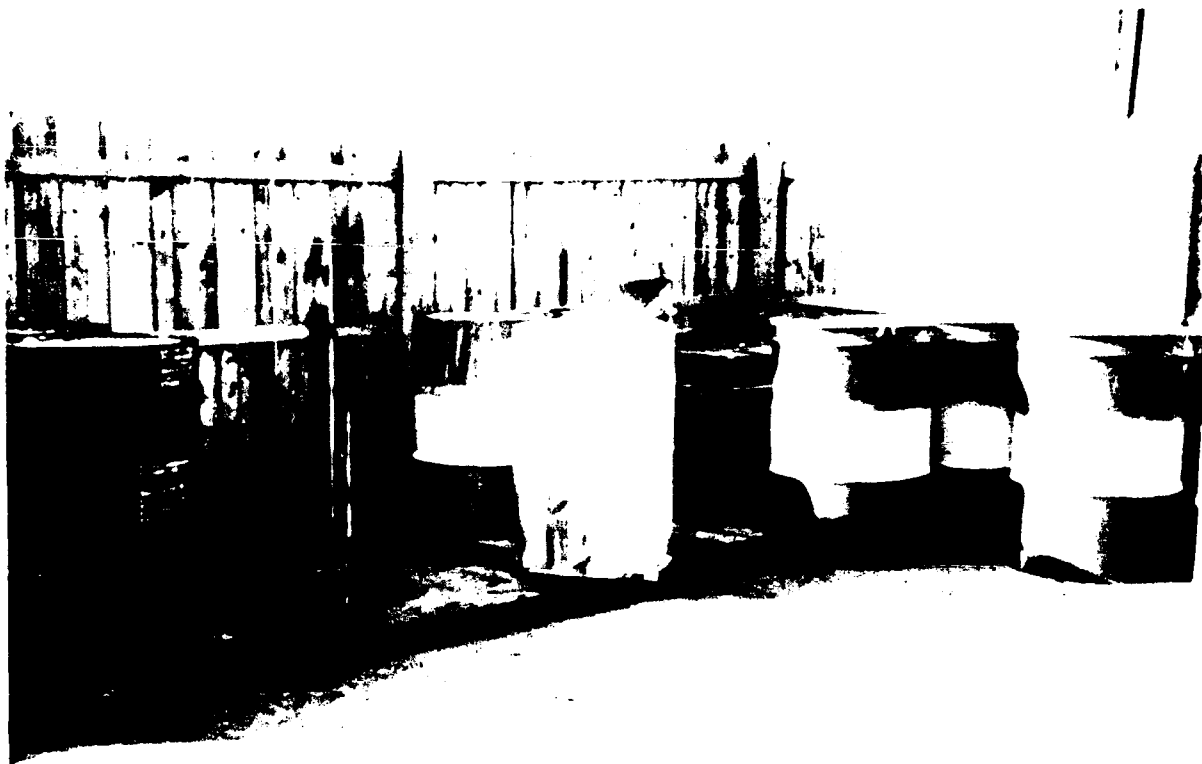


Figure 9. 7th FMS Corrosion Control, Bldg 1060

15. Shop: 7th FMS Wheel and Tire Shop
Contact: MSgt Lamb

Building: 1410
AUTOVON: 739-5565

This shop is responsible for assembling, disassembling, and cleaning wheels and tires for the B-52, KC-135, and some T-37 aircraft. The shop has three tanks containing PD-680 for cleaning bearings (agitated and submerged), rinsing bearings and cleaning wheels and heat shields. Used PD-680 (330 gallons/6 months) is drummed and stored at the shop's accumulation site until the contractor comes to pump it out.

16. Shop: 7th FMS Electric/Battery Shop
Contact: Amn Benham

Building: 1410
AUTOVON: 739-5214

Shop personnel service nickel-cadmium (Ni-Cd) and lead-acid batteries. The number of batteries per month depends upon the season. Ni-Cd batteries are neutralized with boric acid and sent to DRMO for disposal. Lead-acid batteries are sent to DRMO wet.

17. Shop: 7th FMS Pneudraulics
Contact: SSgt Doss

Building: 1050
AUTOVON: 739-5763

This shop is responsible for aircraft hydraulic systems and component maintenance and operational checks. The shop has two PD-680 tanks (15-gallon and 50-gallon) for parts cleaning. Each tank is changed every two months and the contents are placed in 55-gallon drums. The drums are taken outside the shop, placed on a concrete pad (See Figure 10), and eventually taken to the accumulation site at 7th FMS Corrosion Control, Bldg 1060. There is one hydraulic test stand that generates 5-10 gallons of waste hydraulic fluid every month. The waste hydraulic fluid is drummed; when the drum is full it is taken to the accumulation site at 7th FMS Corrosion Control. Dirty rags are collected and sent to the base laundry for exchange.

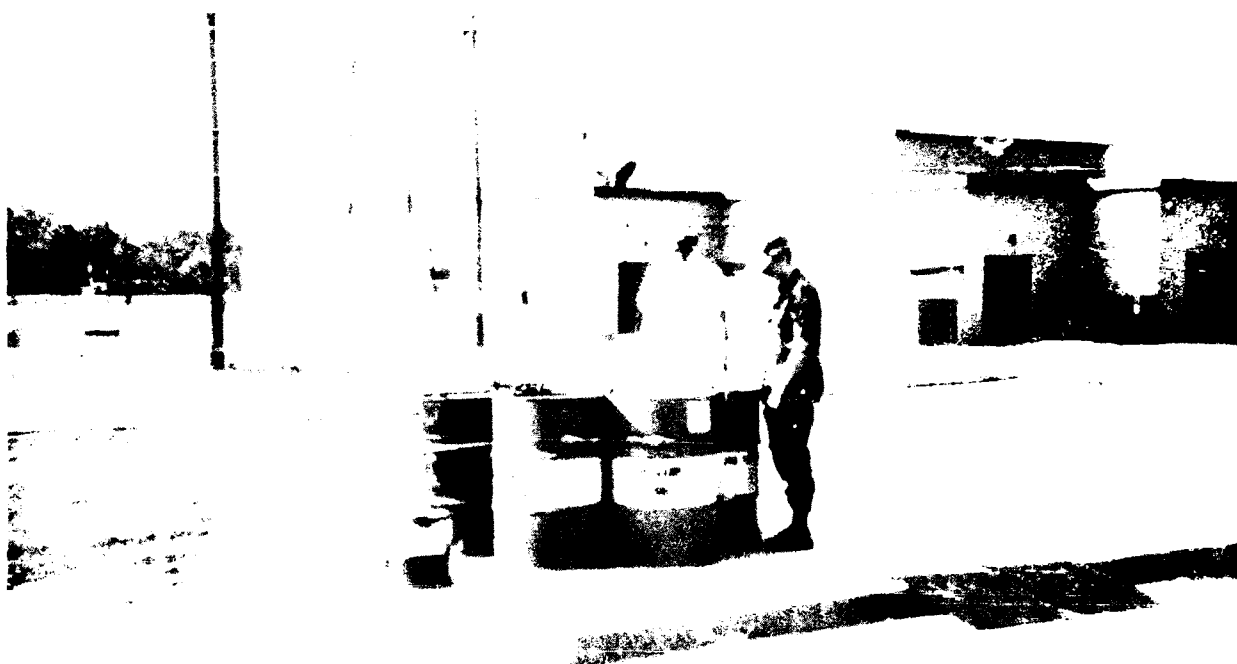


Figure 10: 7th FMS Pneudraulics, Bldg 1050

18. Shop: 7th FMS Test Cell
Contact: TSgt Murfin

Building: 1015
AUTOVON: 739-7622

Jet Engine Test Cell personnel troubleshoot engines, perform field tests and engine rev-up procedures on jet engines. Waste oils (6 gallons/month) and waste fuels (20 gallons/month) are drained to an oil/water separator. Aircraft soap (1 gallon/month), floor finish (2 gallons/month), and gas path cleaner (3 gallons/month) are used to clean equipment and the

interior of the run bay. Soap is rinsed off and drained to an oil/water separator. The oil/water separator appears to be too small to handle the work load of the test cell. The tank has to be pumped out every 2-3 weeks and has overflowed in the past. When the tank overflows, the oil and fuel flow into a ditch which leads to the golf course.

19. Shop: 7th FMS Jet Engine/
Accessory Repair Shop
Contact: SSgt Hartso

Building: 1410
AUTOVON: 739-7876

Shop personnel are responsible for the repair of TF33-P3 and J57 jet engines. The Accessory Repair Shop has a 25-gallon PD-680 tank, a 30-gallon Safety Kleen tank, and a sink. The PD-680 and Safety Kleen tanks are changed on a monthly basis. This shop has a fuel manifold test stand containing 10 gallons of calibrating fluid which is collected in a 600-gallon bowser located at the accumulation site (See Figure 11). The 25-gallon carbon remover tank and ultrasonic cleaning unit in the shop are not in use.

The Bearing Shop has five 7-gallon tanks containing carbon remover, PD-680, PD-680 and 7808 oil, fingerprint remover, and 7808 oil. The tanks are changed out on a monthly basis. All oil based chemicals are placed in the same 600-gallon bowser, and the PD-680 and carbon remover are drummed separately. Touch-up painting is done with spray paint; empty cans are thrown in the trash. A vibrating oil/PD-680 cleaner (10 gallons) is to be installed in the future.



Figure 11: 7th FMS Jet Engine/Accessory Repair, Bldg 1410

20. Shop: 7th FMS AGE
Contact: Mr Huse

Building: 1414
AUTOVON: 739-7720

This shop is responsible for all maintenance and periodic inspections of AGE equipment. Waste PD-680 (40 gallons/month), waste oil (150 gallons/month), waste fluids (55 gallons/month), and waste fuel (165 gallons/month) are drummed separately in 55-gallon drums and stored at the shop's accumulation site until the contractor comes to pump it out. Antifreeze (10 gallons/month) is also drummed and stored at the shop's accumulation site. Citrikleen is used at a 10:1 ratio for washing and degreasing equipment. The Citrikleen is sprayed on, allowed to soak for 15 minutes and then washed off. The rinse water goes down the drain to an oil/water separator. Stenciling is done on the equipment using spray paint; empty spray cans are thrown in the trash. A new longer-lasting polyurethane paint is being tested for possible future use. Dirty rags are sent to the base laundry for exchange.

21. Shop: 7th FMS Washrack
Contact: SrA Laveault

Building: 1027
AUTOVON: 739-7732

This shop washes about seven B-52 and eight KC-135 aircraft per month. PD-680 is used to clean the hydraulic fuel and oil stands on the B-52. Spartan soap (NSN 6850-01-181-7178) is mixed at a ratio of 1:1 in a 2000-gallon above ground tank located next to the building. Carbon remover (NSN 6850-01-184-3182) is used to clean the exhaust tracks and the landing gear. One section of the floor in the shop was improperly constructed and is sloped towards the door rather than the floor drain. This causes the washwater to run out the door and into the storm sewer rather than into the floor drain that leads to an oil/water separator. Civil Engineering is in the process of having the contractor correct the problem.

22. Shop: 7th FMS Fuel Cell Repair
Contact: MSGt Holland

Building: 1058
AUTOVON: 739-7910

This shop cleans and repairs aircraft fuel tanks. This includes removal and replacement of aircraft fuel cells, and certification and maintenance of external tanks. JP-4 is drained from the fuel cells. Large amounts of fuel are put into a bowser, filtered, and put back into the system. Contaminated fuel is taken to the fire training pit. Small amounts of fuel go into a fuel/water separator which is maintained by a contractor. Currently, all rags are sent to the base laundry for exchange. In the future, the shop plans to drum fuel soaked rags and dispose of them as hazardous waste.

23. Shop: 7th FMS NDI
Contact: TSgt Washington

Building: 1414
AUTOVON: 739-7797

7th FMS NDI personnel provide nondestructive inspection services to the 7 FMS, 301 CAMS, and Dallas Naval Air Station. The magnetic particle inspection is a closed system utilizing Magnaflux Magnaglow and iron fillings with a large magnet to find flaws in aircraft parts. Spent Magnaflux solution (25 gallons) is changed every six months, drummed and disposed of as mixed oil waste.

The penetrant inspection process is an open system which uses penetrant, emulsifier, and developer. Parts are sequentially dipped into the penetrant, removed; placed in the emulsifier, removed; and placed in the developer. The part is then passed through a drying oven before inspection and final rinsing. The penetrant (110 gallons) and emulsifier (110 gallons) are changed every six months and drummed as hazardous waste. The developer is processed through a silver recovery unit and then discharged down the drain to the sanitary sewer system.

A Baird Atomic oil analysis spectrometer is used to evaluate engine oil from aircraft. A solvent, 1,1,1-trichloroethane, is used as a wipe on/wipe off process to clean the machine. Waste oil is put in a 10-gallon drum and then taken to the 7 FMS AGE Shop accumulation site, Bldg 1414, where it is then put in 55-gallon drums.

The Cavitator Ultrasonic Cleaner uses 1 gallon of 1,1,1-trichloroethane for cleaning parts. After the part is cleaned, the solvent is put back in the gallon container for future use. After the solvent is used twice (about 1 part/month is cleaned), it is disposed of as hazardous waste through DRMO.

The shop also has an x-ray room and developing room. The developing room has three 15-gallon tanks containing developer, stop bath, and fixer. The developer and stop bath are discharged down the drain to the sanitary sewer system. The fixer is taken to the base photo lab to be processed through a silver recovery unit.

24. Shop: 7th CES Power Production
Contact: SSgt Silvera

Building: 1320
AUTOVON: 739-6223

7th CES Power Production personnel are responsible for preventive maintenance of gasoline and diesel generators. The shop generates waste antifreeze (13 gallons/month), diesel fuel (9 gallons/month), and oil (13 gallons/month). The wastes are drummed and kept at the shop's accumulation site (See Figure 12). The waste oil is pumped out of the drums by a contractor, and the other liquid wastes are sent to DRMO for disposal. PD-680 (9 gallons/month) is used for tool cleaning; after use, it is rinsed down the drain. Lead-acid batteries (6 batteries/month) are turned in wet to DRMO. Dirty rags are sent to the base laundry for exchange. Torn rags that cannot be reused are thrown in the trash. Speedy Dry is used for cleaning up small spills; it is thrown in the trash after use. Touch-up painting is done with spray paint; empty spray paint cans are thrown in the trash.

25. Shop: 7th CES Entomology
Contact: TSgt Lyons

Building: 1217
AUTOVON: 739-5768

The Civil Engineering Entomology Shop is responsible for pest management throughout the base. This includes insect and rodent control basewide, disease vector control, weed control, termite control and supervision of pest control and turf-management contracts. Any leftover chemicals are drained and stored in containers for use at a later time. The rinse water from triple rinsing chemical containers is also used later for mixing pesticides.

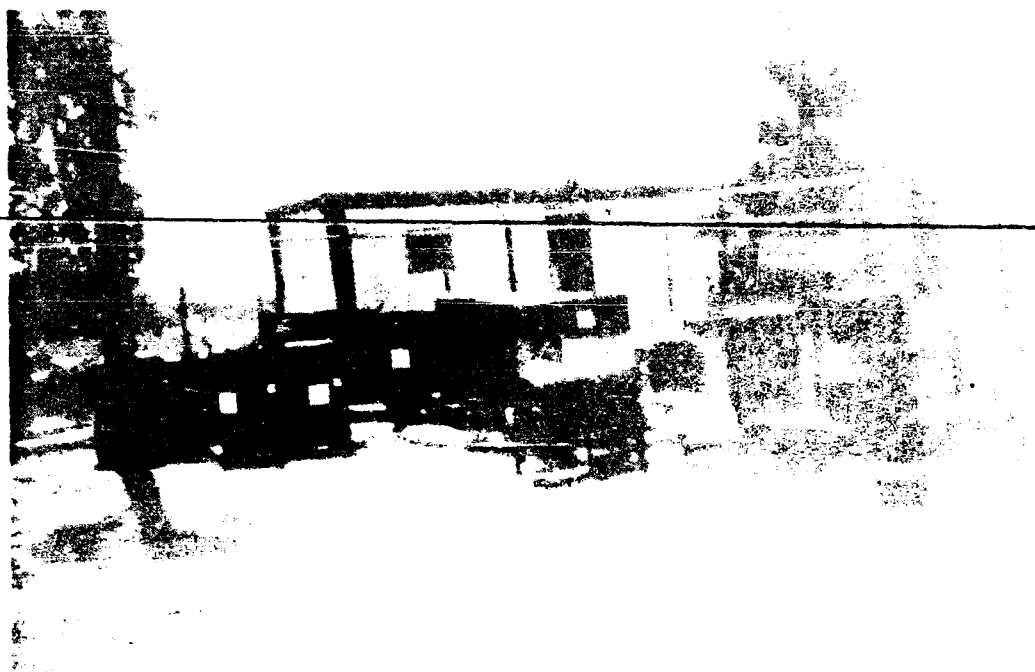


Figure 12. 7th CES Power Production, Bldg 1320

26. Shop: 7th CES Exterior Electric
Contact: Mr Doson

Building: 1217
AUTOVON: 739-5786

Shop personnel are responsible for maintaining all transformers on base and testing transformer oil for polychlorinated biphenyl (PCB). All PCB contaminated transformers have been removed by a contractor. This shop does not generate any hazardous wastes.

27. Shop: 7th CES Liquid Fuels Maintenance
Contact: Mr Allen

Building: 4156
AUTOVON: 739-6225

Liquid Fuels personnel are responsible for maintaining stationary fuel systems associated with transporting fuel to B-52 and KC-135 aircraft. The only source of waste is the rust and dirt sludge mixture remaining from tank cleaning procedures (about 3 gallons/tank). Twenty-four 25,000-gallon tanks are cleaned every five years on a rotating basis. The sludge is placed in a metal container (See Figure 13) to weather for three weeks (in accordance with AF Regulation 85-16) then disposed of in the trash. If a large amount of sludge is generated, it is drummed and disposed of as hazardous waste.

The shop maintains two bowzers (1000-gallon and 600-gallon) for spill clean-up. Larger spills are cleaned up by the Civil Engineering Spill Team. Due to increased awareness, the frequency of spills has been drastically reduced.



Figure 13. 7th CES Liquid Fuels, Bldg 4156

28. Shop: 7th MMS Equipment Maintenance
Contact: TSgt Bittle

Building: 1420
AUTOVON: 739-7415

Shop personnel are responsible for all maintenance and periodic inspections on all munitions trailers. This shop has a 20-gallon PD-680 tank which is changed twice per month. The hydraulic system is drained on each trailer annually (17 gallons/trailer); the shop drains 2-3 trailers every month. MEK is used to flush the brake system on the trailers (half-gallon/trailer). All wastes are drummed and stored at the shop's accumulation site (See Figure 14). Painting is done using spray paint; empty cans are thrown in the trash. Soap (10 gallons/month) used to wash the trailers goes down the drain.

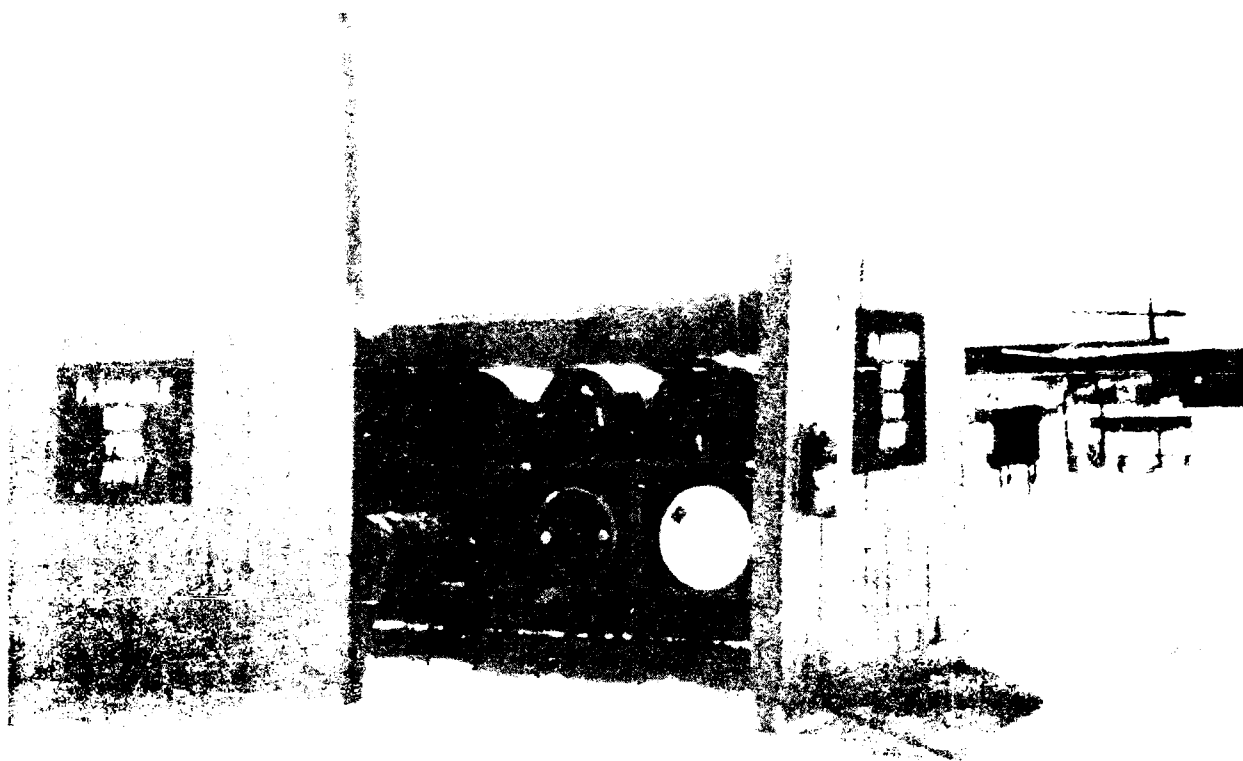


Figure 14. 7th MMS Equipment Maintenance, Bldg 1420

- | | |
|--|-------------------|
| 29. Shop: 7th MMS Conventional Maintenance | Building: 3369 |
| Contact: MSgt Cochran | AUTOVON: 739-7851 |

This shop is responsible for touch-up painting on munitions. Only spray paint is used; empty spray paint cans are thrown in the trash. Naphtha is used for surface preparation. The shop doesn't have any degreasing or cleaning tanks. Dirty rags are sent to the base laundry for exchange. The shop has one 55-gallon drum for waste paints; it hasn't been used in over a year.

- | | |
|--------------------------------|-------------------|
| 30. Shop: 7th AMS Fire Control | Building: 1055 |
| Contact: SrA Arupka | AUTOVON: 739-7385 |

Shop personnel are responsible for repairing and maintaining the ASG-21 fire control systems for the B-52 aircraft. They are also responsible for the teardown and cleaning of 20mm Gatling guns. This shop has a 55-gallon PD-680 tank which is changed twice per year. The oil contractor comes to the shop and pumps the spent PD-680 out of the tank.

The shop has an accumulation site with empty barrels. The barrels are maintained only for emergencies.

31. Shop: 7th CGS Auto Hobby Shop
Contact: Mr Roat

Building: 1140
AUTOVON: 739-7050

The Auto Hobby Shop is housed in a "garage type" building containing equipment for maintenance and repair of privately owned vehicles. A separate building has three stalls for washing vehicles, one grease rack, and a dry paint booth. The shop has an underground tank (850-gallons) that is used for waste oil storage. Patrons pour the oil from a pan into a funnel which leads to the underground tank (See Figure 15). Also, base housing residents can bring oil to the shop to pour into the underground tank. The tank has been in place for more than twenty years and has not been leak tested. A waste oil contractor pumps the tank out every two to three months.

The shop has two Safety Kleen degreasing tanks that are changed every two weeks by the Safety Kleen Corporation. Filters from the paint booth (12 filters/6 months) are thrown in the trash. There are no other paint wastes produced in the shop. PD-680 (55 gallons/month) is used to clean the shop floors and is disposed of down the drain. A new Auto Hobby Shop is scheduled to be built in 1989.

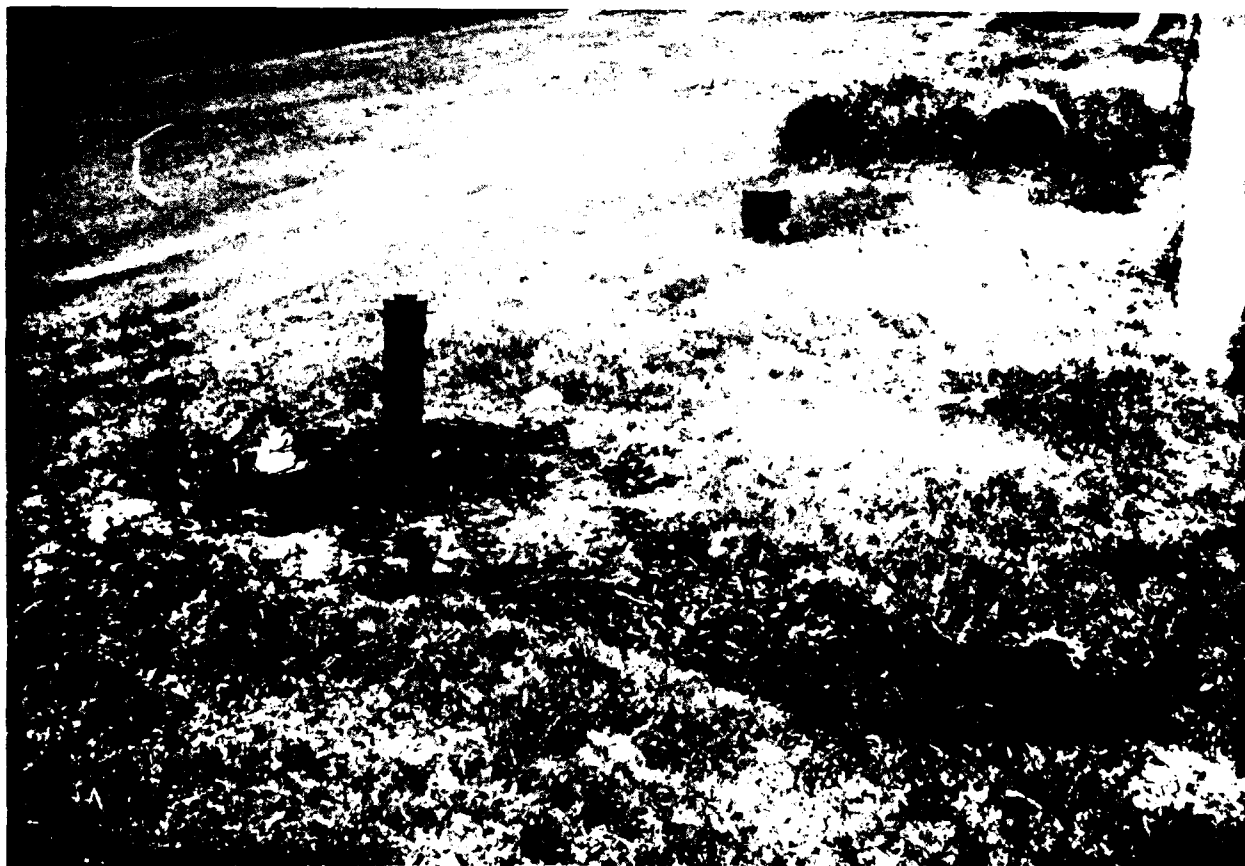


Figure 15. 7th CGS Auto Hobby Shop, Bldg 1140

32. Shop: Fire Training Pit
Contact: Chief Smith

The Fire Training Pit is used to provide Carswell AFB firemen with firefighting experience (See Figure 16). Shops bring contaminated JP-4 (only fuel contaminated with less than 10% water is accepted) to the Fire Training Pit in bowzers. The pit averages about four burns/month. After the training is completed, the fire is relighted so that the remaining fuel will burn off. The pit is unlined and is an Installation Restoration Program (IRP) site. A project is scheduled (late 1989) to dig out the old pit and install a new pit.

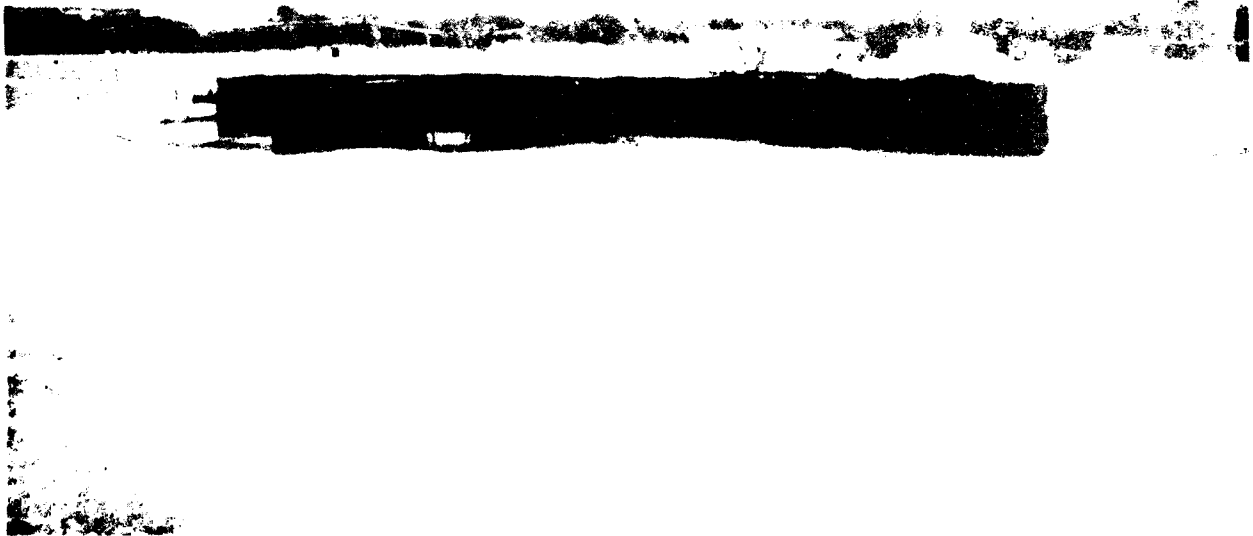


Figure 16. Fire Training Pit

Fourteen accumulation sites were visited at Carswell AFB and the conditions at each are presented in Table 2. The 14 sites evaluated were:

SITE	LOCATION	BLDG
1	7th TRANS Refueling Maintenance	1194
2	7th TRANS Vehicle Maintenance	1191
3	436 STS Paint Shop	1617
4	301 CAMS Phase Dock	1643
5	301 CAMS AGE	1628
6	301 CAMS Propulsion	1602
7	7th FMS Corrosion Control	1060
8	7th FMS Jet Engine Shop	1410
9	7th FMS Wheel and Tire Shop	1410
10	7th FMS Pneudraulics	1050
11	7th FMS AGE	1414
12	7th CES Power Production	1320
13	7th MMS Equipment Maintenance	1420
14	7th AMS Fire Control	1055

V. SUMMARY OF GENERAL WASTE DISPOSAL PRACTICES

A. 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 temporary waste pickup point (at the time of the survey, the pickup point was 7 CES Power Production, Bldg 1320). In general, the paint and thinner wastes are not segregated.

2. Soiled rags from most shops are taken to the base laundry and exchanged for clean ones. Torn rags are thrown in the trash. The 7th FMS Corrosion Control Shop personnel drums rags contaminated with polyurethane paint and disposes of them as hazardous waste.

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

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

5. Waste antifreeze is placed in 55-gallon drums and stored at the accumulation sites. At the time of the survey the base was waiting for approval from the City of Fort Worth Wastewater Treatment Plant to dispose of waste antifreeze in the sewer system.

6. Waste oils are placed in 55-gallon drums or bowlers and stored at the accumulation sites until the waste oil contractor comes to pump it out. In some cases, waste oil is discharged to oil/water separators or is stored in underground tanks and periodically removed by contractors.

Table 2. Conditions of Accumulation Sites

SITE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
secure	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
gates locked	A	A	A	A	A	A	Y	A	A	A	A	A	Y	A
warning sign	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y
impermeable floor	Y	S	Y	S	Y	Y	Y	Y	Y	Y	S	N	N	S
diked/bermed	N	N	N	N	Y	N	N	Y	Y	N	Y	N	N	Y
valve in berm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
SPILL EQUIPMENT														
overpack	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
spill supplies	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
extinguisher	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
CONTAINER														
funnels used	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
container closed	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
deteriorating	N	N	N	N	N	N	N	N	N	N	N	N	N	N
leaking	N	N	N	N	N	N	N	N	N	N	N	N	N	N
spills	N	Y	N	N	N	Y	N	N	N	N	N	Y	Y	N
labeled	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	I	Y	Y
log maintained	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N = NO
 Y = YES
 I = INCOMPLETE
 O = NOT OBSERVED
 A = NOT AVAILABLE
 S = SEMI-IMPERMEABLE (ASPHALT)

7. NDI wastes (penetrant and emulsifier) are drummed and disposed of as hazardous waste.

8. Sludge from the 436 STS Paint Shop is disposed of in the trash. The wastewater from the paint booth is discharged into the sewer system.

9. Waste pesticides from triple rinsing pesticide drums and cleaning fogging equipment are drained, stored in containers, and reused for mixing pesticides.

10. Most of the stripping wastes are generated at the 7th FMS Corrosion Control Shop, Bldg 1060, 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 the temporary waste pickup point.

11. Uncontaminated JP-4 from 7th FMS Fuel Cell Repair is given to POL personnel and is filtered back into the system. JP-4 from maintenance on the refueling trucks is drained to a fuel/water separator. Waste fuel from the separator drains to an underground tank where it is pumped out by a contractor and then taken to the Fire Training Pit. Other shops place contaminated JP-4 in 55-gallon drums and dispose of it as hazardous waste.

12. Most waste hydraulic fluids generated on base are placed in 55-gallon drums, stored at an accumulation site and pumped out by a contractor.

13. Speedy Dry, used to clean small spills, is either put back in a container for reuse or thrown in the trash.

14. At the time of the survey, personnel from the 7th FMS Corrosion Control Shop planned to dispose of the plastic media from the bead blasting unit as hazardous waste.

15. Waste fixers are sent through a silver recovery unit before being discharged to the sewer system. Other photo wastes are diluted and discharged to the sewer system.

16. Used lead-acid batteries are palletized and turned in to DRMO wet, thus eliminating the need to neutralize the acid.

17. A large amount of PD-680 is used for degreasing operations (approximately 4295 gallons/year). Waste PD-680 from most shops is placed in 55-gallon drums and held at designated accumulation sites until picked up by the waste oil contractor. PD-680 used at 301 CAMS AGE, Auto Hobby, 7th MMS Equipment, and 7th CES Power Production for cleaning parts and equipment is rinsed down the drain to either an oil/water separator or the sewer system.

18. Most solvents (not including PD-680) are disposed of in 55-gallon drums. Some solvents are used in process or rinsed down the drain to the sanitary sewer.

19. Safety Kleen personnel service the Safety Kleen degreasing units at the shops as needed. They drain the used degreasant and refill the units on a schedule for each shop. This eliminates the base's responsibility to purchase and dispose of the degreasant (normally PD-680).

VI. FINDINGS, OBSERVATIONS, AND CONCLUSIONS

1. Carswell AFB does not have a hazardous waste analysis plan to characterize the wastestreams and the base has been issued a notice of

violation by the Texas Water Commission (TWC) for the lack of a waste analysis plan. The shops are responsible for identifying what goes into waste containers; however, without a baseline wastestream analysis, untrained personnel may incorrectly identify waste as either hazardous or nonhazardous.

2. The Environmental Coordinator (DEEV) is responsible for training accumulation point managers, who, in turn trains other personnel. At the time of this survey, only one training course had been taught. The course was developed from slides and information obtained from HQ SAC. The Bioenvironmental Engineer was not included in this training. Additional training is scheduled for the future.

3. Most of the accumulation sites on base are not secured, curbed or covered. Several work orders for self-help projects have been submitted for upgrading the accumulation sites. Secured waste storage sites would discourage intentional or unintentional cross contamination of wastes.

4. Currently, DRMO does not have a Hazardous Waste Storage Facility. A new facility is scheduled to be completed in May 89. Wastes are kept at the individual accumulation sites for up to 90 days. At the 60-day point, DEEV is contacted in order to get the waste removed before the 90-day point (this deadline is not always met).

5. Currently, all waste antifreeze is being drummed for disposal as hazardous waste. This is being done because the City of Fort Worth Wastewater Treatment Plant will not accept the antifreeze in the facility.

6. The Bioenvironmental Engineering Shop uses a reusable coliwasa for sampling. The cleaning process is very time consuming and tedious. Disposable ones would be much more convenient and would eliminate the possibility of cross contamination.

7. The 7th FMS Corrosion Control Shop utilizes a new plastic media bead blasting unit. Plans are for the media to be disposed of through DRMO as a hazardous waste.

8. All lead-acid batteries are turned in to DRMO wet, thus eliminating the need to neutralize the acid.

9. The 7th FMS Corrosion Control Shop uses epoxy stripper on large aircraft parts as a brush on/brush off operation. The stripper and paint spill onto barrier paper which is placed on the floor. The paper is then washed off and thrown in the trash. The rinse water, stripper, and paint go down the drain.

10. The base uses a large amount of PD-680. In general, waste PD-680 is placed in 55-gallon drums and stored at the accumulation site until the waste oil contractor comes to pump it out. It is currently being taken free of charge by the contractor.

11. Most shops exchange all of their rags on a one-for-one basis through linen exchange for clean ones. Some shops have started drumming paint contaminated rags for disposal as hazardous waste.

12. The 7th FMS Washrack was improperly constructed. Part of the shop's floor slopes away from the floor drain. Washwater runs out the shop door into a storm drain which leads to a nearby creek. Civil Engineering is in the process of having the contractor correct the problem.

13. The Auto Hobby Shop has an 850-gallon underground storage tank which has been in place for at least 20 yea The tank has not been leak tested.

14. The 7th FMS AGE shop is using Citrikleen on the washrack. Personnel said that Citrikleen did not work quite as well as PD-680, but they had rather use it because it is safer and more pleasant to work with.

15. The BDU-38 Shop (Bldg 8503) is located away from the base. The shop has one 55-gallon barrel of waste paint and thinners and does not have means of disposing of it. Personnel cannot transport hazardous waste to the base without a Department of Transportation permit.

16. Currently, 2600 bomb tail fins are being sandblasted and painted at BDU-38, Bldg 8514. The used sandblasting media has not been tested to determine if it is hazardous or nonhazardous.

17. The 7th TRANS Refueling Maintenance Shop rinses the refueling vehicle tanks with water. The water flows out of the tank onto a sloped concrete slab which leads to a grassy ditch. The grass is dead along the path the water takes to the ditch.

18. The 7th FMS Fuel Cell Repair Shop has a fuel/water separator which is used to collect JP-4 from depuddling procedures. Personnel said the separator is supposed to be pumped out by a contractor, but they have never seen the process being done.

19. The 7th FMS Fuel Cell Repair Shop drains JP-4 from the jets into a flight line bowser. The fuel is tested, and if it is not contaminated it is sent to POL personnel for reuse. This reuse procedure should be used in other shops.

20. The Fire Chief said that waste fuel taken to the fire training pit is supposed to be tested for contamination. If the waste fuel has more than 10% contamination the fuel is not supposed to be burned in the pit. However, the chief stated that some of the fuel brought to the fire training pit may not be tested and may contain more than 10% contamination.

21. The fire training pit is unlined and does not have an oil/water separator. The area is currently an IRP site. A project (scheduled to be completed in late 1989) is underway to dig out the old pit and to install a new pit. The new site should be secured to prevent dumping of other waste at the pit.

22. The 7th AMS Fire Control Shop has a 55-gallon PD-680 tank. When it needs to be changed out the contractor comes to the shop and pumps the waste PD-680 directly out of the tank. This procedure eliminates drumming the waste PD-680. This option should be considered for other shops.

23. Most shop personnel interviewed seemed very enthusiastic about hazardous waste control. They expressed a desire for more specific guidance and more management support to upgrade accumulation sites. Most shops are even willing to use self-help projects to upgrade the sites.

24. The 436 STS Paint Shop has a waterfall paint booth. When the system is cleaned, the sludge is skimmed off and the water is drained into the sewer. A small amount of waste sludge is placed in a plastic bag and thrown in the trash.

25. The 7th FMS Test Cell has an oil/water separator that is too small to handle the work load of the shop. The tank has to be pumped out every two to three weeks to prevent it from overflowing; the tank has overflowed in the past.

26. The 7th MMS Conventional Maintenance Shop has a drum of paint waste which has been there for more than a year. The shop no longer generates paint waste and does not need the drum anymore. The drum should be disposed of.

27. The Bioenvironmental Engineering Shop uses a form to evaluate hazardous waste disposal practices during annual shop surveys.

28. Flight line personnel steam clean jet engines outside Bldg 1643. This area does not have an oil/water separator. The water runs into a grassy ditch.

VII. RECOMMENDATIONS

A detailed outbriefing on recommendations was given on 26 May 88. Representatives from the Bioenvironmental Shop and Civil Engineering Squadron attended.

1. Carswell AFB needs to develop a waste analysis plan. This plan should include: 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 analytical parameters; the sampling methods; the sampling frequency and the test methods (see Table 3 for example), in addition to the information already provided in the base's "Hazardous Waste Management Plan." This type of program will allow the base to establish documented rationale for classifying each wastestream as either hazardous or nonhazardous in addition to meeting Texas Water Commission requirements. For example, the 7th FMS Corrosion Control Shop plans to dispose of the spent plastic bead blasting media as hazardous waste, yet, it has not been adequately analyzed for heavy metals to substantiate whether or not it is hazardous. A suggested list of wastestreams for the base is contained in Table 4.

2. CAFB needs to formalize the management structure to manage hazardous wastes. With DEEV severely undermanned, one comprehensive hazardous waste management plan with limited deviations for every accumulation site should be established. This plan should provide step-by-step details on how the accumulation site managers are to run the program and should be written before the development of future training sessions. The plan should implement the following:

TABLE 3: 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	1 Grab sample	Every other drum	Flash Point	1010	Waste Paint related material, LIQUID	DRMO	D001
			Cadmium Chromium			Cadmium Chromium	7130 7190			D006 D007
	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	1 Composite Sample	From every other drum			Hazardous waste solid (n.o.s.) (Cadmium & Chromium contaminated material)	DRMO	D006 D007
			Cadmium Chromium			Cadmium Chromium	7130 7190			
	Waste Motor oil	VM100-001	Jun 88 FP-H (100F) PH-NA RX-NH TM-H	Coli-wasa	Quarterly	Flash Point	1010	N/A	Sold to Contractor for Recycle	D001
			Arsenic Cadmium Chromium Lead Total Halogens			Arsenic Cadmium Chromium Lead Total Halogens	7061 7130 7190 7421 8010			D004 D006 D007 D008
Vehicle Maint. BLD 100	Neutralized Battery Acid	VM100-002	Aug 88 FP-NH PH-NH RX-NH TM-NH	Grab Sample from tank using dipper	Semiannual			N/A	Down Drain	D008
			Lead			Lead	7421			
Legend: FP - Flash Point EP - EP Toxicity TM - Total Metals RX - Reactivity NA - Not Applicable H - Hazardous NH - Non-Hazardous										

TABLE 4. Suggested Wastestreams

<u>SHOP</u>	<u>WASTESTREAM</u>	<u>SAMPLING FREQUENCY*</u>
CAMS AGE	Oils & Fluids (Bowser) Synthetic Oil PD-680 Tank	Before disposal Semiannually Every other tank change out
CAMS Aero Repair	Paint Stripper PD-680 Tanks	Each drum Semiannually, Each tank
CAMS Propulsion	JP-4 PD-680 7808 Oil	Annually Annually Annually
CAMS Pneudraulics	Hydraulic Fluid PD-680	Semiannually Annually
CAMS Corrosion Control	Paints & Thinners Stripping Tank Dry paint filters	Annually Each tank change out Do three analyses to verify if hazardous or nonhazardous
STS Paint Shop	Paints & Thinners	Annually
STS Electronic Shop	Sodium Persulfate	User's knowledge
CAMS Fire Control	PD-680 Tank	Annually
CES Power Production	Fuels 7808 Oil	Annually Semiannually
CSG Auto Hobby Shop	Oils & Fluids	Dependent upon accumu- lation method used at the new Auto Hobby Shop.
FMS AGE	Fuels PD-680 Oils & Fluids	Quarterly Quarterly Quarterly
FMS Corrosion Control	Soap Tank Rinse water tank Bead Blasting Media (Drum) Paints & Thinners Stripping Tank	Every other tank change out Do three analyses to verify if hazardous or nonhazardous Do three analyses to verify if hazardous or nonhazardous Quarterly Every other tank change out

Table 3, Continued

<u>SHOP</u>	<u>WASTESTREAM</u>	<u>SAMPLING FREQUENCY*</u>
FMS Jet Engine	Carbon Remover PD-680 Oils & Fluids (Bowser) Fuels	Semiannually Quarterly Before Disposal Annually (unless tested by POL personnel for recycling)
FMS NDI	NDI Emulsifier NDI Penetrant NDI Developer X-Ray Developer X-Ray Stop Bath X-Ray Fixer	Annually Annually Do three analyses to verify if hazardous or nonhazardous Do three analyses to verify if hazardous or nonhazardous Do three analyses to verify if hazardous or nonhazardous Do three analyses to verify if hazardous or nonhazardous
FMS Pneudraulics	PD-680 Tanks Fluids	Semiannually, each tank User's knowledge
FMS Wheel and Tire	PD-680 Tanks	Semiannually, each tank
MMS Equipment Maint	PD-680 Tank MEK Fluids	Quarterly User's knowledge Quarterly
TRANS Allied Trades	Paints & Thinners	Semiannually
TRANS Fire Truck Maint	Oil & Fluids	Quarterly
TRANS Refueling Maint	Oils (Bowser) PD-680 Tank Fuels Fluids (Drums	Before Disposal Annually Before taking to Fire Training Pit User's Knowledge
TRANS Vehicle Maint	Oil & Fluids Fuels	Quarterly Semiannually

*Frequency of sampling is based on waste quantities reported at the time of the survey. Another factor to be considered is the shop's waste management practices.

a. Accumulation site managers should hold the rank of Staff Sergeant or higher or the civilian equivalent. The base commander should give these people the authority to control their sites.

b. 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 wastestream generated the waste (each wastestream in a shop should have a unique number), (2) date, type, and amount of waste put into the drum (see Table 5 for example), 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.

c. The accumulation site managers should be taught how to do all the necessary work involved with hazardous waste disposal rather than depending on DEEV to do it, e.g., filling out DD Form 1348-1.

3. The education and training program should provide opportunities for input by the BEE shop on the health hazards associated with hazardous waste since many shop personnel are physically involved with the handling of hazardous wastes. Also, DRMO should provide input on the present and future costs of disposing hazardous wastes, the cost benefits of segregating wastes, and the turn-in procedures.

4. DEEV should find out if the waste oil contractor will go to the shops to pump out the PD-680 tanks. This would eliminate drumming of PD-680. A schedule for tank changes could be established between the shops if necessary.

5. A contract needs to be established for the disposal of waste paints and thinners at Bldgs 8503 and 8514. Also, a characteristic hazardous waste (EP Toxicity) analysis should be done on the spent blasting media used for the bomb fin stripping process (Bldg 8514) to determine if the waste is hazardous or nonhazardous. If the waste is hazardous, a means to dispose of it must also be established.

6. Civil Engineering should leak test the underground tank at the Auto Hobby Shop before the construction of the new Auto Hobby Shop. This underground tank has been in place for at least 20 years and is currently used for the uncontrolled collection of oils from the shop and the base housing area.

7. Shops should continue sending partially used rags to linen exchange for washing. Rags contaminated with dried paint can be thrown in the trash as nonhazardous waste.

8. Saturated Speedy Dry should be disposed of as hazardous waste. Shops should reuse the Speedy Dry until it is saturated rather than disposing of it after one use.

TABLE 5. Example Hazardous Waste Disposal Log

**PAINT SHOP HAZARDOUS WASTE DISPOSAL
LOG FOR DRUM NUMBER: 1**

Date	Time	Type of Waste	Amount of Waste
10 Jun 88	1000	Enamel Paint	1 qt
10 Jun 88	1300	MEK	1 gal
15 Jun 88	1500	MEK	1 gal
20 Jun 88	1100	Polyurethane Paint	1 qt
25 Jun 88	1300	Polyurethane Thinner	1 gal
30 Jun 88	0900	MEK	10 gal
5 Jul 88	1100	Enamel Paint	1 qt
6 Jul 88	1530	MEK	2 gal
6 Jul 88	1130	Enamel Paint	1 qt
7 Jul 88	1130	MEK	2 gal
8 Jul 88	1400	MEK	2 gal
9 Jul 88	1130	MEK	2 gal
11 Jul 88	1400	MEK	2 gal
13 Jul 88	1300	Enamel Paint	1 qt
13 Jul 88	1300	MEK	2 gal
14 Jul 88	1400	MEK	2 gal
16 Jul 88	1130	Enamel Paint	1 qt
16 Jul 88	1130	MEK	5 gal
18 Jul 88	1400	Polyurethane Paint	2 qts
18 Jul 88	1400	Polyurethane Thinner	3 gal
20 Jul 88	1500	MEK	4 gal
21 Jul 88	1600	MEK	1 gal
28 Jul 88	1630	Enamel Paint	1 gal
28 Jul 88	1630	MEK	5 gal
TOTAL:			48 gal

Amounts:

MEK	41.00 gal	85.40%
Polyurethane Thinner	4.00 gal	8.30%
Enamel Paint	2.25 gal	4.70%
Polyurethane Paint	0.75 gal	1.60%

9. The current practice of disposing of ethylene glycol antifreeze as hazardous waste may be unnecessary since it is readily biodegradable and is diluted during use. The Texas Water Commission recommends that the Fort Worth Wastewater Treatment Plant be contacted to discuss the possibility of approving the disposal of waste antifreeze in the sanitary sewer system.

10. The practice of allowing rinse water from 7th FMS Refueling Maintenance to run into the ditch should be discontinued. The JP-4 in the soil is probably causing the grass to die.

11. The wastewater from the waterfall paint booth at the 436 Paint Shop should be analyzed at least three times for hazardous waste characteristics to confirm that it is not hazardous. This must be done to provide documented rationale for discharging this waste to the sewer system.

12. Work orders have been submitted to upgrade many of the accumulation sites. Before construction begins, an overall view of the locations of the accumulation sites should be studied, so the sites can be strategically located throughout the base. This may eliminate some of the accumulation sites.

13. The accumulation sites should be upgraded with fencing, an impermeable floor such as a concrete pad (rather than asphalt), curbing, and a cover. The sites should be located away from floor and storm sewer drains and grassy areas.

14. Since most of the accumulation sites are located in secure areas, the Environmental Coordinator should have access to a government vehicle so that he can regularly observe waste disposal practices and inspect the accumulation sites.

15. Waste solvent minimization can be accomplished by using an alternative solvent such as Citrikleen which is often more effective and is less hazardous than PD-680, by using a solvent leasing program like the Safety Kleen units, or by purchasing a solvent recovery unit for basewide use. 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 analyses, and (4) possible local or state regulatory fees. Table 6 is a listing of shops using PD-680 that the base should consider for possible conversion to Citrikleen (or a similar type of solvent), Safety Kleen, or a solvent recovery unit.

TABLE 6. Alternates for Shops Using PD-680

SHOP	CITRIKLEEN	SAFETY KLEEN	RECOVERY UNIT
301 CAMS Pneudraulics		X	
301 CAMS Propulsion	X		
7 TRANS Refueling Maintenance	X		
7 FMS Pneudraulics		X	
7 FMS Wheel and Tire	X	X	
301 CAMS Aero Repair	X		
7 MMS Equipment Maintenance	X		
7 FMS Jet Engine Shop	X		
301 CAMS AGE	X		
7 FMS AGE	X		X

16. Large quantities of drums with new solvents or oils should not be stored outdoors unprotected or at the accumulation site (e.g., at the 7th FMS Vehicle Maintenance). These drums should be turned back in 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 incident.

17. The base should consider the suggestion by DEEV to use existing above ground 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.

18. Shops expressed difficulty in disposing of empty (triple-rinsed) drums. DRMO will not accept drums as scrap metal. The shops should have a means of crushing or cutting these drums so that they can be disposed of as scrap metal.

19. The 7 FMS Refueling Maintenance personnel can reduce the amount of JP-4 entering the fuel/water separator by purchasing or acquiring metal pans to recover the fuel during vehicle maintenance. The JP-4 can possibly be returned to the base fuel supply for reuse.

20. The base should do hazardous waste characteristics (EP Toxicity) analyses on the spent magnetic particle inspection solution. Presently, all of the spent solution is drummed and disposed of as hazardous waste. Three analyses should be done to determine if the waste is actually hazardous. If the waste is not hazardous it can be disposed of down the drain.

21. The plastic bead blasting waste from 7th FMS Corrosion Control should be sampled to determine if it is hazardous. If the waste is found to be nonhazardous, it can be disposed of in the trash.

22. The oil/water separators should be checked to see if they need to be pumped out. Also, a schedule for periodic clean outs and maintenance should be established.

23. The Auto Hobby Shop should use another product such as Mean Green Soap for cleaning the floors rather than PD-680.

REFERENCES

1. Carswell Air Force Base "Hazardous Waste Management Plan," February 1988.
2. Carswell Air Force Base "Recoverable and Waste Petroleum (RAWP) Plan," April 1987.
3. United States Environmental Protection Agency "Identification and Listing of Hazardous Waste," 40 CFR 261.
4. Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018, January 1980.

APPENDIX A
Request Letter



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 7TH COMBAT SUPPORT GROUP (SAC)

CARSWELL AIR FORCE BASE, TEXAS 75127-5000

11 JAN 1988

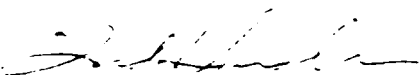
RECEIVED
ATTN: DE

DED

Request for a Hazardous Waste Assistance Survey

HOSP/SGPB *R.V.*
USAF OEHL/CC
IN TURN

1. As discussed between Maj Elliot Ng, OEHL/ECQ Brooks AFB, TX and our Mr Raj Sheth, 7 CSG/DEEV, on 29 December 1987, we request a Hazardous Waste Assistance Survey be performed at Carswell Air Force Base to evaluate our hazardous waste management practices and help us explore options for hazardous waste minimization opportunities.
2. During our October 1987 RCRA inspection, the Texas Water Commission requested we provide them information on our current waste activities, the types of waste generated, the chemical and physical properties of our waste, the process for which they were used, and the method of storage and disposal.
3. Carswell AFB currently does not have a waste analysis plan, and we do not have a hazardous waste analysis performed except when the contents of a drum are unknown. Therefore, your assistance will greatly benefit us in preparing accurate registration of our hazardous waste with the Texas Water Commission.
4. This request has been coordinated with the Bioenvironmental Engineer. Please direct any comments pertaining to this request to Mr Raj Sheth, 7 CSG/DEEV, AUTOVON 739-6261.


FRED HANCHER, GM-13
Deputy Base Civil Engineer

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APPENDIX B
Chemical Disposal Survey Form

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Shop:
Shop Supervisor:
Shop Duties: _____

Building Number:
AUTOVON: X

CATEGORIES OF WASTE AND DISPOSAL METHODS

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

* Specify the types used on next page

Examples of disposal practices:

D-DRUMMED
PIT-PLACED IN TANK
NA-NOT APPLICABLE

RTT-RETURNED TO FUEL TANKS
NDD-NEUTRALIZED FIRST
THEN PLACED DOWN DRAIN

DD-DOWN DRAIN

SPECIFIC CHEMICALS USED
PAINT WASTE AND THINNERS

Specific Waste Types	Waste Disposal Method	Amount of Waste Generated per Month
----------------------	-----------------------	-------------------------------------

Paints

Latex _____
 Polyurethane _____
 Enamel _____

Thinners (list)

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

STRIPPERS

Name of Stripper	Manufacturer	NSN	Amt used/month or		Disposal Method
			Tank Cap.	Change out Freq.	

ACIDS

Name of Acid	Manufacturer	Amt Used/Mo	Disposal Method
Battery Acid	XXXXXXXXXXXX		

SOAP/CLEANERS

Name of Soap/Cleaner	Manufacturer	Amt Used/Mo	NSN

CHEMICAL LISTING (CONT'D)

OILS/FLUIDS

Type of Oil/Fluid	Amt Used/Mo	Disposal Method (if waste goes to a Tank, give Capacity and Location)
Brake Fluid		
Transmission Fluid		
Hydraulic Fluid		
7808 Oil		

SOLVENTS/DEGREASANTS

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

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

PHOTO CHEMICALS

Name of Chemical	Manufacturer	Amt/Month or		Disposal Method
		Tank Cap.	Change Out Freq.	

CHEMICAL LISTING (CONT'D)

NDI CHEMICALS

Name of Chemical	Manufacturer	NSN	Amt/Month or		Disposal Method
			Tank Cap.	Change Out Freq.	
Emulsifier					
Dye Penetrant					
Developer					

OTHER CHEMICALS NOT LISTED

Name of Chemical	Manufacturer	NSN	Amt/Month or		Disposal Method
			Tank Cap.	Change Out Freq.	

SIGNATURE OF PERSON FILLING OUT THE FORM: _____

APPENDIX C
Accumulation Site Survey Form

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**HAZARDOUS WASTE ACCUMULATION SITE
INSPECTION FORM**

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

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

Overall Rating of Accumulation Site: _____

LISTING OF WASTES AT ACCUMULATION 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

Paints and Thinners

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 MMS Equip Maint	1420	Thinner	15	D
7 TRANS Allied Trades	1191	Paint and Thinners	120	D
301 CAMS Corrosion Control	1628	Paint and Thinners	120	D
7 FMS Corrosion Control	1060	Paint	600	D
436 STS Paint	1617	Paint and Thinners	300	D

TOTAL: 1155

Strippers

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
301 CAMS Corrosion Control	1628	Paint Remover	110	D
301 CAMS Aerorepair	1643	Paint Remover	100	D
7 FMS Corrosion Control	1060	Surface Stripper	36	D
7 FMS Corrosion Control	1060	Hot Tank Stripper	640	D
7 FMS Jet Engine Shop	1410	Multi-Sheen	60	DD
7 FMS Corrosion Control	1060	Paint Remover	36	D

TOTAL: 982

Acids

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
301 CAMS AGE	1628	Battery Acid	72	DRMO
7 TRANS Vehicle Maint	1191	Battery Acid	300	DRMO
7 FMS Corrosion Control	1060	Hydrofluoric	1.5	NDD
7 CES Power Production	1320	Battery Acid	360	DRMO
7 FMS Corrosion Control	1060	Alodine	120	NDD

TOTAL: 853.5

Soaps

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
301 CAMS AGE	1628	Mean Green Soap	660	OWS
7 MMS Equip Maint	1420	Soap	120	DD
7 FMS Test Cell	1015	Aircraft	12	OWS
7 FMS Corrosion Control	1060	Aircraft	120	D
7 TRANS Refueling Maint	1194	Aircraft Cleaning Soap	120	OWS
7 FMS Test Cell	1015	Floor Finish	24	OWS
301 CAMS Phase Dock	1643	Mean Green Soap	12	OWS

TOTAL: 1068

Oils

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 TRANS Vehicle Maint	1191	Engine	1800	D
301 CAMS Propulsion	1410	7808	84	D
7 TRANS Refueling Maint	1194	Engine	240	B
7 FMS Test Cell	1015	7808 and 1010	60	OWS
7 TRANS Fire Truck Maint	1425	Engine	480	D
7 FMS Jet Engine Shop	1410	7808	240	B
7 FMS AGE	1414	Motor and Synthetic	1800	D
7 CES Power Production	1320	7808	156	D
301 CAMS AGE	1628	Engine	660	B
7 CSG Auto Hobby Shop	1140	Motor	3000	PIT
301 CAMS AGE	1628	Synthetic	500	D

TOTAL: 9020

Fluids

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
301 CAMS Pneudraulics	1643	Hydraulic	180	D
7 FMS AGE	1414	Hydraulic	660	D
301 CAMS Phase Dock	1643	Hydraulic	12	B
7 MMS Equipment Maint	1420	Brake and Hydraulic	240	D
301 CAMS AGE	1628	Hydraulic, Trans, and Brake	120	B
7 FMS Jet Engine Shop	1410	Hydraulic	24	B
7 FMS Test Cell	1015	Hydraulic	12	OWS
7 FMS Pneudraulics	1050	Hydraulic	3	D
7 TRANS Vehicle Maint	1191	Transmission and Hydraulic	384	D
7 TRANS Fire Truck Maint	1425	Transmission and Hydraulic	180	D
7 TRANS Refueling Maint	1194	Transmission	24	D

TOTAL: 1839

Fuels

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
301 CAMS Propulsion	1410	JP-4	60	D
301 CAMS Phase Dock	1643	JP-4	600	D
7 TRANS Vehicle Maint	1191	Automotive	240	D
7 CES Power Production	1320	Gasoline and Diesel	108	D
7 TRANS Refueling Maint	1194	JP-4	5000	PIT
7 FMS Test Cell	1015	JP-4	240	OWS
7 FMS AGE	1414	Gasoline, Diesel and JP-4	1980	D
7 FMS Jet Engine Shop	1410	JP-4	120	D

TOTAL: 8348

Antifreeze

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 TRANS Vehicle Maint	119	Antifreeze	600	D
7 FMS AGE	1414	Antifreeze	960	D
7 CES Power Production	1320	Antifreeze	156	D
7 TRANS Fire Truck Maint	1425	Antifreeze	120	D
7 TRANS Refueling Maint	1194	Antifreeze	70	D
301 CAMS AGE	1628	Antifreeze	60	D

TOTAL: 1966

Solvents

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 FMS Test Cell	1015	Engine Gas Path	24	OWS
301 CAMS Phase Doc	1643	Carbon Remover	8	OWS, UIP
7 FMS AGE	1414	Citrikleen	660	OWS
7 FMS Jet Engine Shop	1410	Carbon Remover	120	D
7 MMS Equipment Maint	1420	MEK	0.5	UIP
7 FMS Corrosion Control	1060	MEK	240	D
301 CAMS AGE	1628	MEK	12	UIP

TOTALS: 1064.5

PD-680

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 CSG Auto Hobby Shop	1140	PD-680	660	RDD
7 FMS Wheel and Tire	1410	PD-680	660	D
301 CAMS Aerorepair	1643	PD-680	640	D
7 FMS Jet Engine Shop	1410	PD-680	300	D
7 FMS Pneudralics	1050	PD-680	660	D
7 AMS Fire Control	1055	PD-680	110	SBC
301 CAMS AGE	1628	PD-680	660	D
7 TRANS Refueling Maint	1194	PD-680	55	D
7 MMS Equipment Maint	1420	PD-680	240	D
7 CES Power Production	1320	PD-680	108	RDD
301 CAMS Propulsion	1410	PD-680	60	D
301 CAMS AGE	1628	PD-680	300	OWS
7 FMS AGE	1414	PD-680	960	D
301 CAMS Phase Dock	1643	PD-680	480	B
301 CAMS Pneudralics	1643	PD-680	60	D

TOTAL: 5953

Photo Chemicals

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 FMS NDI	1414	Stop Bath	60	NDD
436 STS Photo	1615	Conditioner	1280	DD
7 FMS NDI	1414	Developer	60	NDD
436 STS Photo	1615	Color Developer	1280	DD
436 STS Electronic	1617	Sodium Persulfate	96	D
436 STS Photo	1615	Reverse Bath	1280	DD
7 FMS NDI	1414	Dye Penetrant	220	D
436 STS Photo	1615	Stabilizer	1280	DD
7 FMS NDI	1414	Fixer	60	SRDD
436 STS Photo	1615	Bleach	1280	DD
7 FMS NDI	1414	Developer	220	NDD
7 FMS NDI	1414	Emulsifier	220	D
436 STS Photo	1615	First Developer	1280	DD
436 STS Photo	1615	Fixer	1280	DD

TOTAL: 9896

Safety Kleen

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)	DISPOSAL
7 TRANS Fire Truck Maint	1425	Safety Kleen	84	SBC
7 TRANS Refueling Maint	1194	Safety Kleen	300	SBC
7 TRANS Vehicle Maint	1191	Safety Kleen	500	SBC
7 CSG Auto Hobby Shop	1140	Safety Kleen	5200	SBC

TOTAL: 6084

LEGEND:

- D - DRUMMED
- B - BOWSER
- DD - DOWN DRAIN
- DRMO - SENT TO DRMO
- UIP - USED IN PROCESS
- OWS - OIL/WATER SEPARATOR
- SBC - SERVICED BY CONTRACTOR
- PIT - PLACED IN TANK
- NDD - NEUTRALIZED FIRST THEN PLACED DOWN DRAIN
- SRDD - SILVER RECOVERY FIRST THEN PLACED DOWN DRAIN

APPENDIX E

Summary of Drummed Waste Disposal for Each Waste Category

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SUMMARY OF DRUMMED WASTE DISPOSAL FOR EACH WASTE CATEGORY

Paints and Thinners

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 MMS Equip Maint	1420	Thinner	15
7 TRANS Allied Trades	1191	Paint and Thinners	120
301 CAMS Corrosion Control	1628	Paint and Thinners	120
7 FMS Corrosion Control	1060	Paint	600
436 STS Paint	1617	Paint and Thinners	<u>300</u>

TOTAL: 1155

Strippers

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 FMS Corrosion Control	1060	Paint Remover	36
301 CAMS Corrosion Control	1628	Paint Remover	110
301 CAMS Aerorepair	1643	Paint Remover	100
7 FMS Corrosion Control	1060	Surface Stripper	36
7 FMS Corrosion Control	1060	Hot Tank Stripper	<u>640</u>

TOTAL: 922

Soaps

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 FMS Corrosion Control	1060	Aircraft	<u>120</u>

TOTAL: 120

Oils

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 CES Power Production	1320	7808	156
301 CAMS AGE	1628	Synthetic	500
301 CAMS Propulsion	1410	7808	84
7 TRANS Vehicle Maint	1191	Engine	1800
7 FMS AGE	1414	Motor and Synthetic	1800
7 TRANS Fire Truck Maint	1425	Engine	<u>480</u>

TOTAL: 4820

Fluids

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
301 CAMS Pneudralics	1643	Hydraulic	180
7 MMS Equip Maint	1420	Brake and Hydraulic	240
7 TRANS Refueling Maint	1194	Transmission	24
7 TRANS Vehicle Maint	1191	Transmission & Hydraulic	384
7 TRANS Fire Truck Maint	1425	Transmission & Hydraulic	180
7 FMS Pneudralics	1050	Hydraulic	3
7 FMS AGE	1414	Hydraulic	<u>660</u>

TOTAL: 1671

Fuels

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
301 CAMS Propulsion	1410	JP-4	60
301 CAMS Phase Dock	1643	JP-4	600
7 TRANS Vehicle Maint	1191	Automotive	240
7 FMS Jet Engine Shop	1410	JP-4	120
7 FMS AGE	1414	Gasoline, Diesel and JP-4	1980
7 CES Power Production	1320	Gasoline and Diesel	<u>108</u>

TOTAL: 3108

Antifreeze

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 TRANS Refueling Maint	1194	Antifreeze	70
7 TRANS Vehicle Maint	1191	Antifreeze	600
301 CAMS AGE	1628	Antifreeze	60
7 CES Power Production	1320	Antifreeze	156
7 TRANS Fire Truck Maint	1425	Antifreeze	120
7 FMS AGE	1414	Antifreeze	<u>960</u>

TOTAL: 1966

Solvents

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
7 FMS Jet Engine Shop	1410	Carbon Remover	120
7 FMS Corrosion Control	1060	MEK	<u>240</u>

TOTAL: 360

PD-680

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
301 CAMS Pseudralics	1643	PD-680	60
301 CAMS Propulsion	1410	PD-680	60
7 TRANS Refueling Maint	1194	PD-680	55
7 FMS Pseudralics	1050	PD-680	660
7 FMS Wheel and Tire	1410	PD-680	660
301 CAMS Aerorepair	1643	PD-680	640
7 MMS Equipment Maint	1420	PD-680	240
7 FMS Jet Engine Shop	1410	PD-680	300
301 CAMS AGE	1628	PD-680	660
7 FMS AGE	1414	PD-680	<u>960</u>

TOTAL: 4295

Photo Chemicals

SHOP	BLDG	PRODUCT	QTY(GALLONS/YR)
436 STS Electronic	1617	Sodium Persulfate	96
7 FMS NDI	1414	Emulsifier	220
7 FMS NDI	1414	Dye Penetrant	<u>220</u>

TOTAL: 536

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APPENDIX F
Master List of Shops

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MASTER LIST OF SHOPS

<u>SHOP</u>	<u>CONTACT</u>	<u>BUILDING</u>	<u>EXTENSION</u>
1. 7th TRANS Refueling Maintenance	SSgt Sherburne	1194	7023
2. 7th TRANS Fire Truck Maintenance	TSgt Burns	1425	7007
3. 7th TRANS Allied Trades	SSgt Ford	1191	7760
4. 7th TRANS Vehicle Maintenance	CMSgt Knifley	1191	5443
5. 436 STS Paint	Sgt Bloomingdale	1617	7186
6. 436 STS Electronic	Sgt Vaden	1617	7378
7. 436 STS Photo	TSgt Yates	1615	5611
8. 301 CAMS Phase Dock	SMSgt Winter	1643	5302
9. 301 CAMS Pneudraulics	MSgt Seifert	1643	7885
10. 301 CAMS Aerorepair	MSgt Zimmerman	1643	5679
11. 301 CAMS Corrosion Control	Mr Griffin	1628	5546
12. 301 CAMS AGE	Mr Beard	1628	7168
13. 301 CAMS Propulsion	Mr Luther	1602	7895
14. 7th FMS Corrosion Control	TSgt Back	1060	5481
15. 7th FMS Wheel and Tire	MSgt Lamb	1410	5565
16. 7th FMS Electric/Battery	Amn Benham	1410	5214
17. 7th FMS Pneudraulics	SSgt Doss	1050	5763
18. 7th FMS Test Cell	TSgt Murfin	1015	7622
19. 7th FMS Jet Engine/ Accessory Repair	SSgt Hartso	1410	7876
20. 7th FMS AGE	Mr Huse	1414	7720
21. 7th FMS Washrack	SrA Laveault	1027	7732
22. 7th FMS Fuel Cell Repair	MSgt Holland	1058	7910
23. 7th FMS NDI	TSgt Washington	1414	7797
24. 7th CES Power Production	SSgt Silvera	1320	6223
25. 7th CES Entomology	TSgt Lyons	1217	5768
26. 7th CES Exterior Electric	Mr Dason	1217	5786
27. 7th CES Liquid Fuels	Mr Allen	4156	6225
28. 7th MMS Equipment Maintenance	TSgt Bittle	1420	7415
29. 7th MMS Conventional Maintenance	MSgt Cochran	3369	7851
30. 7th AMS Fire Control	SrA Arupka	1055	7385
31. 7th CGS Auto Hobby Shop	Mr Roat	1140	7050
32. Fire Training Pit			

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APPENDIX G

Summary of Waste Disposal Practices by Shop

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WASTE DISPOSAL PRACTICES BY SHOP FOR CARSWELL AFB

301 CAMS AGE, Building 1628

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Mean Green Soap	660	OWS
Battery Acid	72	DRMO
Engine Oil	660	B
MEK	12	UIP
PD-680	660	D
Synthetic Oil	500	D
Antifreeze	60	D
Hydraulic, Trans, and Brake Fluid	120	B
PD-680	<u>300</u>	OWS

TOTAL: 3044

301 CAMS Aero Repair, Building 1643

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Paint Remover	100	D
PD-680	<u>640</u>	D

TOTAL: 740

301 CAMS Corrosion Control, Building 1628

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Paint Remover	110	D
Paint and Thinners	<u>120</u>	D

TOTAL: 230

301 CAMS Phase Dock, Building 1643

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Mean Green Soap	12	OWS
PD-680	480	B
Carbon Remover	8	OWS, UIP
JP-4	600	D
Hydraulic Fluid	<u>12</u>	B

TOTAL: 1112

301 CAMS Pneudraulics, Building 1643

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Hydraulic Fluid	180	D
PD-680	<u>60</u>	D
TOTAL: 240		

301 CAMS Propulsion, Building 1410

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
JP-4	60	D
PD-680	60	D
7808 Oil	<u>84</u>	D
TOTAL: 204		

436 STS Electronic, Building 1617

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Sodium Persulfate	<u>96</u>	D
TOTAL: 96		

436 STS Paint, Building 1617

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Paint and Thinners	<u>300</u>	D
TOTAL: 300		

436 STS Photo, Building 1615

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Reverse Bath	1280	DD
Conditioner	1280	DD
Fixer	1280	DD
Bleach	1280	DD
Stabilizer	1280	DD
First Developer	1280	DD
Color Developer	<u>1280</u>	DD
TOTAL: 8960		

7 AMS Fire Control, Building 1055

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
PD-680	<u>110</u>	SBC
TOTAL: 110		

7 CES Power Production, Building 1320

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Antifreeze	156	D
Gasoline and Diesel	108	D
Battery Acid	360	DRMO
7808 Oil	156	D
PD-680	<u>108</u>	DD
TOTAL: 888		

7 CSG Auto Hobby Shop, Building 1140

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Safety Kleen	5200	SBC
Motor Oil	3000	PIT
PD-680	<u>660</u>	DD
TOTAL: 8860		

7 FMS AGE, Building 1414

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Antifreeze	960	D
Gasoline, Diesel and JP-4	1980	D
Citrikleen	660	OWS
PD-680	960	D
Hydraulic Fluid	660	D
Motor and Synthetic Oil	<u>1800</u>	D
TOTAL: 7020		

7 FMS Corrosion Control, Building 1060

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Paint	600	D
Hydrofluoric Acid	1.5	NDD
Alodine	120	NDD
Paint Remover	36	D
Aircraft Soap	120	D
Surface Stripper	36	D
MEK	240	D
Hot Tank Stripper	640	D

TOTAL: 1793.5

7 FMS Jet Engine Shop, Building 1410

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Multi-Sheen	60	DD
Carbon Remover	120	D
PD-680	300	D
Hydraulic Fluid	24	B
JP-4	120	D
7808 Oil	240	B

TOTAL: 864

7 FMS NDI, Building 1414

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Stop Bath	60	NDD
Emulsifier	220	D
Fixer	60	SRDD
Developer	220	NDD
Dye Penetrant	220	D
Developer	60	NDD

TOTAL: 840

7 FMS Pneudraulics, Building 1050

WASTE PRODUCT	QTY (GALLONS)	DISPOSAL
PD-680	660	D
Hydraulic Fluid	3	D

TOTAL: 663

7 FMS Test Cell, Building 1015

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Floor Finish	24	OWS
Hydraulic Fluid	12	OWS
JP-4	240	OWS
Aircraft Soap	12	OWS
Engine Gas Path Cleaner	24	OWS
7808 and 1010 Oil	<u>60</u>	OWS
TOTAL: 372		

7 FMS Wheel and Tire, Building 1410

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
PD-680	<u>660</u>	D
TOTAL: 660		

7 MMS Equipment Maintenance, Building 1420

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
PD-680	240	D
MEK	0.5	UIP
Soap	120	DD
Thinner	15	D
Brake and Hydraulic Fluid	<u>240</u>	D
TOTAL: 615.5		

7 TRANS Allied Trades, Building 1191

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Paint and Thinners	<u>120</u>	D
TOTAL: 120		

7 TRANS Fire Truck Maintenance, Building 1425

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Antifreeze	120	D
Engine Oil	480	D
Hydraulic and Transmission Fluid	180	D
Safety Kleen	<u>84</u>	SBC

TOTAL: 864

7 TRANS Refueling Maintenance, Building 1194

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Antifreeze	70	D
PD-680	55	D
Transmission Fluid	24	D
JP-4	5000	PIT
Engine Oil	240	B
Safety Kleen	300	SBC
Aircraft Soap	<u>120</u>	OWS

TOTAL: 5809

7 TRANS Vehicle Maintenance, Building 1191

WASTE PRODUCT	QTY (GALLONS/YR)	DISPOSAL
Engine Oil	1800	D
Safety Kleen	500	SBC
Transmission and Hydraulic Fluid	384	D
Antifreeze	600	D
Battery Acid	300	DRMO
Automotive Fuel	<u>240</u>	D

TOTAL: 3824

LEGEND:

- D - DRUMMED
- B - BOWSER
- DD - DOWN DRAIN
- DRMO - SENT TO DRMO
- UIP - USED IN PROCESS
- OWS - OIL/WATER SEPARTOR
- SBC - SERVICED BY CONTRACTOR
- PIT - PLACED IN TANK
- NDD - NEUTRALIZED FIRST THEN PLACED DOWN DRAIN
- SRDD - SILVER RECOVERY FIRST THEN PLACED DOWN DRAIN

Distribution List

	Copies
HQ AFSC/SGPB Andrews AFB DC 20334-5000	1
HQ USAF/SGPA Bolling AFB DC 20332-6188	1
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HQ SAC/SGPB Offutt AFB NE 68113-5001	1
AAMRL/TH Wright-Patterson AFB OH 45433-6573	1
USAF Regional Medical Center Wiesbaden/SGPB APO New York 09220-5300	1
OL AD, USAFOEHL APO San Francisco 96274-5000	1
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Defense Technical Information Center (DTIC) Cameron Station Alexandria VA 22304-6145	2
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