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**Hazardous Waste Technical Assistance Survey  
Grand Forks AFB ND**

**NANCY S. HEDGECOCK, 2 Lt, USAF, BSC**

**December 1989**

**Final Report**

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

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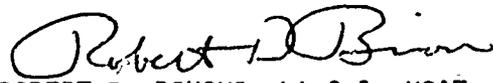
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<p>At the request of 842 Strategic Hospital/SGPB, the AFOEHL conducted a hazardous waste technical assistance survey at Grand Forks AFB (GFAFB) from 28 Aug-1 Sep 89. The scope of this survey was to address hazardous waste management practices and explore 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 the GFAFB hazardous waste program is beginning to operate very well. Recommendations include: (1) Use soaps other than aircraft cleaning compounds for cleaning shop floors at 842 TRANS Special Purpose Maintenance and Refueling Maintenance. (2) Consider using an alternate stripping method such as sodium bicarbonate blasting or plastic media blasting at 319 FMS Corrosion Control. (3) Analyze spent Citrikleen from 319 OMS Wheel and Tire. (4) Consider using an alternate absorbent material for cleaning up small spills. (5) Use a</p>			
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biodegradable soap rather than PD-680 for washing equipment at 321 FMS Pneudraulics. (6) Convert from PD-680 to a more easily managed solvent (e.g., Safety Kleen or equivalent) at 321 MMS AGE. (7) Include sampling and analytical costs in the material conversion cost savings estimation. (8) Store waste oil and fluid accumulated at 319 FMS AGE and Bldg 649 in transportable bowsers rather than 55-gallon drums. (9) Consider disposing of lead-acid batteries wet rather than neutralizing the electrolyte. (10) Lock waste storage containers; (11) Recycle cleaning rags rather than disposing of them after one use. (12) Upgrade accumulation sites to facilitate spill containment and minimize adverse environmental consequences. (13) Analyze used paint filters from 842 TRANS Allied Trades and 842 CSG Auto Hobby for hazardous waste characteristics before disposal.

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The author greatly appreciates the technical assistance and hardwork provided by 1Lt Shelia P. Scott and the personnel at Grand Forks AFB who provided information and logistic support during the survey. Capt Olson, Chief, Bioenvironmental Engineering, 1Lt England and the entire staff of Bioenvironmental Engineering Services, 842 Strategic Hospital/SGPB were especially supportive of the mission during the survey.

I also would like to thank CMSgt Johnson and TSgt Sturdivant for their assistance in escorting the survey team in secured areas of the base.



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## Contents

	Page
DD Form 1473	i
Acknowledgment	iii
Illustrations	v
I. INTRODUCTION	1
II. BACKGROUND	1
III. PROCEDURE	2
IV. DESCRIPTION OF INDUSTRIAL ACTIVITIES	3
V. SUMMARY OF GENERAL WASTE DISPOSAL PRACTICES	17
VI. FINDINGS, OBSERVATIONS AND CONCLUSIONS	18
VII. RECOMMENDATION	20
References	23
Appendix	
A Request Letter	25
B Chemical Disposal Survey Form	29
C Accumulation Site Survey Form	39
D Summary of Waste Disposal Practices for Each Waste Category	43
E Summary of Wastes Disposed as Hazardous Waste at Grand Forks AFB	51
F Master List of Shops	55
G Summary of Waste Disposal Practices by Shop	59
Distribution List	69

## Illustrations

Tables	Title	Page
1	Annual Forecasted Quantities for Waste Categories at Grand Forks AFB	2
2	Example Hazardous Waste Disposal Log	22

Figures		
1	042 TRANS Special Purpose Maintenance Waste Oil Bowser	4
2	042 CES Power Production Waste Oil and Antifreeze Storage Containers	6
3	319 FMS AGE Waste Oil Storage Area	7
4	319 FMS Corrosion Control Paint Stripping Tank	8
5	319 FMS Corrosion Control Accumulation Site	9
6	319 FMS Corrosion Control Safety Kleen Paint Gun Cleaning Unit	10
7	319 FMS Propulsion Waste Oil Storage Bowser	12
8	319 MMS Waste Oil Storage Bowser	15

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## I. INTRODUCTION

The 842d Strategic Hospital/SGPB requested the Occupational and Environmental Health Laboratory, Environmental Quality Branch (AFOEHL/EQE) to conduct a Hazardous Waste Technical Assistance Survey at Grand Forks AFB (Appendix A). The scope of the survey was to address hazardous waste management practices and explore opportunities for hazardous waste minimization.

The survey was conducted by 1Lt Shelia P. Scott and 2Lt Nancy S. Hedgecock on 28 Aug-1 Sep 89.

## II. BACKGROUND

### A. Base Description

Grand Forks, North Dakota is located on the North Dakota-Minnesota border at the junction of the Red Lake River and the Red River of the North. Grand Forks AFB (GF AFB) is located about 15 miles west of the City of Grand Forks. The base is the home of Strategic Air Command's (SAC) 319th Bombardment Wing and 321st Strategic Missile Wing.

### B. Hazardous Waste Program

The hazardous waste program at Grand Forks AFB is managed primarily through the Environmental and Contract Planning Office in Civil Engineering, 321 CSG/DEEV. The Defense Reutilization and Marketing Office (DRMO) is responsible for contractual removal of wastes. Bioenvironmental Engineering Services (BES) helps monitor the program through industrial shop surveys and is responsible for waste sampling at the request of DEEV.

Individual shops are responsible for identifying, segregating, handling, packaging, and labeling the wastes generated by their shop. The wastes are usually placed in a 55-gallon drum located either at a satellite accumulation site or at an accumulation site.

When wastes require disposal, the generator completes an AF Form 2005 and submits it to Supply. Supply generates a DD Form 1348-1 using the information contained on the AF Form 2005. The DD Form 1348-1 is then approved by the Environmental Coordinator indicating that funds are available for disposal of the waste. Finally, the generator submits the DD Form 1348-1 to DRMO who arranges for a waste disposal contractor to pickup the wastes.

Waste sodium chromate, MEK, 1,1,1-trichloroethane, and paint strippers are transported to the DRMO storage facility and stored until the waste disposal contractor picks them up. All other wastes are stored at the accumulation sites. DRMO notifies the generator of the waste disposal pickup date. The wastes are brought to DRMO by the generator on that date.

Waste oil and antifreeze are sold for 5 cents per gallon. All other wastes are disposed of at a cost to the base.

Any unknown wastes are analyzed before disposal. BES has the responsibility to sample unknown wastes and other waste streams on an as needed basis. Samples are sent to the AF Occupational and Environmental Health Laboratory, Analytical Services Division (AFOEHL/SA) for analysis. Results are returned to BES who notifies DEEV.

### III. PROCEDURE

The first step of the survey was to review the base's hazardous waste management plan and the Bioenvironmental Engineer's industrial shop folders to determine which shops generate chemical wastes. This was followed by visits to 33 shops to observe industrial operations, discuss chemical waste disposal practices with shop personnel, and hand out chemical disposal survey forms (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, the DRMO Hazardous Waste Storage Facility (HWSF), and 11 accumulation sites were visited and evaluated. The accumulation site evaluation form is included as Appendix C. The following individuals were contacted to discuss their responsibility and involvement in the hazardous waste program:

Capt Olson, Chief, Bioenvironmental Engineering, SGPB, AV 362-3556  
 1Lt England, Bioenvironmental Engineering, SGPB, AV 362-3556  
 2Lt McRandall, Environmental Coordinator, DEEV, AV 362-6154  
 Mr Cheett, Defense Reutilization and Marketing Office, 362-3784

Based on the data from the completed chemical disposal survey forms, the annual forecasted quantities for nine categories of waste were determined (see Table 1). From Table 1, column 3 the majority of the waste (55.5%) consists of waste oils and fluids; however, these wastes are not considered hazardous wastes. Five percent of the total amount of waste generated is drummed and disposed as hazardous waste through DRMO. From Table 1, column 5, 74 percent of the hazardous wastes generated are paint wastes. Itemized listings of wastes (including categories, shop, amount of waste, and disposal method) are found in Appendix D. Appendix E lists those wastes disposed as hazardous waste.

TABLE 1

ANNUAL FORECASTED QUANTITIES FOR WASTE CATEGORIES AT GRAND FORKS AFB

PRODUCT	TOTAL (GAL/YR)	%TOTAL	DISPOSED AS HAZ WASTE	%TOTAL HAZ WASTE
Oils & Fluids	23534	55.5	0	0
Paints & Thinners	1634	3.9	1634	73.6
Fuels	2680	6.3	NQ*	0
Solvents	326	0.8	266	12.0
Sodium Chromate	160	0.4	160	7.2
Antifreeze	5778	13.6	0	0
Soaps	3590	8.5	0	0
Photo and NDI	1220	2.9	160	7.2
Safety Kleen	3460	8.2	0	0
TOTAL:	42382	100	2220	100

\* Not Quantified

#### IV. DESCRIPTION OF INDUSTRIAL ACTIVITIES

This section details the results of the shop-by-shop chemical usage and disposal practice survey of the following industrial shops (Appendix F contains a master list of shops and Appendix G contains shop-by-shop listing of waste disposal practices):

##### A. 842 Transportation Squadron (TRANS)

Shop: 842 TRANS Refueling Maintenance  
Contact: Mr Brunk

Bldg: 303  
AUTOVON: 362-3380

Refueling Maintenance personnel repair and maintain aircraft refueling vehicles. Reclaimed JP-4 (55 gallons/month) is taken to POL for recycling or disposal through DRMO. Waste oil (27.5 gallons/months) is stored in 55-gallon drums and pumped out by a contractor. Aircraft cleaning soap (18 gallons/month) is used for cleaning floors and equipment. The floor drains lead to an oil/water separator connected to the sanitary sewer. The floor drains are cleaned twice per year. The sludge (10 gallons/year) is disposed as waste oil. Dirty rags are taken to linen exchange for cleaning and reissue. GUNK spray cleaner is used up in process for cleaning and degreasing parts. The empty aerosol cans are disposed as municipal waste. PD-680 is used for testing hoses; none is disposed. Spent antifreeze (55 gallons/2 years) is drummed and disposed through DRMO.

Shop: 842 TRANS Allied Trades  
Contact: SSgt Ehresmann

Bldg: 413  
AUTOVON: 362-3749

Allied Trades personnel perform vehicle body repair and painting. Waste acrylic, lacquer, and enamel paint (5 gallons/month) is drummed in 5-gallon cans and disposed as hazardous waste through DRMO. Used paint filters are disposed as municipal waste. Dirty rags are taken to linen exchange for cleaning and reissue.

Shop: 842 TRANS Special Purpose  
Contact: Mr Ross

Bldg: 416  
AUTOVON: 362-3770

Shop personnel perform routine maintenance on heavy equipment and vehicles (tow trucks, dump trucks, etc.). Waste oil and fluid (250 gallons/month) are drained from vehicles into drip pans. The drip pans are emptied into a trough that drains into an underground tank (See Figure 1). The underground tank is pumped out by a waste oil contractor on an as needed basis. Speedy Dry is reused until saturated; then, it is disposed as municipal waste. Dirty rags and coveralls are sent to linen exchange for cleaning and reissue once per week. Spent antifreeze (55 gallons/3 weeks) is drummed and disposed through DRMO.

The shop has three Safety Kleen degreasing tanks (two 30-gallon tanks and one 5-gallon tank) that are serviced by the contractor once every six weeks.

The shop floor drains lead to an oil/water separator connected to the sanitary sewer. The floor drains are periodically cleaned. The sludge (110 gallons) is disposed as waste oil. GUNK spray cleaner is used up in process

for cleaning and degreasing parts. The empty aerosol cans are disposed as municipal waste. Batteries are taken to the TRANS Battery Shop for electrolyte neutralization and disposal. Aircraft cleaning soap (55 gallons/week diluted 10:1) is used for floor cleaning. Simple Green soap (15 gallons/2 months) is used in a steam cleaner for cleaning parts. Uncontaminated fuel drained from fuel tanks is reused. Contaminated fuel is taken to Refueling Maintenance for disposal with their contaminated fuel.



**Figure 1: 842 TRANS Special Purpose Maintenance Waste Oil Trough**

Shop: 842 TRANS General Purpose Maintenance  
Contact: TSgt Garver and Mr Nesdahl

Bldg: 415  
AUTOVON: 362-3752

Shop personnel perform oil changes, lubrication, winterization, and maintenance on all Grand Forks AFB military vehicles. Waste oil and fluid (450 gallons/month) are drained from vehicles into drip pans. The drip pans are emptied into a trough that drains into an underground tank. The under

ground tank is pumped out by a waste oil contractor on an as needed basis. Speedy Dry is reused until saturated and disposed as municipal waste. Dirty rags are sent to linen exchange for cleaning and reissue. Spent antifreeze (55 gallons/month) is drummed and disposed through DRMO.

The shop has four Safety Kleen degreasing tanks (three 30-gallon tanks and one 10-gallon tank) that are serviced by the contractor every six weeks. The shop floor drains lead to an oil/water separator connected to the sanitary sewer. The floor drains are periodically cleaned. The sludge (10 gallons) is disposed as waste oil. GUNK spray cleaner is used up in process for cleaning and degreasing parts. The empty aerosol cans are disposed as municipal waste.

Shop: 347 TRANS Fire Truck Maintenance  
Contact: SSgt Stevens

Bldg: 530  
AUTOVON: 362-4170

Shop personnel perform maintenance on the Grand Forks AFB fire fighting vehicle fleet. Waste oil and fluid (55 gallons/month) are stored in 55-gallon drums until pumped out by a contractor. Spent antifreeze is taken to the General Purpose Maintenance shop and put into a 55-gallon drum for disposal through DRMO. Dirty rags are taken to linen exchange for cleaning and reissue. Simple Green soap is used for cleaning floors and equipment. The floor drains lead to an oil/water separator connected to the sanitary sewer. GUNK spray cleaner is used up in process for cleaning and degreasing parts. The empty aerosol cans are disposed as municipal waste.

Shop: 842 TRANS Battery Shop  
Contact: Mr Nesdahl

Bldg: 415  
AUTOVON: 362-3756

Shop personnel maintain batteries used in government vehicles. Most batteries are exchanged on a one-for-one basis through CoPars. Electrolyte drained from batteries (10/month) is stored in a 55-gallon plastic drum and neutralized with sodium bicarbonate. The waste is analyzed for toxic metals. Based on analytical results, the neutralized electrolyte is either discharged down the drain to the sanitary sewer or disposed as hazardous waste through DRMO.

Shop: 842 TRANS Tire Shop  
Contact: SrA Foote

Bldg: 413  
AUTOVON: 362-3750

Shop personnel maintain wheels and tires used on government vehicles. Tire and Rim Soap (1 gallon/3 months) is used for lubrication; none is disposed. No wastes are generated in this shop.

#### B. 842 CES Civil Engineering Squadron (CES)

Shop: 842 CES Power Production  
Contact: SSgt Peters

Bldg: 412  
AUTOVON: 460-3889

Shop personnel perform preventive maintenance on generators. Waste oil and fluid (300 gallons/month) is stored in a 300-gallon tank (See Figure 2). The tank is pumped out by a contractor on an as needed basis. The used rags are disposed as municipal waste. Spent antifreeze (55 gallons/month); gasoline and diesel are pumped into a locked waste oil drum and disposed as hazardous waste through DRMO.

through DRMO. The shop has one 40-gallon Safety Kleen degreasing tank that is serviced by the contractor every three months. GUNK spray cleaner is used up in process for cleaning parts. Empty aerosol cans are disposed as municipal waste. Batteries are taken to the 842 TRANS Battery shop for electrolyte neutralization and disposal. Simple Green soap (15 gallons/month) is used for degreasing and cleaning parts and the floor. The shop floor drains lead to an oil/water separator connected to the sanitary sewer. The floor drains are cleaned once per month. The sludge is disposed as waste oil. Reclaimed fuel is taken to POL for recycling or disposal through DRMO.



**Figure 2: 842 CES Power Production Waste Oil and Antifreeze Storage Containers**

Shop: 842 CES Entomology  
Contact: Sgt Cooper

Bldg: 522  
AUTOVON: 362-4289

Entomology Shop personnel are responsible for pest management and weed control throughout the base. Empty pesticide and herbicide containers are triple-rinsed, rendered unusable, and disposed as municipal waste. The triple-rinse water is used for mixing the chemicals. Empty herbicide bags are incinerated.

Shop: 842 CES Exterior Electric  
Contact: TSgt Wentzell

Bldg: 418  
AUTOVON: 362-4411

Shop personnel maintain all exterior electric equipment on base. All Polychlorinated Biphenyl (PCB) transformers (approximately 70) are being replaced with non-PCB transformers (4/quarter). All PCB transformers are sent to DRMO for disposal.

C. 319 Field Maintenance Squadron (319 FMS)

Shop: 319 FMS AGE  
Contact: Mr Alberts

Bldg: 601  
AUTOVON: 432-4239

Shop personnel service, maintain, and dispatch flight line support equipment. Waste engine oil (220 gallons/month) and hydraulic fluid (50 gallons/month) are stored in 55-gallon drums until pumped out by a contractor (See Figure 3). Spent antifreeze (120 gallons/month) is drummed and disposed through DRMO. The shop has two Safety Kleen degreasing tanks (10-gallon and 30-gallon capacity) that are serviced by the contractor every six weeks. Aircraft soap (50 gallons/month) is used for washing equipment. The shop floor drains lead to an oil/water separator connected to the sanitary sewer. Dirty rags are taken to linen exchange for cleaning and reissue. Small amounts of contaminated diesel and JP-4 are drummed and disposed through DRMO.



Figure 3: 319 FMS AGE Waste Oil Storage Area

Shop: 319 FMS Corrosion Control  
Contact: MSgt Safford

Bldg: 517  
AUTOVON: 432-3817

Shop personnel perform corrosion treatment and paint B-1B and KC-135 support equipment and T-38 wheels. The shop has a stripping area and a waterfall paint booth. The chemical stripping process uses a hot stripping tank and a rinse area (See Figure 4). The stripper (440 gallons/6 months) is drummed and disposed as hazardous waste. The rinsewater is drummed and analyzed for hazardous waste characteristics and toxic metals. Based on analytical results, the waste is either disposed of down the drain or through DRMO as hazardous waste. The shop has obtained a pressure washer so the rinsewater can be reused rather than drummed after only one use. The shop has one 16-gallon Safety Kleen degreasing tank that is serviced by the contractor every six weeks.

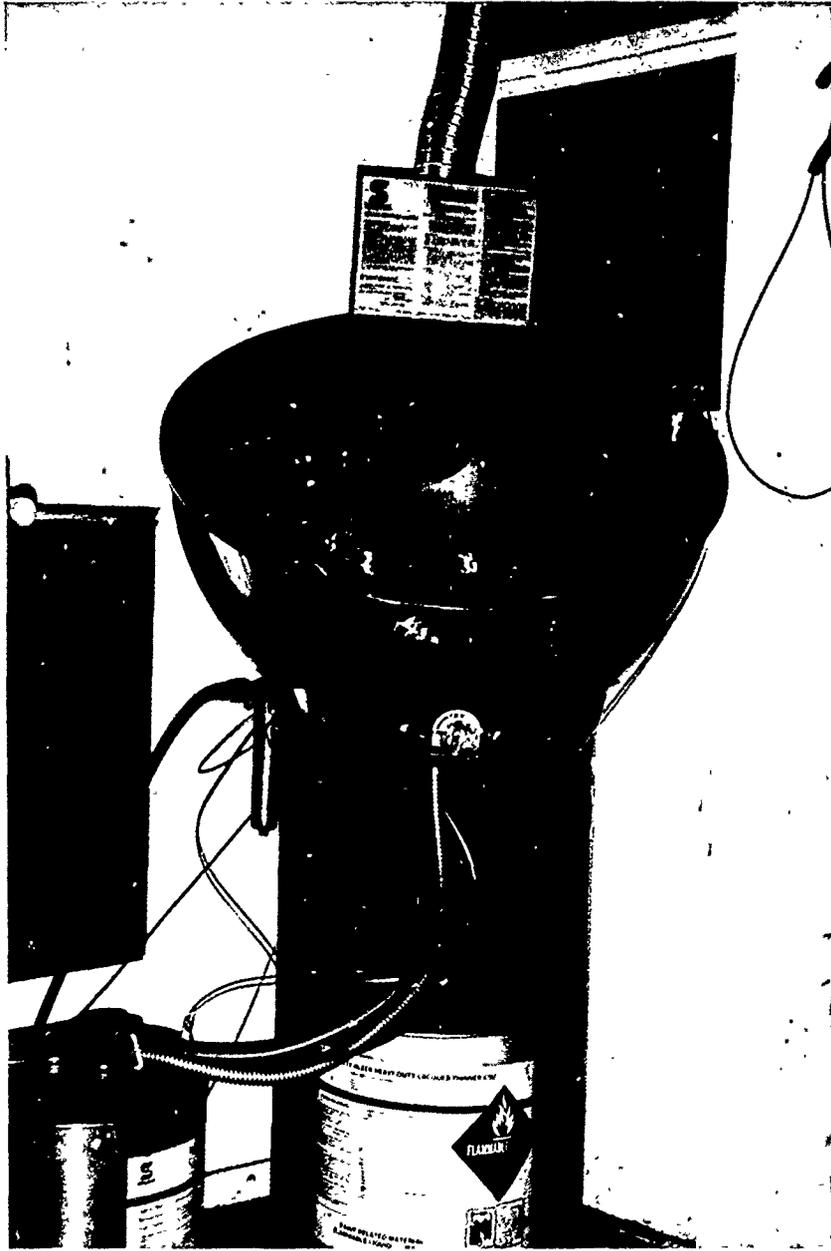


Figure 4. 319 FMS Corrosion Control Paint Stripping Tank

The waterfall paint booth is changed out on an as needed basis. The water (approximately 350 gallons) is analyzed for hazardous waste characteristics and toxic metals before disposal. Based on analytical results, the water is either disposed down the drain or through DRMO as hazardous waste. Waste MEK, polyurethane paint, and polyurethane thinner (55 gallons/month total) are drummed and disposed as hazardous waste through DRMO. All drummed wastes are stored at the shop's accumulation site (See Figure 5). The shop also has a 10-gallon Safety Kleen paint gun cleaning unit that is serviced every 4 weeks (See Figure 6). Shop personnel are pleased with its performance. Dirty rags are taken to linen exchange for cleaning and reissue. Isopropyl alcohol is used up in process for wiping down parts before painting.



**Figure 5: 319 FMS Corrosion Control Accumulation Site**



**Figure 6: 319 FMS Corrosion Control Safety Kleen  
Paint Gun Cleaning Unit**

Shop: 319 FMS Fuel Cell Repair  
Contact: SSgt Green

Bldg: 649  
AUTOVON: 432-4188

Shop personnel clean and repair aircraft fuel tanks. JP-4 (approximately 110 gallons/month) is either blended back into the fuel system or disposed through DRMO. Small amounts of JP-4 are discharged down the drain to an oil/water separator connected to the sanitary sewer.

Shop: 319 FMS NDI  
Contact: MSgt Duncan

Bldg: 605A  
AUTOVON: 432-6269

Shop personnel perform inspection of B-1B and KC-135 aircraft structural components using dye penetrant, magnetic particle and x-ray inspection methods. Spent x-ray developer (60 gallons/year) is discharged down the drain to the sanitary sewer. Spent x-ray fixer (60 gallons/year) is processed through a silver recovery unit before being discharged down the drain to the sanitary sewer.

Dye penetrant inspection is an open system which uses penetrant, emulsifier, and developer. The shop has converted to a hydrophilic dye penetrant inspection process. This conversion has reduced the amount of hazardous wastes generated by the shop. Parts are sequentially dipped into the penetrant and the emulsifier, then rinsed and allowed to dry. Next, the part is dipped into the developer, passed through a drying oven, inspected, and rinsed. Spent penetrant (110 gallons/year) is drummed and disposed as hazardous waste through DRMO. Spent emulsifier (110 gallons/year), developer (110 gallons/year) and rinsewater generated during the inspection process are discharged down the drain to an oil/water separator connected to the sanitary sewer. Magnetic particle solution (50 gallons/year) is drummed and disposed through DRMO.

A Baird Atomic oil analysis spectrometer is used to evaluate engine oil from aircraft. 1,1,1-trichloroethane is used as a wipe on/wipe off solvent to clean the machine. Waste oil is put in a 5-gallon can, taken to the 319 FMS AGE Shop, and transferred to a 55-gallon drum.

Shop: 319 FMS Propulsion  
Contact: MSgt Ouellete

Bldg: 605A  
AUTOVON: 432-6269

Shop personnel repair F-101 engines, clean engine parts, and clean and inspect engine bearings. JP-4 (100 gallons/year) is drained from the engines into buckets and poured into a 55-gallon drum. The fuel is taken to the Petroleum, Oils, and Lubricants (POL) laboratory for testing, then blended back into the system if possible. Waste 7808 oil (100 gallons/year) is stored in a bowser (See Figure 7). The 55-gallon drums and the bowser are kept locked; the key is maintained by MSgt Ouellete. Dirty cleaning rags are taken to linen exchange for cleaning and reissue. The shop has a 25-gallon Safety Kleen tank that is serviced every six weeks by the contractor.

The bearing room has four 4-gallon tanks containing 7808 oil, PD-680, carbon remover, and fingerprint remover. The 7808 oil (4 gallons/3 months) is placed in the shop's waste oil bowser. The PD-680, carbon remover, and fingerprint remover are replenished as necessary and are not changed out.



**Figure 7: 319 FMS Propulsion Waste Oil Storage Bowser**

Shop: 319 FMS Test Cell  
Contact: TSgt Lueck

Bldg: 621  
AUTOVON: 432-6239

Jet Engine Test Cell personnel troubleshoot engines, perform field tests and engine rev-up procedures on jet engines. The shop tests six to eight engines per month. Very little fuel or oil leaks from the engines during testing procedures. Fuel and oil leaks that do occur are wiped up with rags, if possible. The rags are taken to the Propulsion Shop and stored with their dirty rags. The shop floor drains lead to an oil/water separator connected to the sanitary sewer. The separator has not needed cleaning in the past three to four years.

Shop: 319 FMS Washrack  
Contact: SSgt Amenhauser

Bldg: 605  
AUTOVON: 432-

Shop personnel are responsible for washing B-1B and KC-135 aircraft. Citri-Solve 50 (110 gallons/month) is used for washing the aircraft. The waste is discharged down the drain to an oil/water separator connected to the sanitary sewer.

D. 319 Operational Maintenance Squadron (319 OMS)

Shop: 319 OMS Wheel and Tire  
Contact: SSgt Gant

Bldg: 609  
AUTOVON: 432-4038

Shop personnel assemble, disassemble, and clean wheels and tires for the B-1B and KC-135 aircraft. The shop has two Safety Kleen degreasing tanks (30-gallon and 15-gallon capacity) that are serviced every six weeks by the contractor. The shop also has a 100-gallon Citrikleen tank that is changed out every six months. The waste is drummed and disposed through DRMO. Rinse-water is discharged down the drain to the sanitary sewer. Dirty cleaning rags are taken to linen exchange for cleaning and reissue. MEK is used up in process for wiping down wheels.

Shop: 319 OMS Glossy Eagle  
Contact: TSgt Rock

Bldg: 602  
AUTOVON: 432-6190

Shop personnel strip and reburish KC-135 interiors. Small amounts of oil and fluid drain into drip pans. The waste is absorbed with Speedy Dry and disposed as municipal waste. Dirty cleaning rags are taken to linen exchange for cleaning and reissue. Spray paint is used for touch-up painting. The empty aerosol cans are disposed as municipal waste.

Shop: 319 OMS Bomber Phase  
Contact: TSgt Duncklee

Bldg: 601  
AUTOVON: 432-5928

Shop personnel perform phase inspections, flight line engine run-ups, refuel, defuel and wash aircraft. Waste hydraulic fluid (55 gallons/month) is taken to the Building 649 accumulation site. Small amounts of Speedy Dry are disposed as municipal waste. Dirty cleaning rags are taken to linen exchange for cleaning and reissue. Citri-Solve 50 (100 gallons/month) is used for aircraft washing. The waste is discharged down the drain to an oil/water separator connected to the sanitary sewer. Shop personnel are not pleased with the performance of the soap; it will not clean the B-1B aircraft.

Shop: 319 OMS Tanker Phase  
Contact: SSgt Parkhurst

Bldg: 603  
AUTOVON: 432-4091

Shop personnel perform periodic inspections and repairs on KC-135 aircraft. Waste 5606 hydraulic fluid (55 gallons/month) is taken to the building 649 accumulation site. Small amounts of Speedy Dry are disposed as municipal waste. Dirty cleaning rags are taken to linen exchange for cleaning and reissue.

Shop: 319 OMS Repair and Reclamation  
Contact: TSgt Dumire

Bldg: 603  
AUTOVON: 432-4095

Shop personnel troubleshoot, repair, modify, install, and remove aircraft components. Waste 7808 engine oil (1 quart/month) and 5606 hydraulic fluid (1 gallon/month) are taken to the Building 649 accumulation site. Small amounts of Speedy Dry are disposed as municipal waste. Dirty cleaning rags are taken to linen exchange for cleaning and reissue. Spray paint (1 can/2 months) is used for touch-up painting. The empty aerosol cans are disposed as municipal waste. Small amounts of toluene are used up in process.

Shop: 319 OMS Bomber Maintenance  
Contact: SSgt Girard

Bldg: 649  
AUTOVON: 432-4319

Shop personnel launch, recover, and perform maintenance on B-1B aircraft. All waste engine oil and hydraulic fluid generated within the secured 600 area are brought to this shop. The wastes are pumped from the container into tanks which are then emptied into 55-gallon drums. When the waste disposal contractor comes on base, the wastes are taken outside the secured area for pickup by the contractor. The process is time consuming and messy. Speedy Dry (20 bags/month) is used on the flight line for cleaning up spills. The used Speedy Dry is disposed as municipal waste.

E. 321 Field Missile Maintenance Squadron (321 FMMS)

Shop: 321 FMMS Corrosion Control  
Contact: TSgt Brownell

Bldg: 306  
AUTOVON: 432-5159

Shop personnel inspect, remove, and treat corrosion on missile launch facilities (LF) and launch control facilities (LCF). Personnel are responsible for 150 missile sites and all associated removable support equipment. Waste MEK, toluene, and enamel paint (2 gallons/month) are disposed as hazardous waste through DRMO. The shop uses white cleaning rags rather than the usual type cleaning rag. The shop launders the rags themselves.

Shop: 321 FMMS Periodic Maintenance  
Contact: TSgt Boettcher

Bldg: 306  
AUTOVON: 432-5156

Shop personnel inspect and repair support equipment malfunctions on missile LFs and LCFs. Waste diesel fuel, engine oil, and hydraulic fluid (500 gallons/2 1/2 months) are brought from the missile sites to the shop. The waste is poured into a locked 500-gallon underground tank. The tank is pumped out by a contractor. The key to the underground tank and a log containing the type and quantity of waste, date, and generating organization are maintained by TSgt Boettcher. The shop uses Kim-Wipes rather than cloth rags for cleaning purposes. They are disposed as municipal waste. Spent antifreeze (55 gallons/2 months) is drummed and disposed through DRMO.

Shop: 321 FMMS Power and Electric  
Contact: Sgt Currqn

Bldg: 306  
AUTOVON: 432-5134

Shop personnel service, inspect, troubleshoot, and repair components of mobile, AGE, missile and computer emergency control systems, missile transporters, standby power systems and LF/LCF emergency batteries. Sodium chromate (40 gallons/90 days) is purged from components in the field, brought to the accumulation site located in Building 314, and poured into a 55-gallon drum. The waste is disposed every 90 days as hazardous waste through DRMO. Cleaning rags contaminated with sodium chromate are drummed and disposed as hazardous waste.

Shop: 321 FMMS Pneudraulics  
Contact: TSgt Gregie

Bldg: 306  
AUTOVON: 432-3179

Shop personnel inspect, repair, and service shock isolators used in LFs and LCFs. Waste 5606 hydraulic fluid (20 gallons/month) is drained from components in the field, brought back to the shop, and poured into the

500-gallon underground tank. Freon 113 spray is used up in process for parts cleaning. PD-680 (5 gallons/month) is used in a high pressure cleaner for cleaning extremely dirty parts from the missile sites. The waste is discharged down the drain to an oil/water separator connected to the sanitary sewer.

F. 319 Missile Maintenance Squadron (319 MMS)

Shop: 319 MMS AGE  
Contact: SrA Miller

Bldg: 557  
AUTOVON: 432-5998

Shop personnel perform maintenance and periodic inspections on munitions AGE. The shop has one 25-gallon PD-680 tank. The waste is drummed and disposed through DRMO as hazardous waste. Waste F-1711B hydraulic fluid and brake fluid (180 gallons total/year) are stored in a locked bowser and pumped out by a waste disposal contractor (See Figure 8). Dirty rags are taken to linen exchange for cleaning and reuse. Tennant Brand soap is used for cleaning the floor.



Figure 8: 319 MMS AGE Waste Oil Storage Bowser

G. 842 Combat Support Group (842 CSG)

Shop: 842 CSG Auto Hobby  
Contact: Ms Shire

Bldg: 310  
AUTOVON: 432-3394

The Auto Hobby Shop contains equipment for maintenance and repair of privately owned vehicles. The shop has one 25-gallon Safety Kleen degreasing tank that is serviced every six weeks by the contractor. Waste oil and transmission fluid (800 gallons/3 months) are placed in an aboveground storage tank. The tank is pumped out by a waste disposal contractor. Waste paint and thinner (5 gallons/6 months) are drummed and disposed as hazardous waste through DRMO. Spent antifreeze (220 gallons/year) is drummed and disposed through DRMO. Filters (2 1/2 paint jobs) from the dry paint booth are disposed as municipal waste. Carburetor and cold parts cleaner (8 gallons/year) is disposed through DRMO as hazardous waste. Empty aerosol cans are disposed as municipal waste. Used batteries are disposed of wet through a local contractor. Powdered detergent (25 pounds/6 months) is used for cleaning floors. The shop floor drains discharge to an oil/water separator connected to the sanitary sewer.

Shop: 842 CSG Visual Services  
Contact: Sgt Hagan

Bldg: 533  
AUTOVON: 432-4133

Shop personnel process color and black and white film. Fixer is processed through a silver recovery unit before being discharged down the drain to the sanitary sewer. All other photo processing chemicals are discharged down the drain to the sanitary sewer.

H. 842 Strategic Hospital (842 Hosp)

Shop: 842 Hosp Dental X-Ray  
Contact: SSgt Culver

Bldg: 108  
AUTOVON: 432-5433

Shop personnel develop x-rays produced at the Dental Clinic. Fixer (10 gallons/month) is taken to the 842 Hosp Medical X-Ray Lab for processing through a silver recovery unit before being discharged down the drain to the sanitary sewer. Developer (10 gallons/month) is discharged down the drain to the sanitary sewer.

Shop: 842 Hosp Medical X-Ray  
Contact: TSgt Hamilton

Bldg: 109  
AUTOVON: 432-5535

Shop personnel develop x-rays produced at the Hospital. Fixer (20 gallons/month) is processed through a Peterson Silver Recovery Cell before being discharged down the drain to the sanitary sewer. Developer (20 gallons/month) is discharged down the drain to the sanitary sewer.

I. 842 Supply Squadron (842 SUPS)

Shop: 842 SUPS Fuels Lab  
Contact: Capt Adams

Bldg: 545  
AUTOVON: 432-3715

Shop personnel are responsible for analyzing the base fuel supply. Reclaimed fuel accumulated by shops throughout the base is tested by Fuels Lab personnel. If the fuel is not contaminated, it is blended back into the system. If the fuel is contaminated, the generating shop is required to send it to DRMO for disposal. Very little fuel is disposed through DRMO.

## V. SUMMARY OF GENERAL WASTE DISPOSAL PRACTICES

The 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 oils and fluids are placed in bowlers, 55-gallon drums or underground waste oil storage tanks and stored at the shops until the waste oil contractor comes to pump it out. In some cases, waste oils and fluids are discharged to oil/water separators that are periodically cleaned out by a contractor. Currently, waste oils and fluids are sold for 5 cents/gallon. The payment received is based on demand at the time of disposal.

2. Waste paints and thinners are generally placed in 5-gallon cans or 55-gallon drums and stored at the appropriate accumulation site. Before disposal, the wastes are sampled by BES personnel. The waste is then transported to the DRMO storage facility until it is picked up by a contractor for disposal as hazardous waste.

3. Rinsewater generated during stripping procedures at 319 FMS Corrosion Control is drummed, sampled by BES personnel, and disposed according to analytical results. If hazardous, the waste is disposed as hazardous waste through DRMO. If nonhazardous, the waste is discharged down the drain to the sanitary sewer.

4. Uncontaminated fuel is taken to POL for reclamation. Small amounts of contaminated fuel are drummed and disposed through DRMO.

5. General purpose vehicle batteries are exchanged on a one-for-one basis through CoPars. Other used lead-acid batteries are drained into plastic drums. The spent electrolyte is sampled by BES personnel before it is neutralized with sodium bicarbonate. Based on analytical results, the waste is either disposed as hazardous waste through DRMO or discharged down the drain to the sanitary sewer.

6. Waste solvents (e.g., PD-680) are drummed and disposed through DRMO. Most shops have contracts with the Safety Kleen Corporation to service solvent tanks. Safety Kleen drains the used degreasant and refills the units on a schedule for each shop (typically every six weeks). This eliminates the base's responsibility to purchase and dispose of the degreasant (normally PD-680).

7. Waste fixers are processed through a silver recovery unit before being discharged down the drain to the sanitary sewer. All other photo chemicals are discharged down the drain to the sanitary sewer.

8. Waste dye-penetrant and magnetic particle solution generated at 319 FMS NDI are drummed and disposed through DRMO. Waste emulsifier and developer are discharged down the drain to an oil/water separator connected to the sanitary sewer.

9. Dirty cleaning rags from most shops are taken to linen exchange and exchanged for clean ones. The rags are sent to a contractor in Fargo ND for cleaning.

10. Paint filters from the dry paint booth at 842 CSG Auto Hobby Shop and 842 TRANS Allied Trades are disposed as municipal waste.

11. Speedy Dry, used to clean up small spills, is disposed as municipal waste.

12. Water from 319 FMS Corrosion Control waterfall paint booth is either discharged down the drain to the sanitary sewer or drummed and disposed as hazardous waste.

13. Rinsewater from 319 FMS Corrosion Control paint stripping procedures is either discharged down the drain to the sanitary sewer or drummed and disposed as hazardous waste.

14. Empty aerosol cans are disposed as municipal waste.

15. Waste antifreeze is stored in 55-gallon drums at the shops until disposal through DRMO. Currently, waste antifreeze is sold for approximately 5 cents/gallon. The payment received is based on market conditions.

16. Rinsewater generated from triple-rinsing pesticide and herbicide containers and cleaning equipment is reused to mix the chemicals.

17. Soaps and cleaning compounds are discharged down the drain to oil/water separators connected to the sanitary sewer.

## VI. FINDINGS AND CONCLUSIONS

A. In the past year, PD-680 usage has almost been eliminated by leasing Safety Kleen degreasing units rather than using PD-680 in tanks. The base has estimated that the conversion will save approximately \$20,000/year.

B. The Environmental Coordinator (DEEV) is responsible for training accumulation site managers, who, in turn train shop personnel. The training course is given quarterly. The BES, Fire Department, and DRMO are given opportunities to provide inputs during the training session.

C. Underground storage tanks installed before 1965 are being leak-tested this year. Newer underground storage tanks are scheduled for leak-testing in the future.

D. Most accumulation sites are located next to grassy areas. Generally, the storage areas aren't curbed or covered. Waste oil and fluid storage drums and bowsers located at 842 CES Power Production, 321 FMMS Periodic Maintenance, and 319 FMS Propulsion are kept locked. The shop supervisor or accumulation site manager maintains the key. This prevents accidental or intentional waste cross-contamination.

E. Grand Forks AFB is in the process of establishing a baseline waste characterization for most of the hazardous wastestreams. Most potentially hazardous wastes are sampled and analyzed before disposal. 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 Resource Conservation and Recovery Act (RCRA) requirements. It should also eliminate the need to sample and analyze all wastes leaving the base.

F. Each accumulation site and waste oil storage area has a designated primary and alternate site manager.

G. Currently, the DRMO storage facility is permitted to store waste sodium chromate, MEK, paint strippers, and 1,1,1-trichloroethane. Other wastes are stored at the accumulation sites for up to 90 days. When the DRMO storage facility RCRA Part B permit is issued, DRMO will be able to store other hazardous wastes in the facility.

H. 319 FMS Corrosion Control has a Safety Kleen paint gun cleaning unit. Shop personnel are pleased with its performance.

I. The Safety Kleen degreasing units are funded by each shop using funds from their operations and maintenance budget. Shop personnel are very satisfied with the Safety Kleen performance.

J. Most shops utilize the service of a local linen contractor for cleaning dirty rags.

K. Most potentially hazardous wastes are sampled and analyzed before disposal.

L. 319 FMS Corrosion Control personnel are planning to recycle the rinsewater generated during stripping procedures. This will greatly reduce the amount of waste generated at the shop.

M. Three 55-gallon drums of unknown wastes are stored at 321 FMMS Periodic Maintenance. The drums have been sampled by BES personnel and will be disposed based on analytical results.

N. The Hospital is using a Peterson Silver Recovery Cell rather than the usual silver recovery unit. This process requires much less space in the developing room and supposedly recovers more silver from the fixer than the usual process.

O. 321 FMMS Periodic Maintenance maintains a log of the underground waste oil storage tank contents. This log includes type of waste, quantity of waste, date, and generating organization.

## VII. RECOMMENDATIONS

A. 842 TRANS Special Purpose Maintenance and Refueling Maintenance should consider using a milder soap than aircraft soap for cleaning floors. Alkaline aircraft cleaner is generally irritating to the skin and corrosive to cast iron and other metals found in service connections, drains, etc.

B. 319 FMS Corrosion Control should consider using an alternate stripping method such as sodium bicarbonate blasting or plastic media blasting. Either of these stripping methods should reduce the amount of hazardous waste generated by the shop and would also eliminate the need for the hot paint stripping tank.

C. The spent Citrikleen from 319 OMS Wheel and Tire should be analyzed to determine if it is hazardous. The sludge layer should be sampled separately from the liquid layer. This sampling procedure might prove that only the sludge portion is hazardous and would reduce the amount of hazardous waste generated.

D. All shops that use Speedy Dry should consider using an alternate absorbent material such as one that is siliceous-based. This type absorbent material reduces clean up time, requires less absorbent, and reduces quantity of hazardous waste generated.

E. 321 FMMS Pneudraulics should consider using a biodegradable soap rather than PD-680 for washing equipment.

F. 321 MMS AGE should convert from PD-680 to a more manageable solvent (e.g., Safety Kleen or equivalent). This would eliminate the need for the shop to be classified as a satellite accumulation site and the drumming and disposal of waste PD-680.

G. Sampling and analytical costs should be included in the estimation of savings incurred by the material conversion from PD-680.

H. Shops that generate large quantities of waste oil and fluid (319 FMS AGE and the Bldg 649 accumulation site) should consider storing the wastes in a portable bowser. This would eliminate the need to drum the wastes.

I. DRMO should be contacted to determine if it is possible to find a local contractor who will accept wet lead-acid batteries. This would eliminate the need for neutralizing, sampling, analyzing, and disposing the spent electrolyte. The Auto Hobby Shop has a contract with a local contractor for disposal of wet lead-acid batteries.

J. Waste storage containers should be locked to prevent cross-contamination of wastes. Also, accumulation site managers should document the waste storage container contents in a log. This log should contain: (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 2 for example), (3) start and stop dates

of filling each drum, and (4) name and signature of person putting the waste in the container. Also, a uniform system of documentaton should be used by all site managers on base. This type of log can provide documented rationale for substituting user's knowledge for analytical results for waste disposal (40 CFR 262.11).

K. All shops on base should consider the possibility of establishing a contract with the local linen contractor for supplying cleaning rags. This option may not be feasible in all situations but may prove to be beneficial in others.

L. DEEV should ensure that all accumulation site and waste oil storage area primary and alternate managers receive hazardous waste training before assuming the position.

M. Although not required by law, it would be advantageous to Grand Forks AFB to upgrade the accumulation sites with, at a minimum, covers, locking fences, and impermeable, diked surfaces. These measures could facilitate spill containment and minimize adverse environmental consequences (e.g., soil and groundwater contamination from leaks and spills).

N. The used paint filters at 842 TRANS Allied Trades and 842 CSG Auto Hobby shops should be analyzed to determine whether or not they are hazardous. If they prove to be nonhazardous, the filters can continue to be disposed as municipal waste.

O. Photographic wastes from 319 FMS NDI, 842 CSG Visual Services, 842 Hosp Dental X-Ray, and 842 Hosp Medical X-Ray should be sampled and analyzed for toxic metals before disposal.

TABLE 2: Example Hazardous Waste Disposal Log

PAINT SHOP HAZARDOUS WASTE DISPOSAL G. FOR DRUM NUMBER: 1-

Date	Type of Waste	Amount of Waste	Name & Signature
10 Jun 89	Enamel Paint	1 qt	
10 Jun 89	MEK	1 gal	
15 Jul 89	MEK	1 gal	
20 Jun 89	Polyurethane Paint	1 qt	
25 Jun 89	Polyurethane Thinner	1 gal	
30 Jun 89	MEK	10 gal	
5 Jul 89	Enamel Paint	1 qt	
6 Jul 89	MEK	2 gal	
6 Jul 89	Enamel Paint	1 qt	
7 Jul 89	MEK	2 gal	
8 Jul 89	MEK	2 gal	
9 Jul 89	MEK	2 gal	
11 Jul 89	MEK	2 gal	
13 Jul 89	Enamel Paint	1 qt	
13 Jul 89	MEK	2 gal	
14 Jul 89	MEK	2 gal	
16 Jul 89	Enamel Paint	1 qt	
16 Jul 89	MEK	5 gal	
18 Jul 89	Polyurethane Paint	2 qts	
18 Jul 89	Polyurethane Thinner	3 gal	
20 Jul 89	MEK	4 gal	
21 Jul 89	MEK	1 gal	
28 Jul 89	Enamel Paint	1 gal	
28 Jul 89	MEK	7 gal	

TOTAL: 50 gal

Amounts:

MEK	43.00 gal	86.00%
Polyurethane Thinner	4.00 gal	8.00%
Enamel Paint	2.25 gal	4.50%
Polyurethane Paint	0.75 gal	1.50%

## References

1. Environmental Science and Engineering, Inc., "Installation Restoration Program, Phase I: Records Search," Grand Forks AFB ND, April 1985.
2. Grand Forks AFB, "Installation Hazardous Waste Management Plan," 1 June 1989.
3. Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018, Jan 1980.
4. United States Environmental Protection Agency, "Identification and Listing of Hazardous Waste," 40 CFR 261.

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**APPENDIX A**  
**Request Letter**

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DEPARTMENT OF THE AIR FORCE  
842D STRATEGIC HOSPITAL (SAC)  
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA 58205-5000



REPLY TO  
ATTN. OF: SGPB

6 Mar 89

SUBJECT: Request for Environmental and Hazardous Waste Survey

TO: HQ SAC/SGPB  
USAFOEHL/ECw (Major Ng)  
IN TURN

1. We request an environmental consultant visit to quantify storm drainage effluents (wastewater characterization survey) at Grand Forks AFB, ND. Also, we request a hazardous waste survey of this facility while the consultant team is on base. The results of the surveys will be used to pinpoint sources of contamination and supplement grab sampling data gathered during past years. Guidance is also sought on the proper management of our sewage lagoons.
2. Grand Forks AFB has a storm drainage system with seven outfall points exiting the base. They are not permitted, however, the waters are regulated by the State of North Dakota. The hazardous waste disposal and monitoring program is adequate, however, there is concern about the existence of additional areas and quantities generated at non-industrial locations. Our current lagoon system does have some industrial wastes entering its waters. We need to determine if this presents a large problem to the lagoon system itself.
3. Bioenvironmental Engineering staffing is at 77% and is anticipated to fall further or remain steady. Our office currently has only one composite sampling device. To adequately accomplish a survey of this size, we feel additional support is required.
4. Please contact me at AV 362-5598 for further information.

  
ELLEN C. ENGLAND, 1st Lt, USAF, BSC  
Chief, Bioenvironmental Engineering

cc: 842 CSG/DEEV

*Peace . . . . is our Profession*

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**APPENDIX B**  
**Chemical Disposal Survey Form**

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PLEASE HAVE THIS FORM READY FOR PICKUP BY:

SHOP:

BLDG:

CONTACT:

AUTOVON:

Please fill out this form as accurately and completely as possible. If you have any questions on filling it out, please call Lt Hedgecock at X5596

Examples:

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

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

OILS & FLUIDS

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

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

1. Does this shop have any underground storage tanks? \_\_\_\_\_

If yes: How many? \_\_\_\_\_

Capacity? \_\_\_\_\_

What is stored in the tank? \_\_\_\_\_

How often is it cleaned out? \_\_\_\_\_

Has it ever been leak-tested? \_\_\_\_\_

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

If yes: How often is it cleaned out? \_\_\_\_\_

3. Does the shop have any Safety Kleen units? \_\_\_\_\_

If yes: How many? \_\_\_\_\_

Tank capacity? \_\_\_\_\_

How often are they serviced? \_\_\_\_\_

4. What does the shop do with dirty rags? \_\_\_\_\_

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

6. Describe shop activities and responsibilities below:

**PAINT WASTE AND THINNERS**

<b>PAINTS</b>	<b>Amount of Waste generated/month</b>	<b>Disposal Method</b>
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-----  
Latex  
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Polyurathane  
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Enamel  
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Other  
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Comments  
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**THINNERS (list below)**  
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Comments  
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**STRIPPERS**

<b>Name of Stripper</b>	<b>National Stock #</b>	<b>Amount of Waste per Month</b>	<b>OR Tank Size</b>	<b>Change Out Freq</b>
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Comments

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**ACIDS**

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

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**BATTERIES**

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

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**SOAPS/CLEANERS**

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

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**OILS AND FLUIDS**

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**OTHER CHEMICALS** (Please list any chemicals that contain phenols)

Name of Chemical	Manufacturer	National Stock #	Tank Size	Change Out Freq	Disposal Method
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Signature of person filling out this  
form \_\_\_\_\_

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**APPENDIX C**  
**Accumulation Site Survey Form**

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**HAZARDOUS WASTE ACCUMULATION SITE  
INSPECTION FORM**

LOCATION: \_\_\_\_\_  
ACCUMULATION SITE MANAGER: \_\_\_\_\_

DATE: \_\_\_\_\_  
PHONE: \_\_\_\_\_

ITEM	CONDITIONS	STATUS		COMMENTS
		YES	NO	
STORAGE SITE	Secure			
	Gates Locked			
	Warning Signs			
	No smoking			
	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

WASTE: Oil & Fluid

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
TRANS General Purpose Maint	Oil Sludge	220	UGT
TRANS Special Purpose Maint	Oil & Fluid	3000	UGT
CSG Auto Hobby Shop	Oil & Fluid	3200	AGT
FMS AGE	Hydraulic	600	D
TRANS Refueling Maint	Oil Sludge	10	D
CES Power Production	Oil & Fluid	3600	3600
MMS AGE	Brake Fluid	180	D
FMS Propulsion	7808 Oil	100	D
OMS Tanker Phase	Hydraulic Fluid	660	D
FMMS Periodic Maint	Oil	900	UGT
FMS AGE	Oil	2640	D
TRANS Fire Truck Maint	Oil & Fluid	660	D
TRANS Special Purpose Maint	Oil Sludge	220	UGT
FMMS Periodic Maint	Hydraulic Fluid	900	UGT
OMS Repair & Reclamation	7808 Oil	2	D
OMS Bomber Phase	Hydraulic Fluid	660	D
CES Power Production	Oil Sludge	NQ	D
321 FMMS Pneudraulics	Hydraulic Fluid	240	UGT
TRANS Refueling Maint	Oil	330	D
OMS Repair & Reclamation	5606 Hydraulic Fluid	12	D
TRANS General Purpose Maint	Oil & Fluid	5400	UGT

TOTAL: 23534

WASTE: Safety Kleen

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
OMS Wheel & Tire	Safety Kleen	390	SBC
CSG Auto Hobby Shop	Safety Kleen	220	SBC
FMS Corrosion Control	Safety Kleen	140	SBC
FMS AGE	Safety Kleen	350	SBC
FMS Corrosion Control	Safety Kleen	130	SBC
TRANS General Purpose Maint	Safety Kleen	900	SBC
FMS Propulsion	Safety Kleen	220	SBC
CES Power Production	Safety Kleen	160	SBC
TRANS Special Purpose Maint	Safety Kleen	600	SBC
FMS AGE	Safety Kleen	350	SBC

TOTAL: 3460

WASTE: Paint Waste

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
FMS Corrosion Control	Rinsewater	NQ	D
FMS Corrosion Control	Stripper	880	D
TRANS Allied Trades	Paint	60	D
OMS Repair & Reclamation	Spray Paint	NQ	UIP
OMS Glossy Eagle	Spray Paint	NQ	UIP
CSG Auto Hobby Shop	Paint & Thinner	10	D
FMMS Corrosion Control	Paint & Thinner	24	D
FMS Corrosion Control	Paint & Thinner	660	D
FMS Corrosion Control	Paint Booth Water	NQ	D-DD

TOTAL: 1634

WASTE: Fuel

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
TRANS Special Purpose Maint	Fuel	NQ	REC
CES Power Production	Fuel	NQ	REC
TRANS Refueling Maint	JP-4	660	REC
FMMS Periodic Maint	Diesel	600	UGT
FMS Propulsion	JP-4	100	REC
FMS AGE	JP-4	NQ	D
FMS AGE	Diesel	NQ	D
FMS Fuel Cell Repair	JP-4	NQ	4
FMS Fuel Cell Repair	JP-4	1320	REC

TOTAL: 2680

WASTE: Antifreeze

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
CES Power Production	Antifreeze	660	D
FMS AGE	Antifreeze	1440	D
TRANS Special Purpose Maint	Antifreeze	1000	D
FMS AGE	Antifreeze	1440	D
TRANS Refueling Maint	Antifreeze	28	D
TRANS General Purpose Maint	Antifreeze	660	D
CSG Auto Hobby Shop	Antifreeze	220	D
FMMS Periodic Maint	Antifreeze	330	D
TRANS Fire Truck Maint	Antifreeze	NQ	D

TOTAL: 5778

WASTE: Soap

SHOP	WASTE	QTY (GAL/YR)	DISPOSAL
FMS Washrack	Citri-Solve 50	1320	OWS
TRANS Special Purpose Maint	Aircraft Soap	70	OWS
TRANS Refueling Maint	Aircraft Soap	220	OWS
TRANS Fire Truck Maint	Simple Green	NQ	OWS
MMS AGE	Tennant Soap	NQ	OWS
CES Power Production	Simple Green	180	OWS
CSG Auto Hobby Shop	Detergent	50*	OWS
OMS Bomber Phase	Citri-Solve 50	1200	OWS
FMS AGE	Aircraft Soap	600	OWS
TRANS Special Purpose Maint	Simple Green	90	OWS

\* LB/Yr TOTAL: 3590

WASTE: Speedy Dry

SHOP	WASTE	DISPOSAL
OMS Tanker Phase	Speedy Dry	T
OMS Glossy Eagle	Speedy Dry	T
TRANS Special Purpose Maint	Speedy Dry	T
TRANS General Purpose Maint	Speedy Dry	T
OMS Bomber Maint	Speedy Dry	T
OMS Repair & Reclamation	Speedy Dry	T
OMS Bomber Phase	Speedy Dry	T

WASTE: Batteries

SHOP	WASTE	QTY/YR**	DISPOSAL
TRANS Special Purpose Maint	Batteries		N
TRANS Battery Shop	Batteries	120	N
CSG Auto Hobby Shop	Batteries		SBC
TRANS Battery Shop	CoPars Batteries	NQ	SBC
CES Power Pro	Batteries		N

\*\* Most vehicle batteries are taken to TRANS Battery Shop

WASTE: Rags

SHOP	WASTE	DISPOSAL
TRANS Special Purpose Maint	Rags	LE
OMS Glossy Eagle	Rags	LE
OMS Tanker Phase	Rags	LE
FMS AGE	Rags	LE
TRANS Allied Trades	Rags	LE
FMS Propulsion	Rags	LE
OMS Repair & Reclamation	Rags	LE
FMMS Corrosion Control	Rags	L
TRANS General Purpose Maint	Rags	LE
OMS Wheel & Tire	Rags	LE
CES Power Production	Rags	T
FMS Corrosion Control	Rags	LE
MMS AGE	Rags	LE
OMS Bomber Phase	Rags	LE
FMMS Periodic Maint	Kim-Wipes	T
FMMS Power & Electric	Rags	D
TRANS Fire Truck Maint	Rags	LE
FMS Test Cell	Rags	LE

WASTE: Entomology

SHOP	WASTE	DISPOSAL
CES Entomology	Containers	T
CES Entomology	Paper Bags	I
CES Entomology	Triple-Rinse Water	REC

WASTE: NDI and Photo

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
Hospital Medical X-Ray	Developer	240	DD
CSG Visual Services	Fixer	NQ	SRDD
FMS NDI	X-Ray Developer	60	DD
FMS NDI	Penetrant	110	D
HOSP Medical X-Ray	Fixer	240	SRDD
FMS NDI	Mag Particle Soln	50	D
FMS NDI	Developer	110	OWS
HOSP Dental X-Ray	Developer	120	DD
FMS NDI	Emulsifier	110	OWS
FMS NDI	X-Ray Fixer	60	SRDD
CSG Visual Services	Developer	NQ	DD
Hospital Dental X-Ray	Fixer	120	SRDD

TOTAL: 1220

WASTE: Solvents

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
OMS Repair & Reclamation	Toluene	NQ	UIP
FMS Corrosion Control	Alcohol	NQ	UIP
321 FMMS Pneudraulics	PD-680	60	OWS
CSG Auto Hobby Shop	Carburetor Cleaner	16	D
FMS Propulsion	Fingerprint Remover	0	REP
FMS Propulsion	PD-680	0	REP
FMS Propulsion	Carbon Remover	0	REP
OMS Wheel & Tire	MEK	NQ	UIP
MMS AGE	PD-680	50	D
OMS Wheel & Tire	Citrikleen	200	D

TOTAL: 326

WASTE: Sodium Chromate

SHOP	WASTE	QTY(GAL/YR)	DISPOSAL
FMMS Power & Electric	Sodium Chromnate	160	D

Total: 160

LEGEND: T - TRASH  
 D - DRUMMED  
 L - LAUNDERED  
 I - INCINERATED  
 N - NEUTRALIZED  
 DD - DOWN DRAIN  
 LE - LINEN EXCHANGE  
 REP - REPLENISHED  
 REC - RECYCLED  
 UGT - UNDERGROUND TANK  
 AGT - ABOVEGROUND TANK  
 OWS - OIL/WATER SEPARATOR  
 UIP - USED IN PROCESS  
 SBC - SERVICED BY CONTRACTOR  
 SRDD - SILVER RECOVERY THEN  
 DOWN DRAIN

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**APPENDIX E**

**Summary of Wastes Disposed as Hazardous Waste at Grand Forks AFB**

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WASTES DISPOSED AS HAZARDOUS WASTE AT GRAND FORKS AFB

Type of Waste: Paint & Thinner

Shop	Bldg	Product	Qty (Gal/Yr)
FMMS Corrosion Control	306	Paint & Thinner	24
TRANS Allied Trades	413	Paint	60
FMS Corrosion Control	517	Rinsewater	NQ
FMS Corrosion Control	517	Stripper	880
FMS Corrosion Control	517	Paint & Thinner	660
CSG Auto Hobby Shop	310	Paint & Thinner	10

TOTAL: 1634

Type of Waste: Fuel

Shop	Bldg	Product	Qty (Gal/Yr)
FMS AGE	601	Diesel	NQ
FMS AGE	601	JP-4	NQ

Type of Waste: Rags

Shop	Bldg	Product	Qty (Lb/Yr)
FMMS Power & Electric	306	Rags	120

TOTAL: 120

Type of Waste: NDI

Shop	Bldg	Product	Qty (Gal/Yr)
FMS NDI	605	Mag Particle Soln	50
FMS NDI	605	Penetrant	110

TOTAL: 160

Type of Waste: Solvent

Shop	Bldg	Product	Qty (Gal/Yr)
MMS AGE	557	PD-680	50
OMS Wheel & Tire	609	Citrikleen	200
CSG Auto Hobby Shop	310	Carburetor Cleaner	16

TOTAL: 266

Type of Waste: Sodium Chromate

Shop	Bldg	Product	Qty (Gal/Yr)
FMMS Power & Electric	306	Sodium Chromate	160

TOTAL: 160

**APPENDIX F**  
**Master List of Shops**

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MASTER LIST OF SHOPS

	SHOP	CONTACT	BUILDING	EXTENSION
1.	842 TRANS Refueling Maintenance	Mr Brunk	303	3380
2.	347 TRANS Allied Trades	SSgt Ehresmann	413	3749
3.	347 TRANS Special Purpose Maintenance	Mr Ross	416	3770
4.	347 TRANS General Purpose Maintenance	TSgt Garver	415	3752
5.	347 TRANS Fire Truck Maintenance	SSgt Stevens	530	4170
6.	842 TRANS Tire Shop	SrA Foote	413	3750
7.	842 TRANS Battery Shop	Mr Nesdahl	415	3756
8.	842 CES Power Production	SSgt Peters	412	3748
9.	842 CES Entomology	Sgt Cooper	522	4289
10.	842 CES Exterior Electric	TSgt Wentzell	418	4411
11.	319 FMS AGE	Mr Alberts	601	4239
12.	319 FMS Corrosion Control	MSgt Safford	517	3817
13.	319 FMS Fuel Cell Repair	SSgt Green	649	4188
14.	319 FMS NDI	MSgt Duncan	605A	6269
15.	319 FMS Propulsion	MSgt Ouellete	621	3945
16.	319 FMS Test Cell	TSgt Lueck	621	6239
22.	319 FMS Washrack	SSgt Amenhauser	605	
17.	319 OMS Wheel and Tire	SSgt Gant	609	4038
18.	319 OMS Glossy Eagle	TSgt Rock	602	6190
19.	319 OMS Bomber Phase	TSgt Duncklee	601	5928
20.	319 OMS Tanker Phase	SSgt Parkhurst	603	4091
21.	319 OMS Repair and Reclamation	TSgt Dumire	603	4095
23.	319 OMS Bomber Maintenance	SSgt Girard	649	4319
24.	321 FMMS Corrosion Control	TSgt Brownell	306	5159
25.	321 FMMS Periodic Maintenance	TSgt Boettcher	306	5156
26.	321 FMMS Power and Electric	Sgt Curran	306	5134
27.	321 FMMS Pneudraulics	TSgt Gregie	306	3179
28.	319 MMS Munitions AGE	SrA Miller	557	5998
29.	842 CSG Auto Hobby	Ms Shire	310	3394
30.	842 CSG Visual Services	Sgt Hagan	533	4133
31.	842 Hosp Dental X-Ray	SSgt Culver	108	5433
32.	842 Hosp Medical X-Ray	TSgt Hamilton	109	5535
33.	842 SUPS Fuels Lab	Capt Adams	545	3715

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**APPENDIX G**

**Summary of Waste Disposal Practices by Shop**

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DISPOSAL PRACTICES BY SHOP FOR GRAND FORKS AFB

Shop: 321 FMMS Pneudraulics, Building 306

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Hydraulic Fluid	240	UGT
PD-680	60	OWS
TOTAL: 300		

Shop: CES Entomology, Building 522

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Paper Bags	NQ	I
Triple-rinse Water	NQ	REC
Containers	NQ	T

Shop: CES Power Production, Building 412

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Oil & Fluid	3600	AGT
Fuel	NQ	REC
Rags	NQ	T
Antifreeze	660	D
Safety Kleen	160	SBC
Batteries	BS	N
Simple Green	180	OWS
Oil Sludge	NQ	D
TOTAL: 4600		

Shop: CSG Auto Hobby Shop, Building 310

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Carburetor Cleaner	16	D
Safety Kleen	220	SBC
Detergent	50	OWS
Batteries	NQ	SBC
Paint & Thinner	10	D
Antifreeze	220	D
Oil & Fluid	3200	AGT
TOTAL: 3716		

Shop: CSG Visual Services, Building 533

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Developer	NQ	DP
Fixer	NQ	SRDD

Shop: FMMS Corrosion Control, Building 306

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	L
Paint & Thinner	24	D

TOTAL: 24

Shop: FMS Periodic Maintenance, Building 306

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Diesel	600	UGT
Antifreeze	330	D
Kim-Wipes	NQ	T
Hydraulic Fluid	900	UGT
Oil	900	UGT

TOTAL: 2730

Shop: FMMS Power & Electric, Building 306

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Sodium Chromate	160	D
Rags	120 Lb/Yr	D

TOTAL: 160 Gal/Yr  
120 Lb/Yr

Shop: FMS AGE, Building 601

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Oil	2640	D
Safety Kleen	350	SBC
Rags	NQ	LE
Aircraft Soap	600	OWS
JP-4	NQ	D
Antifreeze	1440	D
Hydraulic Fluid	600	D
Diesel	NQ	D

TOTAL: 5630

Shop: FMS Corrosion Control, Building 517

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Paint Booth Water	NQ	D-DD
Safety Kleen	140	SBC
Rinsewater	NQ	D
Rags	NQ	LE
Paint and Thinner	660	D
Safety Kleen Paint Gun Cleaning Unit Stripper	130	SBC
Alcohol	880	D
	NQ	UIP

TOTAL: 1810

Shop: FMS Fuel Cell Repair, Building 649

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
JP-4	1320	REC
JP-4	NQ	OWS

TOTAL: 1320

Shop: FMS NDI, Building 605

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Mag Particle Solution	50	D
Developer	110	OWS
X-Ray Developer	60	DD
Emulsifier	110	OWS
X-Ray Fixer	60	SRDD
Penetrant	110	D

TOTAL: 500

Shop: FMS Propulsion, Building 621

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Safety Kleen	220	SBC
PD-680	0	REP
JP-4	100	REC
Fingerprint Remover	0	REP
7808 Oil	100	D
Carbon Remover	0	REP
Rags	NQ	LE

TOTAL: 420

Shop: FMS Test Cell, Building 621

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	LE

Shop: FMS Warehouse, Building 605

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Citri-Solve 50	1320	OWS

TOTAL: 1320

Shop: Hospital Dental X-Ray, Building 108

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Fixer	120	SRDD
Developer	120	DD

TOTAL: 240

Shop: Hospital Medical X-Ray, Building 109

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Fixer	240	SRDD
Developer	240	DD

TOTAL: 480

Shop: MMS AGE, Building 557

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Tennant Soap	NQ	OWS
Rags	NQ	LE
Brake Fluid	180	D
PD-680	50	D

TOTAL: 230

SHOP: OMS Bomber Maint, Building 649

WASTE PRODUCT	QTY(BAGS/YR)	DISPOSAL
Speedy Dry	240	T

TOTAL: 240

Shop: OMS Bomber Phase, Building 601

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	LE
Citri-Solve 50	1200	OWS
Hydraulic Fluid	660	D
Speedy Dry	NQ	T

TOTAL: 1860

Shop: OMS Glossy Eagle, Building 602

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Speedy Dry	NQ	T
Rags	NQ	LE
Spray Paint	NQ	UIP

Shop: OMS Tanker Phase, Building 603

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Hydraulic Fluid	660	D
Rags	NQ	LE
Speedy Dry	NQ	T

TOTAL: 660

Shop: OMS Wheel & Tire, Building 609

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Rags	NQ	LE
MEK	NQ	UIP
Citrikleen	200	D
Safety Kleen	390	SBC

TOTAL: 590

Shop: OMS Repair & Reclamation, Building 603

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Spray Paint	NQ	UIP
7808 Oil	2	D
5606 Hydraulic Fluid	12	D
Rags	NQ	LE
Toluene	NQ	UIP
Speedy Dry	NQ	T

TOTAL: 14

SHOP: TRANS Allied Trades, Building 413

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Paint	60	D
Rags	NQ	LE

TOTAL: 60

Shop: TRANS Battery Shop, Building 415

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Batteries	120*	N
Batteries	NQ	SBC

TOTAL: 120

\* Batteries from throughout base

Shop: TRANS Fire Truck Maintenance, Building 530

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Simple Green	NQ	OWS
Rags	NQ	LE
Antifreeze	NQ	D
Oil & Fluid	660	D
TOTAL: 660		

Shop: TRANS General Purpose Maintenance, Building 415

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Oil Sludge	220	UGT
Oil & Fluid	5400	UGT
Speedy Dry	NQ	T
Antifreeze	660	D
Rags	NQ	LE
Safety Kleen	900	SBC
TOTAL: 7180		

Shop: TRANS Refueling Maintenance, Building 303

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Oil	330	D
JP-4	660	REC
Antifreeze	28	D
Oil Sludge	10	D
Aircraft Soap	220	OWS
TOTAL: 1248		

SHOP: TRANS Special Purpose Maintenance, Building 416

WASTE PRODUCT	QTY(GAL/YR)	DISPOSAL
Batteries	BS	N
Aircraft Soap	70	OWS
Simple Green	90	OWS
Fuel	NQ	REC
Oil & Fluid	3000	UGT
Rags	NQ	LE
Speedy Dry	NQ	T
Antifreeze	1000	D
Safety Kleen	600	SBC
Oil Sludge	220	UGT
TOTAL: 4980		

LEGEND: T - TRASH                      REC - RECYCLED  
D - DRUMMED                      UGT - UNDERGROUND TANK  
L - LAUNDERED                      AGT - ABOVEGROUND TANK  
I - INCINERATED                      OWS - OIL/WATER SEPARATOR  
N - NEUTRALIZED                      UIP - USED IN PROCESS  
DD - DOWN DRAIN                      SBC - SERVICED BY CONTRACTOR  
LE - LINEN EXCHANGE                      SRDD - SILVER RECOVERY THEN DOWN DRAIN  
REP - REPLENISHED

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