DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE FOR ENVIRONMENT, SAFETY AND OCCUPATIONAL HEALTH RISK ANALYSIS (AFMC)
BROOKS CITY-BASE TEXAS

10 SEP 2004

MEMORANDUM FOR 16 CES/CEV
ATTN: MRS. ANDREA BISHOP
415 INDEPENDENCE ROAD
HURLBURT FIELD, FL 32544-5244

FROM: AFIOH/RSE
2513 Kennedy Circle
Brooks City-Base, TX 78235-5116

SUBJECT: Letter, IOH-RS-BR-LT-2004- 0047, 2003 Air Emissions Inventory for Hurlburt Field AFB, Florida

1. At the request of the 16 CES/CEV, a team from the Air Quality Branch of the Environmental Analysis Division of the Air Force Institute for Operational Health (AFIOH/RSEQ) conducted a comprehensive air emissions inventory for Hurlburt Field AFB located in Okaloosa County, Florida. The inventory provides estimates of 2003 actual and potential criteria pollutant and hazardous air pollutant (HAP) emissions from stationary sources as defined by the State of Florida's air regulations. The results of this inventory provide emissions data necessary to the applicability of the Title V permitting requirements, the CAA of 1990, and the State of Florida Air Pollution Regulations.

2. Our study team consisted of technical experts in the field of air pollution evaluation and control, Mr. Joe Fleming and Mr. William Paine. The air emission inventory at Hurlburt Field was conducted in two phases. The first phase included an on-site survey of the installation, which was conducted during March 2004. During the site visit, the inventory team gathered data for process operations and material consumption, interviewed installation personnel, and gathered other information necessary for the calculation of air pollution emissions. The second phase of the inventory involved converting field data into source-specific emission rates.

3. We appreciate the support your office provided to our study team and we look forward to working with you in future environmental efforts. If you have any technical questions concerning the report, please contact Mr. Joe Fleming at DSN 240-4973 or email at joe.fleming@brooks.af.mil, or Capt Vincent Falls at DSN 240-4859 or email at vincent.falls@brooks.af.mil. We are committed to providing the absolute best quality of services possible. If you have comments on the quality of our services please contact me at DSN 240-4687 or email me at lynn.borland@brooks.af.mil. You can also reach us at our website http://www.brooks.af.mil/afioh/.

VINCENT D. FALLS, Capt, USAF, BSC
Chief, Air Quality Branch

LYNN L. BORLAND, Lt Col, USAF, BSC
Chief, Environmental Analysis Division

Attachment:
2003 Air Emissions Inventory for Hurlburt Field

cc: 16 AMDS/SGPB

Distribution: Approved for public release, distribution unlimited

2003 AIR EMISSIONS INVENTORY FOR HURLBURT FIELD

Submitted To:

16th CES/CEV
415 Independence Road
Hurlburt Field, Florida 32544-5344

Prepared By:

Air Quality Branch
Environmental Analysis Division
Air Force Institute for Operational Health (AFIOH)
2513 Kennedy Circle Brooks City-Base, TX 78235-5116
DSN 240-3305, COMM 210-536-3305
Fax 210-536-3945
Website: http://www.brooks.af.mil/afioh

July 2004

TABLE OF CONTENTS

Section		Page
List of Tables		iii
List of Acronyms		vi
Executive Summary		ES-1
Section 1	Introduction	1-1
Section 2	Abrasive Blasting Units	2-1
Section 3	Aircraft Engine Testing	3-1
Section 4	External Combustion Units	4-1
Section 5	Fuel Cell Maintenance	5-1
Section 6	Fuel Storage	6-1
Section 7	Fuel Transfer	7-1
Section 8	Gasoline Storage and Dispensing Operations	8-1
Section 9	Laboratory Chemicals	9-1
Section 10	Landfill Emissions	10-1
Section 11	Miscellaneous Chemicals	11-1
Section 12	Open Detonation of Energetic Materials	12-1
Section 13	Pesticide Application	13-1
Section 14	Site Restoration	14-1
Section 15	Small Arms Firing	15-1
Section 16	Solvent Cleaning Tanks	16-1
Section 17	Stationary Internal Combustion Engine Equipment	17-1
Section 18	Architectural Coatings	18-1
Section 19	Welding Operations	19-1
Section 20	Miscellaneous Sources	20-1
Section 21	Paint Spray Booths	21-1
Appendix A	Fuel Speciation Data	A-1

LIST OF TABLES

Table No		Page
ES-1	Summary of Actual 2003 Criteria Pollutant Emissions	ES-3
ES-2	Summary of Potential Criteria Pollutant Emissions from Sources with Permit Limits	ES-4
ES-3	2003 Summary of Hazardous Air Pollutant Emissions for all Sources	ES-5
ES-4	Summary of Actual Hazardous Air Pollutant Emissions for Sources with Permit Limits	ES-7
ES-5	Summary of Potential Hazardous Air Pollutant Emissions for Sources with Permit Limits	ES-8
2-1	Summary of Abrasive Blasting Operations Performed	2-1
2-2	Actual 2003 Emissions from Abrasive Blasting Units	2-4
3-1	2003 Summary of Aircraft Engine Testing	3-1
3-2	Aircraft Engine Emission Factors	3-2
3-3	2003 Emissions from Aircraft Engine Testing	3-5
4-1	Criteria Pollutant Emission Factors for External Combustion Units	4-2
4-2	HAP Emission Factors for External Combustion Units	4-2
4-3	External Combustion Sources	4-4
4-4	2003 Criteria Pollutant Emissions from External Combustion Units	4-11
4-5	2003 HAP Emissions from External Combustion Units	4-12
5-1	2003 Fuel Cell Maintenance Operations	5-1
5-2	2003 Actual Emissions from Fuel Cell Maintenance	5-4
6-1	Summary of Horizontal Fixed Roof Tanks	6-4
6-2	Summary of Internal Floating Roof Tanks	6-5
6-3	2003 Actual Emissions from Fuel Storage Tanks	6-6
6-4	Potential Emissions from Fuel Storage Tanks	6-7
7-1	Summary of 2003 Fuel Transfers	7-1
7-2	Saturation Factors for Calculating Petroleum Liquid Loading Losses	7-3
7-3	Properties of Selected Petroleum Liquids	7-3
7-4	Actual 2003 Emissions from Fuel Transfer	7-5
8-1	VOC Emission Factors for Gasoline Service Stations	8-2
8-2	Summary of Gasoline AST's	8-4
8-3	2003 VOC Emissions from Gasoline AST's	8-5
8-4	2003 HAP Emissions from Gasoline AST's	8-5
9-1	2003 Emissions from Lab Chemicals	9-2
10-1	Landfills	10-1
10-2	2003 Emissions From Landfills	10-3
11-1	2003 Summary of Miscellaneous Chemicals Used	11-3
11-2	Actual 2003 Emissions from Miscellaneous Chemical Used	11-9
12-1	2003 Summary of Open Detonation Operations	12-4
12-2	Average Emission Factors for Selected Open Detonation Pollutants	12-1
12-3	Average CO and NO_x Emission Factors for Open Detonation	12-1
12-4	2003 Emissions from Open Detonation Operations	12-5

13-1	2003 Summary of Volatile Pesticides Used	13-3
13-2	Actual 2003 Emissions from Pesticide Application	13-4
14-1	Emissions from Site Restoration	14-1
15-1	2003 Summary of Ammunition Used at Small Arm Ranges	15-1
15-2	Energetic Material and Lead Content for Ammunition	15-2
15-3	2003 Emissions from Small Arms Firing	15-3
16-1	Summary of Solvent Cleaning Tanks	16-3
16-2	2003 Emissions from Solvent Cleaning Tanks	16-4
17-1	Emission Factors for Small Diesel Internal Combustion Engines	17-2
17-2	Emission Factors for Large Diesel Internal Combustion Engines	17-3
17-3	Internal Combustion Engine Driven Equipment	17-5
17-4	2003 Criteria Pollutant Emissions from Generators	17-7
17-5	2003 Criteria Pollutant Emissions from Engine Driven Pumps	17-9
17-6	2003 HAP Emissions from Generators	17-10
17-7	2003 HAP Emissions from Engine Driven Pumps	17-12
17-8	2003 Actual Criteria Pollutant Emissions from Generators at the Training Grounds	17-13
17-9	2003 Potential Criteria Pollutant Emissions from Generator at the Training Ground	17-13
17-10	2003 Actual HAP Emissions from the Generators at the Training Grounds	17-14
17-11	2003 Potential HAP Pollutant Emissions from the Generators at the Training Grounds	17-14
17-12	2003 Summary of Internal Combustion Engine Emissions	17-15
18-1	2003 Summary of Architectural Coatings	18-3
18-2	2003 Emissions from Architectural Coatings	18-5
19-1	2003 Summary of Welding Operations	19-1
19-2	Emission Factors used for Welding Operations	19-2
19-3	2003 Emissions from Welding Operations	19-3
20-1	2003 Summary of Woodworking/Sanding/Disintegrator Operations	20-1
20-2	Losses from Accidental Releases	20-1
20-3	Emissions Factors for Fire Fighter Training using Liquid Propane Fuel	20-3
20-4	2003 Emissions from Particle Collectors	20-5
20-5	2003 Emissions from Fuel Spills	20-6
20-6	2003 Emissions from Fire Fighter Training	
21-1	2003 Summary of Surface Coating used in Paint Spray Booths	21-5
21-2	2003 Emissions from Paint Spray Booths	21-9
A-1	Liquid Phase and Vapor Phase Speciation of JP-8	A-2
A-2	Liquid Phase and Vapor Phase Speciation of Diesel Fuel	A-2
A-3	Liquid Phase and Vapor Phase Speciation of Gasoline	A-2

LIST OF ACRONYMS

AAFES	Army and Air Force Exchange Service
AFB	Air Force Base
AFIOH	Air Force Institute for Occupational Health
AST	Aboveground Storage Tank
Btu/yr	British Thermal Units per year
CAAA	Clean Air Act Amendments
CFR	Code of Federal Regulations
CO	Carbon Monoxide
FIRE	Factor Information Retrieval Data System
HAP	Hazardous Air Pollutant
kW	Kilowatt
kW-hr/yr	Kilowatt hours per year
lb/MMBtu	Pounds per Million British Thermal Unit
lbs/hr	Pounds per Hour
lbs/yr	Pounds per Year
MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units per Hour
$MMft^3/yr$	Million Cubic Feet per Year
10^6 ft^3	Million Cubic Feet
MSDS	Material Safety Data Sheet
NO_X	Nitrogen Oxides
PM_{10}	Particulate Matter With an Aerodynamic Diameter Less Than 10 Microns in Diameter
SCC	Source Classification Code
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxides
tons/yr	Tons per Year
TSP	Total Suspended Particulate
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The Air Quality Branch of the Environmental Analysis Division of the Air Force Institute for Operational Health (AFIOH/RSEQ) conducted a comprehensive air emissions inventory for Hurlburt Field (AFB) located in Okaloosa County, Florida. This inventory was accomplished during March 2004 for calendar year (CY) 2003 emissions. The results of this inventory provide emissions data necessary to determine the permit status of Hurlburt Field under the provisions of the Clean Air Act Amendments (CAAA) of 1990, and the State of Florida Air Pollution Regulations.

This air emission inventory estimates actual and potential criteria pollutant emissions from stationary sources as defined in Title I of the CAAA. These pollutants include carbon monoxide (CO), oxides of nitrogen (NO_X), lead (Pb), total particulate matter and/or particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), oxides of sulfur (SO_X), and volatile organic compounds (VOC). The inventory also estimates actual and potential hazardous air pollutant (HAP) emissions from stationary sources as defined in Title III of the CAAA. Potential sources of pollutants are addressed only if required by State of Florida Air Operating Permit (Permit # 0910064-007-AF).

Twenty-existing stationary source categories were identified during the course of this inventory. The permitted and non-permitted actual pollutant emissions as well as the potential permitted emissions from stationary sources (not including fugitive emissions) are summarized below.

	Permitted (tons/yr)		**All Sources (tons/yr)**
Pollutant	**Actual**	**Potential**	**Actual**
PM_{10}	0.16	3.24	5.11
CO	0.12	8.59	5.16
SO_x	0.03	2.62	0.29
NO_x	0.50	39.74	9.54
VOCs	6.53	38.85	23.16
Lead	<0.01	<0.1	0.0028
HAPs	1.3	6.9	4.6

The emissions inventory indicates that “potential emissions” from permitted stationary sources, when using permit limits for total JP-8 fuel usage, diesel usage, paint booth paint usage, fuel consumption for aircraft engine testing, training exercise facility kW hours, and natural gas usage limit, Hurlburt Field should not exceed the State of Florida Operating Permit Limits. Potential emissions of HAPs are below the major source threshold for individual HAPs (10 tons/yr for any single HAP) as well as total HAPs (25 tons/yr total HAPs). As such, Hurlburt Field will avoid the costly and time-consuming requirements of those National Emission Standards for Hazardous Air Pollutants (NESHAPs) that apply only to major sources for HAPs.

Based upon this emission inventory effort, AFIOH/RSEQ would propose the following recommendations:

- Ensure that all shops use chemicals/paints dispensed through the HazMat Pharmacy.

- Encourage the Red Horse Squadron to connect the air pollution control equipment for the carpenter shop saws and sanders.

- Perform annual air emissions inventories updates.

- Perform equipment source inventory to ensure all shops are reporting all emission sources.

Tables ES-1 through ES-5 on the following pages provide a summary of the actual and potential emissions at Hurlburt Field.

Table ES-1 Summary of Actual 2003 Criteria Pollutant Emissions

Source Type	Permitted/ Exempt	CO (lb/yr)	NO_X (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
Abrasive Blasting Units	Exempt			509.91		
Aircraft Engine Testing	Permitted	225.56	903.36	228.08	44.84	60.43
External Combustion Units	Exempt	7,760.76	9,239.00	702.16	55.43	508.15
Fuel Cell Maintenance	Exempt					2,473.05
Fuel Storage	Permitted					8,232.45
Fuel Transfer	Exempt					1,208.07
Gasoline Storage and Dispensing	Exempt					17,940.66
Laboratory Chemicals	Exempt					15.29
Landfills	Exempt					1,498.04
Miscellaneous Chemicals	Exempt					11,471.79
Open Detonation of Energetic Materials	Exempt	32.28	14.58	245.78		0.70
Pesticide Application	Exempt					375.19
Site Restoration	Exempt					117.27
Small Arms Firing	Exempt	78.55				
Solvent Cleaning Tanks	Exempt					144.33
Stationary Internal Combustion Engine Equipment	Exempt	1,598.16	7,359.13	473.10	441.87	544.61
Architectural Coatings	Exempt					5,928.22
Welding Operations	Exempt			5.02		
Miscellaneous Sources	Exempt	15.40	55.70	12.53	16.00	692.72
Paint Spray Booths	Permitted			93.59		4,750.62
Training Facility Power Generation	Permitted	20.41	94.71	6.72	6.26	7.64
Family Housing External Combustion Units	Exempt	598.80	1,407.18	113.77	8.98	82.34
Total Permitted Actual Emissions (lb/yr)		**245.96**	**998.07**	**328.39**	**51.10**	**13,051.13**
Total Permitted Actual Emissions (tons/yr)		**0.12**	**0.50**	**0.16**	**0.03**	**6.53**
Total Actual Emissions (lb/yr)		**10,329.91**	**19,073.67**	**2,390.67**	**573.39**	**56,051.55**
Total Actual Emissions (tons/yr)		**5.16**	**9.54**	**1.20**	**0.29**	**28.03**

Note: Shaded areas are fugitive emissions

Table ES-2 Summary of Potential Criteria Pollutant Emissions from Sources with Permit Limits

Source Type	CO	NO_X	PM_{10}	SO_X	VOC
Aircraft Engine Testing	343.36	1,375.17	347.20	68.26	91.99
Fuel Storage					40,991.87
Paint Spray Booths			535.46		27,179.71
Training Facility Power Generation	16,828.26	78,095.20	5,542.24	5,164.36	6,298.00
Total Emissions (lb/yr)	**17,172**	**79,470**	**6,425**	**5,233**	**74,562**
Total Emissions (tons/yr)	**8.59**	**39.74**	**3.21**	**2.62**	**37.28**

Table ES-3 2003 Summary of Hazardous Air Pollutant Emissions for all Sources

Source Type	Acetaldehyde	Acrolein	Arsenic	Benzene	Beryllium	Carbaryl	Cadmium	Chromium	1,3-Butadiene	Cumene	Cobalt	Ethyl Benzene	Ethylene Glycol	Formaldehyde	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Hexane	Lead
Abrasive Blasting Units																		
External Combustion Units			1.8E-02	1.9E-01	1.1E-03		1.0E-01	1.3E-01			7.8E-03			6.9E+00			1.7E+02	4.6E-02
Fuel Cell Maintenance				4.9E+00						7.2E+00		2.1E+01					2.1E+01	
Fuel Transfer				3.1E+00						3.5E+00		1.0E+01					1.0E+01	
Gasoline Storage and Dispensing				2.9E+01						2.0E+00		5.0E+00					2.3E+01	
Laboratory Chemicals																		
Landfills				3.8E+00								1.3E+01					1.5E+01	
Miscellaneous Chemicals								9.3E+01				3.6E+01	1.9E+03		8.8E+01	3.4E+01	2.5E+02	2.8E+00
Open Detonation of Energetic Mat.				5.7E-02														1.2E+00
Pesticide Application						9.6E-02							2.0E+00					
Site Restoration				1.7E+00								5.0E-02					2.3E+00	
Small Arms Firing																		1.5E+00
Solvent Cleaning Tanks												5.2E-01						
Stationary Int. Comb. Engine Equip.	7.7E-01	1.2E-01		1.4E+00					5.0E-02					1.5E+00				
Architectural Coatings												2.2E+01	5.0E+02		2.2E+02			
Welding Operations								3.7E-01			1.3E-04							
Miscellaneous Sources				3.3E+00						1.9E+00		5.6E+01		7.0E-01			7.5E-01	
Exercise Training Grounds	1.6E-02	2.0E-03		2.0E-02					8.4E-04					2.0E-03				
Total Emissions (lb/yr)	**7.8E-01**	**1.2E-01**	**1.8E-02**	**4.8E+01**	**1.1E-03**	**9.6E-02**	**1.0E-01**	**9.3E+01**	**5.1E-02**	**1.5E+01**	**7.9E-03**	**1.6E+02**	**2.4E+03**	**9.2E+00**	**3.1E+02**	**3.4E+01**	**4.9E+02**	**5.5E+00**
Total Emissions (tons/yr)	**3.9E-04**	**6.1E-05**	**9.2E-06**	**2.4E-02**	**5.5E-07**	**4.8E-05**	**5.1E-05**	**4.7E-02**	**2.6E-05**	**7.3E-03**	**3.9E-06**	**8.2E-02**	**1.2E+00**	**4.6E-03**	**1.5E-01**	**1.7E-02**	**2.4E-01**	**2.8E-03**

Table ES-3 (continued) 2003 Summary of Hazardous Air Pollutant Emissions for all Sources

Source Type	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Methyl tert-butyl ether	Naphthalene	Nickel	Phenol	POM	Tetrachloro-ethylene	Toluene	2,2,4-Trimethylpentane	Vinyl Chloride	Xylenes	Total HAPs
Abrasive Blasting Units																	**0.0E+00**
External Combustion Units								5.6E-02			8.1E-03		3.1E-01				**1.7E+02**
Fuel Cell Maintenance								2.1E+01					4.1E+01	4.9E-01		1.2E+02	**2.3E+02**
Fuel Transfer							9.1E-01	4.5E+00					2.0E+01	3.7E-01		5.6E+01	**1.1E+02**
Gasoline Storage and Dispensing							2.0E+02	7.1E-01					4.6E+01	3.9E+01		2.5E+01	**3.7E+02**
Laboratory Chemicals																	**0.0E+00**
Landfill					1.3E+01	4.8E+00							9.3E+01		1.2E+01	3.3E+01	**1.9E+02**
Miscellaneous Chemicals	1.6E+01	1.1E+02	1.5E+00	1.2E+02	4.5E+02	1.2E+02				1.4E+00			4.4E+02			4.8E+02	**4.2E+03**
Open Detonation of Energetic Mat.													2.1E-02				**1.3E+00**
Pesticide Application		1.6E+01	4.1E+00	4.5E-01				7.1E-01									**2.3E+01**
Site Restoration													1.2E+00			4.4E-01	**5.7E+00**
Small Arms Firing																	**1.5E+00**
Solvent Cleaning Tanks		1.3E-01	7.7E-02	4.3E-02	2.1E+00	1.3E+00						7.7E-02				5.8E-01	**4.8E+00**
Stationary Int. Comb. Engine Equip.								1.4E-01			2.7E-01		6.0E-01			4.1E-01	**5.3E+00**
Architectural Coatings													2.1E+01			1.5E+02	**9.0E+02**
Welding Operations	2.0E-01								7.6E-04								**5.7E-01**
Miscellaneous Sources							3.3E+00	1.0E-02					1.1E+01	5.3E-01		3.0E+01	**1.1E+02**
Exercise Training Grounds								7.8E-03			8.9E-03		8.9E-03		6.1E-03	1.8E+01	**1.8E+01**
Total Emissions (lb/yr)	**1.6E+01**	**1.3E+02**	**5.7E+00**	**1.2E+02**	**4.6E+02**	**1.2E+02**	**2.1E+02**	**2.7E+01**	**7.6E-04**	**1.4E+00**	**2.9E-01**	**7.7E-02**	**6.7E+02**	**4.0E+01**	**1.2E+01**	**9.1E+02**	**6.3E+03**
Total Emissions (tons/yr)	**8.1E-03**	**6.5E-02**	**2.9E-03**	**5.9E-02**	**2.3E-01**	**6.1E-02**	**1.0E-01**	**1.4E-02**	**3.8E-07**	**6.9E-04**	**1.4E-04**	**3.8E-05**	**3.4E-01**	**2.0E-02**	**5.9E-03**	**4.6E-01**	**3.2E+00**

Table ES-4 Summary of Actual Hazardous Air Pollutant Emissions for Sources with Permit Limits

Source Type	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Cumene	Ethyl Benzene	Formaldehyde	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Hexane	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Naphthalene	POM	Styrene	Toluene	2,2,4-Trimethylpentane	Xylenes	Total HAPs
Aircraft Engine Testing	1.2E-01		2.4E-01			3.5E-02	1.8E+00					7.3E-04		5.1E-02		1.1E-02	1.4E-01		7.1E-02	**2.3E+00**
Fuel Storage			1.8E+01		2.4E+01	7.1E+01				6.9E+01				7.0E+01			1.4E+02	1.6E+00	3.9E+02	**7.8E+02**
Paint Spray Booths						1.0E+02		2.6E+01	9.2E-01	5.5E+01	6.1E+01	4.8E+01	3.5E+02				8.6E+02		3.6E+02	**1.9E+03**
Training Facility Power Generation	1.6E-02	2.0E-03	2.0E-02	8.4E-04			2.5E-02							1.8E-03	3.7E-03		8.9E-03		6.1E-03	**6.7E-02**
Total Emissions (lb/yr)	**0**	**2.0E-03**	**1.8E+01**	**8.4E-04**	**2.4E+01**	**1.7E+02**	**1.8E+00**	**2.6E+01**	**9.2E-01**	**1.2E+02**	**6.1E+01**	**4.8E+01**	**3.5E+02**	**7.0E+01**	**3.7E-03**	**1.1E-02**	**1.0E+03**	**1.6E+00**	**7.5E+02**	**2.6E+03**
Total Emissions (tons/yr)	**7.1E-05**	**9.9E-07**	**9.0E-03**	**4.2E-07**	**1.2E-02**	**8.6E-02**	**9.0E-04**	**1.3E-02**	**4.6E-04**	**6.2E-02**	**3.1E-02**	**2.4E-02**	**1.7E-01**	**3.5E-02**	**1.8E-06**	**5.3E-06**	**5.0E-01**	**8.2E-04**	**3.8E-01**	**1.3E+00**

Table ES-5 Summary of Potential Hazardous Air Pollutant Emissions for Sources with Permit Limits

Source Type	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Cumene	Ethyl Benzene	Formaldehyde	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Hexane	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Naphthalene	POM	Styrene	Toluene	2,2,4-Trimethylpentane	Xylenes	Total HAPs
Aircraft Engine Testing	1.9E-01		3.7E-01			5.3E-02	2.7E+00					1.1E-03		7.7E-02		1.6E-02	2.1E-01		1.1E-01	3.7E+00
Fuel Storage			2.6E+02		1.4E+02	1.1E+02				4.8E+00				1.2E+00			4.7E+02	4.1E+00	7.7E+02	1.8E+03
Paint Spray Booths						5.8E+02		1.5E+02	5.3E+00	3.1E+02	3.5E+02	2.8E+02	2.0E+03				4.9E+03		2.1E+03	1.1E+04
Training Facility Power Generation	1.4E+01	1.6E+00	1.6E+01	6.9E-01			2.1E+01							1.5E+00	3.0E+00		7.3E+00		5.0E+00	7.0E+01
Total Emissions (lb/yr)	**1.4E+01**	**1.6E+00**	**2.8E+02**	**6.9E-01**	**1.4E+02**	**6.9E+02**	**2.4E+01**	**1.5E+02**	**5.3E+00**	**3.2E+02**	**3.5E+02**	**2.8E+02**	**2.0E+03**	**2.8E+00**	**3.0E+00**	**1.6E-02**	**5.4E+03**	**4.1E+00**	**2.8E+03**	**1.2E+04**
Total Emissions (tons/yr)	**6.9E-03**	**8.2E-04**	**1.4E-01**	**3.5E-04**	**6.8E-02**	**3.5E-01**	**1.2E-02**	**7.5E-02**	**2.6E-03**	**1.6E-01**	**1.7E-01**	**1.4E-01**	**9.9E-01**	**1.4E-03**	**1.5E-03**	**8.1E-06**	**2.7E+00**	**2.0E-03**	**1.4E+00**	**6.2E+00**

Section 1
Introduction

1.1 Installation Background

Hurlburt Field is located west of Fort Walton Beach, Florida in Okaloosa County. Okaloosa County is classified as an attainment area for the National Ambient Air Quality Standards. Air pollution sources located in attainment areas are considered a major source of air pollution (requiring a Title V operating permit) if they have the potential-to-emit greater than 100 tons per year of any criteria pollutant, 10 tons per year of any single hazardous air pollutant, or 25 tons per year of all hazardous air pollutants combined. A source may avoid Title V permit requirements if they are willing to accept and implement federally enforceable limits on equipment operation that limit potential emission to less than 100 tons per year for any criteria pollutant. Sources that accept these restrictions are considered "synthetic minor sources." In 2003, Hurlburt Field was considered a synthetic minor source. The State of Florida Operating permit limits NOx emissions to 41.2 tons/yr and VOC emissions to 16.9 tons/yr of actual permitted emissions.

1.2 Emissions Inventory Methodology

The air emission inventory at Hurlburt Field was conducted in two phases. The first phase included an on-site survey of the installation, which was conducted from 1 to 5 March 2004. During the site visit, the inventory team gathered data for process operations and material consumption, interviewed installation personnel, and gathered other information necessary for the calculation of air pollution emissions.

The second phase of the air emissions inventory involved converting field data into source-specific emission rates. Emissions were calculated using data in the following USEPA-recommended hierarchy: actual test data, emission factors, material (mass) balance, process-specific empirical relationships, and engineering estimates. All emission factors used in the calculations came from the "Air Emissions Inventory Guidance Documents for Stationary and Mobile Sources at Air Force Installations," written by the Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis (AFIOH), Brooks AFB TX. In completing emission calculations, SO_x emissions were assumed to be SO_2. AFIOH/RSEQ performed mass balance calculations for chemical processes when no test data, emission factors, or other calculation methods were available. For example, mass balance is typically used to calculate VOC and organic HAP emissions from chemical processes, such as painting operations, printing operations, pesticide application, and miscellaneous chemical usage. In conducting mass balance calculations, the weight percent of a chemical constituent was multiplied by the amount of product used. Chemical constituent data were obtained from material safety data sheets (MSDSs) on file at the installation, requested from the manufacturer, or obtained from the Hazardous Material Information System. If the specific chemical MSDS was not available, a representative MSDS was used.

Potential to Emit (PTE) calculations for permitted sources were completed to determine compliance with the State of Florida Operating Permit. PTE was calculated by using permit limits. The limits used to calculate potential emissions are:

- limiting the total amount of jet fuel purchased to 50,000,000 gallons per year,

- limiting the total amount of diesel fuel used to 1,000,000 gallons per year,

- limiting the fuel used at the aircraft engine test facility to 62,500 gallons,

- limiting the use of any auxiliary power generation units at the exercise facility to less than 1,880,000 kW hours per year.

- and limiting the total amount of paint and paint related materials used in the paint booths to 4,600 gallons per year.

Sections 2 through 21 provide stationary source emission descriptions, emission calculation methods, and sample calculations for each source category. Specific assumptions for each emission calculation are presented in these sections. The emissions data is compiled in the format presented in the guidance document, "Air Emissions Inventory Guidance Documents for Stationary and Mobile Sources at Air Force Installations," written by the Air Force Institute for Operational Health (AFIOH), Brooks AFB TX.

1.3 Conclusions/Recommendations

Twenty source categories were identified during the inventory effort. These sources at Hurlburt Field include abrasive blasting units, aircraft engine testing, fuel cell maintenance, boilers, generators, paint booth operations, fuel storage, fuel transfer, gasoline storage and dispensing, site restoration, welding, solvent cleaning tanks, training facility power generation, fire fighting, accidental discharges, and woodworking operations. Fugitive sources are those whose emissions cannot reasonably pass through a vent, stack, or functionally equivalent opening. Fugitive emission sources at Hurlburt Field include pesticide applications, miscellaneous chemical usage, landfills, open detonation of energetic materials, small arms firing, and architectural coatings. The exempt source is emissions from family housing external combustion units.

Based upon this emission inventory effort, the following recommendations are presented to simplify the annual inventory update process at Hurlburt Field:

- Continue to maintain a tracking system for miscellaneous chemical usage in the various shops/facilities throughout the base.

- Install a ventilation system for the woodworking system operated by the Red Horse Squadron.

- Prepare a new emission inventory annually.

- Prepare and implement a complete air emission source equipment inventory and track emissions through APIMS/EESOH.

SECTION 2
ABRASIVE BLASTING UNITS

2.1 Background

Abrasive blasting operations involve the use of a hard material (e.g., plastic beads, glass beads, aluminum oxide, sand, etc.) to remove old paint and/or corrosion from equipment. A high-pressure gun is used to blast the hard material at the equipment being stripped/cleaned. Depending on the size of the equipment, blasting is usually performed in either a small-enclosed cabinet (i.e., glove box) and/or in a booth. The exhaust from blasting operations, which contains a mixture of blasting material and stripped paint dust, is ventilated to a control device such as a fabric filter, cyclone, or a combination of both.

During CY2003, there were four abrasive blasting operations performed at Hurlburt Field, with two different types of abrasive blasting media. Summary information on Hurlburt Field abrasive blasting operations during CY2003 is provided in Table 2-1.

Table 2-1 Summary of Abrasive Blasting Operations Performed

Source	Unit Type	Shop	Material Type	Material Density (lb/gal)	Control Device	Control Efficiency (%)	Waste Collected (gal/yr)
Bldg 90714	Booth	16 EMS / LGMFE	Plastic Beads	12	Fabric Filter	95	660
Bldg 90714	Cabinet	16 EMS / LGMFE	Plastic Beads	12	Cyclone	95	55
Bldg 90714	Cabinet	16 EMS / LGMFE	Plastic Beads	12	Cyclone	95	89
Bldg 91137	Cabinet	823 RHS / LGTMA	Glass Beads	21	HEPA Filter	99	10

The pollutant of concern from abrasive blasting operations is particulate matter. A small amount of HAPs may also be emitted if the paint on the parts being stripped contains HAP metals such as chromium, lead, or cadmium. However, due to the lack of analysis data on the waste blasting materials generated, possible HAP emissions were not addressed. The applicable Source Classification Code is as follows:

- 3-09-002-99 Industrial Processes; Fabricated Metal Products; Abrasive Blasting of Metal Parts; General

2.2 Emissions Calculation Method

Emissions of particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) from controlled abrasive blasting units are calculated using a mass balance approach based on the estimated efficiency of the control device and the amount of waste blasting material collected during the year. The following equation is used:

$$E_{PM} = [(MWM_{col}) / (eff/100)] - MWM_{col}$$

Where,

E_{PM} = Emissions of particulate matter (lb/yr)
MWM_{col} = Mass of waste material collected [i.e., captured by the control device] (lb/yr)
eff = Efficiency of control device (%)

Since the mass of waste blasting material collected during the year is not directly known, it must be calculated based on the volume collected and the density of the waste material. The following equation is used:

$$MWM_{col} = VWM_{col} * D$$

Where,

MWM_{col} = Mass of waste material collected (lb/yr)
VWM_{col} = Volume of waste material collected (gal/yr)
D = Density of the waste material (lb/gal)

It's important to note that since the size of the particulate matter emitted into the atmosphere is unknown, it is conservatively assumed that PM_{10} emissions are equal to total PM emissions.

2.3 Sample Calculation

The following is an example calculation for determining actual particulate matter emissions from the cabinet in Building 90714:

Type of blast media:	Plastic Beads
Estimated density of blast media:	12 lb/gal
Quantity of blast media collected in 2003:	55 gal
Type of Control Device:	Cyclone Collector
Estimated efficiency of control device:	95 %

First, calculate the mass of waste blasting material collected by the cyclone during the year:

$$MWM_{col} = VWM_{col} * D$$
$$MWM_{col} = 55 \text{ gal/yr} * 12 \text{ lb/gal} = 660 \text{ lb/yr}$$

Next, calculate the particulate emissions:

$$E_{PM} = [(MWM_{col}) / (eff/100)] - MWM_{col}$$
$$E_{PM} = [(660 \text{ lb/yr}) / (95\%/100)] - 660 \text{ lb/yr} = \mathbf{34.74\ lb/yr}$$

2.4 Emissions Summary

Actual emissions from abrasive blasting operations are provided on page 2-4 in Table 2-2.

2.5 REFERENCES

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations (revised December 2003),* (Section 2), May 1999, IERA/RSEQ, Brooks AFB TX.
2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 13.2.6, September 9.

Table 2-2 Actual 2003 Emissions from Abrasive Blasting Units

Source	Waste Material Collected (gal/yr)	Material Density (lb/gal)	Waste Material Collected (lb/yr)	Control Efficiency (%)	PM_{10} Emissions (lb/yr)
Bldg 90714	660	12	7920	95	416.84
Bldg 90714	55	12	660	95	34.74
Bldg 90714	89	12	1068	95	56.21
Bldg 91137	10	21	210	99	2.12
				Total	**509.91**

SECTION 3
AIRCRAFT ENGINE TESTING

3.1 Background

Testing of aircraft engines is required to ensure proper operation prior to flight. During testing, the aircraft engine is typically run at several different power settings for specified periods of time. Engine testing can be performed with the engines on the aircraft or off the aircraft. Since testing with the engines on the aircraft is considered to be a mobile source by both the Air Force and Environmental Protection Agency (EPA), these emissions are not addressed in this report (i.e., only uninstalled engine testing is addressed).

During CY 2003, Hurlburt Field (16CRS/LGMPT) performed engine testing at one outdoor test stand. Testing was performed on two types of engines (the T56-A-15 and the T56-A-7) used on C-130 aircraft. Uninstalled engine testing was performed at building 90809. Engine testing was performed using the following power settings: Low Speed Ground Idle (LSGI), High Speed Ground Idle (HSGI), Flight Idle (FI), Reverse, Crossover, and Take Off (RCT). Additional information on Hurlburt Field aircraft engine testing operations during CY 2003 is provided in Table 3-1 below.

Table 3-1 Summary of Aircraft Engine Testing During 2003

Building No.	Type of Test Facility	Engine Model	on/off aircraft	Number tested during the year (test/yr)	Average run time per test at each power setting (min/test)	Average fuel usage rate at each power setting (lb/hr)
90809	Test Pad	T56-A-15	Off	112 Engine Tests 25 Prop Tests	LSGI: 3 min HSGI: 7.5 min FI: 10 min RCT: 2/15/12 min	LSGI: 1,300 HSGI: 1,600 FI: 2,000 RCT: 2,500/3,000/4,400
90809	Test Pad	T56-A-7	Off	6	LSGI: 3 min HSGI: 7.5 min FI: 10 min RCT: 2/15/12 min	LSGI: 1,300 HSGI: 1,600 FI: 2,000 RCT: 2,500/3,000/4,400

The applicable Source Classification Code for Hurlburt Field aircraft engine testing operations is:

- SCC 2-04-001-2001 Internal Combustion Engines; Engine Testing; Aircraft Engine Testing; Other Not Classified.

3.2 Emissions Calculation Methods

Actual emissions from aircraft engine test operations are calculated using the quantity of fuel combusted and Air Force aircraft engine emission factors. Separate calculations must be performed for each different power setting the engine is tested at to derive. The quantity of fuel combusted is determined based on the number of engines tested, the average test time at each

power setting, and the average fuel flow rate at each power setting. The following equation is used for each power setting:

$$E_{pol(setting)} = FR_{setting} * EF$$

Where,

$E_{pol(setting)}$ = Emissions of a particular pollutant from testing performed at a particular power setting (lb/yr)
$FR_{setting}$ = Fuel usage during testing at the applicable power setting (10^3 lb of fuel)
EF = Emission factor (lb/10^3 lb of fuel)

After the emissions of a particular pollutant are calculated for each different power setting, the values are added together to obtain the total emissions of that pollutant.

Emission factors for the T56-A-15 and T56-A-7 engine are found in Table 3-2. The emission factors are from the Air Force's "Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations".

Table 3-2 Aircraft Engine Emission Factors[a,b]

Pollutant	LSGI		HSGI		FI		RCT	
	T56-A-15	T56-A-7	T56-A-15	T56-A-7	T56-A-15	T56-A-7	T56-A-15	T56-A-7
Criteria								
CO	3.84	15.09	2.82	5.45	1.65	2.44	1.77	2.46
NO_X	7.49	5.62	8.31	6.58	9.69	10.12	11.42	11.5
PM (Total)	3.64	3.64	3.85	3.85	1.46	1.46	1.22	1.22
PM_{10}	3.64	3.64	3.85	3.85	1.46	1.46	1.22	1.22
SO_X	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
VOC[c]	1.97	7.6	0.58	0.73	0.42	0.33	0.28	0.23
HAPs								
Acetaldehyde	1.04E-02	1.04E-02	ND	ND	5.43E-04	5.43E-04	1.64E-04	1.64E-04
Acrolein	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.00476	0.00476	4.45E-03	4.45E-03	1.34E-03	1.34E-03	7.86E-04	7.86E-04
Ethylbenzene	ND	ND	6.19E-04	6.19E-04	3.12E-04	3.12E-04	1.80E-04	1.80E-04
Formaldehyde	4.11E-02	4.11E-02	3.34E-02	3.34E-02	9.27E-03	9.27E-03	3.80E-04	3.80E-04
MEK	1.33E-04	1.33E-04	7.00E-05	7.00E-05	ND	ND	6.15E-05	6.15E-05
Naphthalene	1.16E-03	1.16E-03	1.04E-03	1.04E-03	1.77E-04	1.77E-04	1.34E-04	1.34E-04
Styrene	ND	ND	3.70E-04	3.70E-04	ND	ND	ND	ND
Toluene	2.71E-03	2.71E-03	2.29E-03	2.29E-03	9.60E-04	9.60E-04	2.52E-05	2.52E-05
Xylenes	3.11E-04	3.11E-04	1.05E-03	1.05E-03	5.83E-04	5.83E-04	8.77E-04	8.77E-04

a All values are in units of pounds pollutant per thousand pounds of fuel burned (lb/10^3 lb)
b ND = Not Detected
c Based on the emission factor for Total Hydrocarbons

The emission factor for SO_X is dependent on the sulfur content of the fuel (i.e., all the sulfur in the fuel is assumed to be converted to SO_X). The SO_X emission factor for a particular aircraft fuel can be calculated using the following equation:

EF_{SOx} = 20 * S

Where,

EF_{SOx} = SO_X Emission Factor (lb/10^3 lb)
20 = Factor which is derived by converting "weight percent" into units of "lb/1000 lb" and then multiplying times the ratio of the molecular weight of SO_2 to the molecular weight of sulfur.
S = Weight percent sulfur content of the fuel

The weight percent sulfur content of the fuel has been found to vary depending on geographic location. According to the report titled "Survey of Jet Fuels Procured by the Defense Energy Support Center, 120010 – 120016," the 120016 average sulfur content for JP-8 fuel in the east coast region was 2.3%. Using this sulfur content value, the SO_X emission factor is calculated as follows:

EF_{SOx} = 20 * S
EF_{SOx} = 20 * (2.3%/100) = **0.46 lb/10^3 lb of fuel**

Potential emissions are calculated by dividing the permit limit by the actual fuel burned in aircraft engine testing. For 2003, 41,056 gallons of fuel were used in uninstalled engine tests. Using the permit limit of 62,500 gallons, this provides a potential emission factor of 1.52.

3.3 Sample Calculation

The following is an example calculation for determining actual carbon monoxide emissions from aircraft engine testing operations:

Engine type:	T56-A-15
NO_x emission factor at High Speed Ground Idle (EF):	8.31 lb/10^3 lb of fuel
2003 fuel volume used at High Speed Ground Idle ($FR_{setting}$):	27.40 10^3 lb of fuel

$E_{pol(setting)}$ = $FR_{setting}$ * EF
$E_{NOx(setting)}$ = 27.40 * 8.31 = **227.69 lb/yr**

3.4 Emissions Summary

Actual and Potential emissions from aircraft engine testing operations are provided in Table 3-3 on page 3-5.

3.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations,* (Revised December 2003), (Sections 3), May 2001. IERA/RSEQ, Brooks AFB TX.

2. U.S. Air Force. *IERA-RS-BR-SR-2001-0010, Air Emission Inventory Guidance Document for Mobile Sources at Air Force Installations,* (Revised December 2003), (Section 3), January 2002. IERA/RSEQ, Brooks AFB TX.

Table 3-3 2003 Emissions from Aircraft Engine Testing

Pollutant	Emissions/Power Setting (lb/yr)								Actual Emissions (lb/yr)	Potential Emissions (lb/yr)
	LSGI		HSGI		FI		RCT			
	T56-A-15	T56-A-7	T56-A-15	T56-A-7	T56-A-15	T56-A-7	T56-A-15	T56-A-7		
Criteria										
CO	34.20	5.89	77.27	6.54	75.35	4.88	20.21	1.23	**225.56**	**343.36**
NO_X	66.70	2.19	227.69	7.90	442.51	20.24	130.38	5.75	**903.36**	**1,375.17**
PM_{10}	32.41	1.42	105.49	4.62	66.67	2.92	13.93	0.61	**228.08**	**347.20**
SO_X	4.10	0.18	12.60	0.55	21.01	0.92	5.25	0.23	**44.84**	**68.26**
VOC	17.54	2.96	15.89	0.88	19.18	0.66	3.20	0.12	**60.43**	**91.99**
HAPs										
Acetaldehyde	9.3E-02	4.1E-03	0.0E+00	0.0E+00	2.5E-02	1.1E-03	1.9E-03	8.2E-05	**1.2E-01**	**1.9E-01**
Acrolein	ND	ND	ND	ND	ND	ND	ND	ND	**0.0E+00**	**0.0E+00**
Benzene	4.2E-02	1.9E-03	1.2E-01	5.3E-03	6.1E-02	2.7E-03	9.0E-03	3.9E-04	**2.4E-01**	**3.7E-01**
Ethylbenzene	ND	ND	1.7E-02	7.4E-04	1.4E-02	6.2E-04	2.1E-03	9.0E-05	**3.5E-02**	**5.3E-02**
Formaldehyde	3.7E-01	1.6E-02	9.2E-01	4.0E-02	4.2E-01	1.9E-02	4.3E-03	1.9E-04	**1.8E+00**	**2.7E+00**
MEK	ND	ND	ND	ND	ND	ND	7.0E-04	3.1E-05	**7.3E-04**	**1.1E-03**
Naphthalene	1.0E-02	4.5E-04	2.8E-02	1.2E-03	8.1E-03	3.5E-04	1.5E-03	6.7E-05	**5.1E-02**	**7.7E-02**
Styrene	ND	ND	1.0E-02	4.4E-04	ND	ND	ND	ND	**1.1E-02**	**1.6E-02**
Toluene	2.4E-02	1.1E-03	6.3E-02	2.7E-03	4.4E-02	1.9E-03	2.9E-04	1.3E-05	**1.4E-01**	**2.1E-01**
Xylenes	2.8E-03	1.2E-04	2.9E-02	1.3E-03	2.7E-02	1.2E-03	1.0E-02	4.4E-04	**7.1E-02**	**1.1E-01**

ND = Not detected

SECTION 4
EXTERNAL COMBUSTION UNITS

4.1 Background

Hurlburt Field currently operates numerous boilers, furnaces, space heaters, and water heaters throughout the base. These external combustion units range in size from 0.01 million British thermal units per hour (MMBtu/hr) to 5.44 MMBtu/hr. All units are natural gas fired with no option for dual firing. The natural gas usage was measured at two locations, one for the family housing units and one for the remainder of the base. As the individual unit fuel consumption rates could not be determined, emissions were calculated for the non-residential portion of the base. The following is a summary breakdown of the heating units at Hurlburt Field:

General Location	Number of Heating Units	Size Range
Military Family Housing (MFH)	Unknown	<0.3 MMBtu/hr
Remainder of Base	256	0.01 to 5.44 MMBtu/hr

More specific information on Hurlburt Field's external combustion units is provided in Table 4-3 found at the end of this section. Information provided includes exact building locations where heating units are found, size of the units found at each building, unit manufacturer, model number, and serial number of the unit.

4.2 Emission Calculation Method

Emissions from Hurlburt Field's external combustion units were calculated using Environmental Protection Agency (EPA) emission factors and the quantity of fuel combusted during 2003. The equation used to calculate actual emissions is as follows:

$$E_{pol} = FC * EF$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
FC = Fuel consumption (10^6 ft^3 for natural gas)
EF = Emission Factor (lb/10^6 ft^3 for natural gas)

Potential emissions from Hurlburt Field's heating units were calculated in the same manner as actual emissions except a worst-case fuel consumption was used instead of the actual 2003 fuel consumption. The worst-case fuel consumption was based on the permit limit of 375 MMCF.

Emission factors used to calculate emissions from the boilers/heaters at Hurlburt Field are provided in Tables 4-1 and 4-2 below. These emission factors are based on the following Source Classification Codes:

- SCC 1-03-006-02 (External Combustion Boilers, Commercial/Institutional, Natural Gas, 10 - 100 MMBtu/hr)
- SCC 1-03-006-03 (External Combustion Boilers, Commercial/Institutional, Natural Gas, < 10 MMBtu/hr)
- No SCC (Residential Furnaces, Natural Gas)

Table 4-1 Criteria Pollutant Emission Factors for External Combustion Units

Category	Units[a]	CO	Lead	NO_X	PM_{10}[b]	SO_X	VOC
Commercial/Institutional Natural Gas Boilers with a Heat Input Rating of 10 to 100 MMBtu/hr (SCC 1-03-006-02)[c]	$lb/10^6\ ft^3$	84	0.0005	100	7.6	0.6	5.5
Commercial/Institutional Natural Gas Boilers with a Heat Input Rating of 0.3 to <10 MMBtu/hr (SCC 1-03-006-03)[c]	$lb/10^6\ ft^3$	84	0.0005	100	7.6	0.6	5.5
Residential Natural Gas Combustors with a Heat Input Rating of < 0.3 MMBtu/hr (No SCC)[c]	$lb/10^6\ ft^3$	40	0.0005	94	7.6	0.6	5.5

[a] $lb/10^6\ ft^3$ = pounds pollutant per million cubic feet of natural gas burned.
[b] Includes both filterable and condensable particulate matter.
[c] Emission factors for natural gas combustion are from Section 1.4 of AP-42.

Table 4-2 HAP Emission Factors for External Combustion Units

Pollutant	Emission Factor	Units[a]
All Natural Gas Boilers/Heaters[b]		
Arsenic	0.0002	$lb/10^6\ ft^3$
Beryllium	1.2E-05	$lb/10^6\ ft^3$
Benzene	0.0021	$lb/10^6\ ft^3$
Cadmium	0.0011	$lb/10^6\ ft^3$
Chromium	0.0014	$lb/10^6\ ft^3$
Cobalt	8.4E-05	$lb/10^6\ ft^3$
Formaldehyde	0.075	$lb/10^6\ ft^3$
Hexane	1.8	$lb/10^6\ ft^3$
Lead	0.0005	$lb/10^6\ ft^3$
Manganese	0.00038	$lb/10^6\ ft^3$
Mercury	0.00026	$lb/10^6\ ft^3$
Naphthalene	0.00061	$lb/10^6\ ft^3$
Nickel	0.0021	$lb/10^6\ ft^3$
Polycyclic Organic Matter (POM)[c]	8.8E-05	$lb/10^6\ ft^3$
Selenium	2.4E-05	$lb/10^6\ ft^3$
Toluene	0.0034	$lb/10^6\ ft^3$

[a] $lb/10^6\ ft^3$ = pounds pollutant per million cubic feet of natural gas burned.
[b] All HAP emission factors for natural gas combustion are from Section 1.4 of AP-42.
[c] Total of all individual POM pollutants.

4.3 Sample Calculation

The following are example calculations for determining actual carbon monoxide emissions from the non-residential portion of the base.

Type of Fuel Used by Boiler: Natural Gas
Actual Quantity of Fuel Consumed in 2003: 92.39 10^6 ft^3
Carbon Monoxide (CO) Emission Factor: 84 lb/10^6 ft^3

E_{pol} = FC * EF
E_{CO} = 92.39 10^6 ft^3 * 84 lb/10^6 ft^3 = **7,760.8 lb/yr**

4.4 Emission Summary

Actual and potential criteria and HAP pollutant emissions from boilers/heaters are provided in Tables 4-4 and 4-5 on pages 4-11 and 4-12 respectively.

4.5 REFERENCES

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations*, (Revised December 2003), (Section 9) May 2001. IERA/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources (AP-42), Section 1.3, September 2001.

3. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources (AP-42), Section 1.4, March 2001.

4. U.S. Environmental Protection Agency, Factor Information Retrieval System (FIRE), Version 6.01, May 1999.

Table 4-3 External Combustion Sources

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
00001	Heating Systems	LOCHNVAR	CHN0750	J937854	750,000	1
00001	Heating Systems	Patterson-Kelley Co.	N-1700	CH37944627	1,700,000	1
90001	Heating Systems	RUUD	UQKA-A0360K-010	5617A369815084	N/A	1
90001	Heating Systems	RUUD	URKA-A036JK08E	1R5539ADAAF389817711	80,000	4
90002	Heating Systems	AMERICAN STANDARD	TTA180B300CB	K362MALAH	N/A	1
90002	Heating Systems	AMERICAN STANDARD	TTA120B300BB	K442K9DAH	N/A	1
90004	Hot Water Boiler	PLUMBING & HEATING DIV	G50-S31	31652A00652	1,674,000	1
90004	Boiler	Spencer	3W40500GP	13031	40,500	1
90005	Hot Water Boiler	AUBURN	Unknown	UNLISTED	*1,000,000	1
90005	Heating Systems	CLEAVER BROOKS	M4W-2500	G-14973-M4	2,500,000	1
90006	Heating Systems	LOCHNVAR	CBN0475	A888246	475,000	1
90006	Hot Water Boiler	RUUD	RPG308-27-6	0780M21263	30,000	1
900064	Heating Systems		TUD100C960A0		*100,000	2
90010	Heating Systems	LENNOX	80MGF3/4-100AI	6393K17020	100,000	1
90010	Hot Water Boiler	RHEEM	81VPBS	1293308547	*100,000	1
90013	Heating Systems	ACE BUEHLER	b4d3	986/67465	*100,000	1
90014	Heating Systems	REDD-I-INC	R	369471	*100,000	1
90015	Heating Systems	LENNOX	G2004E-75-2	5891F01693	75,000	1
90023	Heating Systems	A D SMITH	HW420780	780JB8551493	420,000	1
90024	Heating Systems	RUUD	NOT LISTED	NOT LISTED	*100,000	1
90028	Heating Systems	POWER FLAME	WCR2-G-15	069570870	2,200,000	1
90028	Hot Water Boiler	RHEEM	81V80D-A	R-0996C05251	*1,000,000	1
90029	Heating Systems	RITE	180WG	25289	180,000	1
90029	Hot Water Boiler	VENTURA	72V250	049687718	250,000	1
90032	Heating Systems	CYCLONETIC	JB1G-02-R7795AA	W021282A	*100,000	1
90033	Heating Systems	A D SMITH	HW420780	780JM8449741	420,000	1
90033	Heating Systems	RAYPAC	H1-0333C-CCARBAA	9206100904	333,000	1
90037	Heating Systems	LENNOX	G23Q516-125-4	5897C34930	125,000	2
90037	Hot Water Boiler	RHEEM	21V50-2	RN0597A38491	50,000	1
90039	Heating Systems	LENNOX	G20Q2E-50-4	5893M20833	50,000	1
90042	Hot Water Boiler	STATE COURIER	CV302RT1	E84771878	*1,000,000	1
90052	Heating Systems	LENNOX	G20Q5-6E-1005	5893M18476	100,000	1
90052	Heating Systems	LENNOX	G20Q5-6E-1005	5893M18478	100,000	1
90053	Hot Water Boiler	RHEEM	G76-100B	RN1092D00025	100,000	1
90053	Heating Systems	RITE	150	23444	1,500,000	1

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
90055	Heating Systems	INTER-CITY PRODUCT INC	CA5560VAC1	L951355892	60,000	1
90059	Heating Systems	REZNOZ	X100-6	ATD66Q2N22716	N/A	1
90061	Heating Systems	RAYPAC	H-0333A-CCARBCA	1288108427	333,000	1
90062	Heating Systems	ACE BUEHLER	B4E	V555723	*100,000	1
90062	Hot Water Boiler	RHEEM	21V50-2	RN0190A45625	50,000	1
90063	Hot Water Boiler	AO SMITH	ELSF1097	GA984011493-917	1,097,000	1
90063	Hot Water Boiler	RHEEM	81VP10S	R0393304162	10,000	1
90065	Heating Systems	RAYPAC	H-0333B-CCCRBBA	1189108863	333,000	1
90065	Hot Water Boiler	RHEEM	81V40D	019DB43562	40,000	1
90066	Heating Systems	CARRIER	58SSC090-111LC	2192A03114/ 2192A03133	110,000	2
90066	Hot Water Boiler	RHEEM	61VP10S	0991L05688	10,000	1
90067	Hot Water Boiler	RHEEM	21V40-7	0492A13510	40,000	1
90067	Hot Water Boiler	RHEEM	21V40-7	0492A13510	40,000	1
90068	Heating Systems	LENNOX	G2003-4E125-4	5892M14675/ 5893A04519	125,000	2
90068	Hot Water Boiler	RHEEM	81VD	0393303653	40,000	1
90069	Heating Systems	LENNOX	G2003-4E-125-4	5892M14687/ 5892M12150	125,000	2
90069	Hot Water Boiler	RHEEM	81VP10S	0393303698	10,000	1
90070	Hot Water Boiler	A D SMITH	FSG 50 224	GL94-2122094-S45	*1,000,000	1
90070	Heating Systems	LENNOX	G23Q4/5-100-2	5895E-26952/ 5895E-26955	100,000	2
90075	Heating Systems	TRANE	GRAA20 PDBA0N 8BL20 200	A95K44967	N/A	1
90075	Heating Systems	TRANE	GLND0 35AED 2000AK	A95J44939	N/A	1
90100	Heating Systems	RHEEM	RGDO-10ECJR	F22898747	10,000	1
90102	Boiler (Steam)	CLEAVER BROOKS	P700-30	L-82732	1,255,000	1
90102	Heating Systems	CLEAVER BROOKS	P700-30	L82732	1,255,000	1
90102	Hot Water Boiler	RHEEM	ELD80	R0397C16547	80,000	1
90109	Heating Systems	A D SMITH	HW160P821	821K8229943	160,000	1
90121	Hot Water Boiler	RHEEM	81SV30D B	R0396102938	30,000	1
90122	Hot Water Boiler	LOCHNVAR	CNR125-075DF9	MF0774211	75,000	1
90131	Heating Systems	AJAX	WGFD-600	82872	600,000	1
90131	Hot Water Boiler	RHEEM	EGS-9-85-1	R0979500627	85,000	1
90137	Heating Systems	LOCHNVAR	CBN0380	E841142	380,000	1
90137	Hot Water Boiler	RHEEM	62MV-30D	0384B22556	30,000	1
90145	Heating Systems	RAYPAC	H1-1125C-CEARCAA	9510126602	1,125,000	1
90145	Hot Water Boiler	RHEEM	G75-100	0795G02171	100,000	1
90203	Heating Systems	WELL MCLAIR	BL-576-SW		*100,000	1

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
90204	Heating Systems	DAYTON	3E228	C8028384/85/86	*100,000	3
90204	Hot Water Boiler	RICHMOND	8MV40-2C	RM1098B36856	40,000	1
90205	Hot Water Boiler	RHEEM	64-15S	0885D02154	15,000	1
90210	Heating Systems	PATTERSON KELLEY	Unknown	BH37-94-4614	1,491,000	1
90213	Heating Systems	RAYPAC	H10403C-CCAHBAA		1,040,000	1
90220	Boiler	MCQUAY	MSL114DH	3XD00147-04	*1,000,000	1
90220	Boiler	MCQUAY	MSL122DH	3XD00146-04	*1,000,000	1
90220	Heating Systems	RAYPAC	H1-0403BCCARBAA	9204099370	403,000	1
90220	Heating Systems	RAYPAC	H1-0514C-CCARCAA	9204099369	514,000	1
90220	Hot Water Boiler	RUDD	PE40-2	0492B21599	40,000	1
90221	Heating Systems	AJAX	WG0FD-400	86-390 7	400,000	1
90223	Hot Water Boiler	AO SMITH	BT65222	MH96-0566397-222	165,000	1
90223	Heating Systems	YORK	Unknown		*100,000	4
90226	Heating Systems	RITE	63WG0	9022088	*100,000	1
90228	Hot Water Boiler	AO SMITH	BTC 197970	MB980719134-970	197,000	1
90228	Heating Systems	TRANE	Unknown		*100,000	6
90229	Heating Systems	AJAX	WG0FD-400	8639188	40,000	1
90229	Hot Water Boiler	DAYTON	3E124B	B7936166	*1,000,000	1
90230	Heating Systems	RAYPAC	W2-0514	9808151864	*100,000	1
90230	Hot Water Boiler	RUDD	ELD52-3	1098C15118	N/A	1
90231	Heating Systems	ACE BUEHLER	B4E	81869	*100,000	1
90232	Hot Water Boiler	AO SMITH	DT270820	AJB2-08713820	1,260,000	1
90232	Heating Systems	RAYPAC	H1458C-CEARCAA	9609133445	1,458,000	1
90300	Boiler	RHEEM	RF200-92	1091D07374	200,000	1
90300	Heating Systems	TRANE	TWA060C300A1	K304M6DFF	30,000	1
90304	Boiler	RAYPAC	H4-0824A-CEDRCDA	9303106735	824,000	1
90304	Hot Water Boiler	RUDD	P30-6	0193A09885	30,000	1
90310	Hot Water Boiler	RHEEM	RFD200-91	0695G03513	200,000	1
90310	Boiler	WELL MCLAIR	PFG-8-PIN		*1,000,000	1
90319	Hot Water Boiler	MOR-FLO	ER-6-STR	E35410	*1,000,000	1
90320	Boiler (Steam)	HURST	3082	V61-150-182	*1,000,000	1
90320	Hot Water Boiler	RHEEM	GD500-77	0396G02836	500,000	1
90322	Boiler	RAYPAC	HI-0724C-BEARCAA	960119305	724,000	1
90322	Hot Water Boiler	RHEEM	DB500-77	0396G02837	500,000	1
90323	Boiler	RAYPAC	HI-0724C-BEARCAA	9601120304	724,000	1

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
90323	Hot Water Boiler	RHEEM	GE500-77	0396G02838	500,000	1
90325	Hot Water Boiler	VANGUARD	6E720	VG1297B40582	*1,000,000	1
90326	Hot Water Boiler	AIR COMP. PRODUCTS INC	COS-033H1	0597-D7307	33,000	1
90326	Boiler	RAYPAC	WH10824	204193893	824,000	1
90328	Hot Water Boiler	NATIONAL	ILLEG.	ILLEG.	*1,000,000	1
90329	Boiler	RAYPAC	HI-0724C-BEARCAA	9601129305	724,000	1
90329	Hot Water Boiler	RHEEM	GD500-77	0396G0289	500,000	1
90330	Boiler	RAYPAC	HI-0724I-BEARCAA	9601129303	724,000	1
90330	Hot Water Boiler	RHEEM	GD500-77	0396G02840	500,000	1
90331	Boiler	RAYPAC	H1-0842C-BEARCAA	9601129321	824,000	1
90331	Hot Water Boiler	VANGUARD	6E721	0395B10467	*1,000,000	1
90332	Boiler (Steam)	RAYPAC	HI-07246-BEARCAA	9601129305	724,000	1
90332	Hot Water Boiler	RHEEM	DB500-77	0396G02837	500,000	1
90333	Boiler	RAYPAC	HI-0724C-CEARCAA	9609133448	724,000	1
90333	Hot Water Boiler	RHEEM	GD500-77	0796G01138	500,000	1
90334	Boiler	RAYPAC	W2-1758C-CEAHDAA	9604130461	1,758,000	1
90337	Boiler (Steam)	RAYPAC	H1-0624C-BEAHCAA	9601129320	624,000	1
90337	Hot Water Boiler	RHEEM	81V52B	1290847779	52,000	1
90339	Hot Water Boiler	CARRIER	HI-0263C-CEARBAA	9303106671	*1,000,000	1
90339	Boiler	RAYPAC	H1-0263C-CEARBAA	9303106671	263,000	1
90340	Boiler	RAYPAC	Unknown		*1,000,000	1
90340	Hot Water Boiler	Unable to Read	40JRD1	056375127079	*1,000,000	1
90343	Boiler	PATTERSON KELLEY	N-1200	BB38890811	1,380,000	1
90343	Hot Water Boiler	VANGUARD	0896E00070	6E747	*1,000,000	1
90345	Boiler	AJAX	WG0FD-1275	80-32688	1,275,000	1
90345	Hot Water Boiler	Unable to Read	UNREADABLE	5004	*1,000,000	1
90346	Boiler	COOPER	HW 670 780	780P18228428	*1,000,000	1
90349	Boiler	RAYPAC	HI-0824C-BEAHCAA	9601129323	824,000	1
90349	Hot Water Boiler	RAYPAC	HI-0824C-REAHCAA	9601129310	824,000	1
90350	Boiler	Unable to Read	AAE1080-N-E	AFH-6217	1,080,000	1
90352	Boiler	RAYPAC	H4-112SA-CEDRCDA	9610134666	112,000	1
90352	Hot Water Boiler	RAYPAC	W1-0824A-BEDRDAA	9610134566	824,000	1
90353	Boiler	RITE	63	23857	*1,000,000	1
90353	Hot Water Boiler	VANGUARD	6E739	VGN0293D04333	*1,000,000	1
90359	Hot Water Boiler	BRADFORD WHITE	M40T5LN-3	CD5391248	*1,000,000	1

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
90367	Boiler	AJAX	WG-1050	86230	1,050,000	1
90367	Hot Water Boiler	RAYPAC	W1-07244-BEDRDAA	9403114144	724,000	1
90368	Hot Water Boiler	AO SMITH	HW300932	932B9843218	300,000	1
90368	Hot Water Heater	Raypak	H30624	20419193301	627,000	1
90368	Water Boiler	UNDERWESTOR LAB	76	9022073	*1,000,000	1
90369	Hot Water Boiler	AO SMITH	HW 670 932	932A9842483	670,000	1
90369	Water Boiler	UNDERWESTOR LAB	105	8921784	*1,000,000	1
90371	Hot Water Boiler	RHEEM	81VP15S	0297306646	15,000	1
90372	Hot Water Boiler	RHEEM	RF200-92	0590001593	200,000	1
90373	Hot Water Boiler	RHEEM	RF200-92	0590D01156	200,000	1
90375	Hot Water Boiler	RUDD	RF200-92	0590D01595	200,000	1
90377	Hot Water Boiler	RHEEM	8140D C	RH 1097D03212	140,000	2
90378	Hot Water Boiler	RHEEM	81V40D C	RH 1097003212	40,000	2
90379	Hot Water Boiler	RHEEM	81B40D	RH1097D03211	40,000	1
90380	Hot Water Boiler	RHEEM	21V40-7	0395A42160	40,000	1
90382	Hot Water Boiler	RHEEM	81SV300 B	RH 0598C01007	300,000	1
90400	Hot Water Boiler	RUDD	RP20S-2	0380M85533	20,000	1
90405	Boiler	AO SMITH	HW-300872	87L2L897539	300,000	1
90503	Hot Water Boiler	RHEEM	RF156-82	0493G00931	156,000	1
90503	Boiler	WELL MCLAIR	P-488-W		1,357,000	1
90505	Hot Water Boiler	RHEEM	21V40-7	0295A39063	40,000	1
90507	Boiler	PK	N-700	AE33911971	*1,000,000	1
90508	Boiler	PK	N-700	AE33911970	*1,000,000	1
90509	Boiler	LOCHNVAR	CBN380	J820485	380,000	1
90509	Hot Water Boiler	STANDARD	666H-52D	037610K18	*1,000,000	1
90517	Hot Water Boiler	A D SMITH	BTP-300-1500	SK93-45905-Y3	1,500,000	1
90517	Boiler	WELL MCLAIR	P-588-W	CP2439997	1,357,000	1
90603	Hot Water Boiler	A D SMITH	74672	K87	*1,000,000	1
90612	Hot Water Boiler	RITE	63X	7616299	*1,000,000	1
90618	Hot Water Boiler	RAYPAC	W2-0514	980851862	514,000	1
90700	Boiler (Steam)	YORK	SPHV-L25 N/2	9018246 H-97501	5,440,000	1
90701	Hot Water Boiler	AO SMITH	HW1240780P	780P08768155	1,240,000	1
90708	Hot Water Boiler	JARCO	AHJWB35	2328	*1,000,000	1
90710	Hot Water Boiler	RITE	48	22806	*1,000,000	1
90714	Hot Water Boiler	AJAX	WGED-1750	909-42272	1,750,000	1

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
90726	Boiler	HURST	250	FB8630W	*1,000,000	1
90730	Hot Water Boiler	A D SMITH	HW300771	771PG826305	300,000	1
90731	Hot Water Boiler	A D SMITH	HW420780	780SH8337799	420,000	1
90735	Hot Water Boiler	A D SMITH	HW300932	932K9740785	300,000	1
90736	Hot Water Boiler	FEDERAL	FR PK 350	76L261	1,575,000	1
90743	Hot Water Boiler	PK	54111	0944-S70131	*1,000,000	1
90747	Hot Water Boiler	LOCHNVAR	CWN1120	E928152	1,120,000	2
90747	Hot Water Boiler	WEIL MCLAIN	P588-11		1,357,000	1
90748	Hot Water Boiler	AO SMITH	HW420741	741JB47756852	420,000	1
90748	Hot Water Boiler	RITE	48	22087	*1,000,000	1
90755	Hot Water Boiler	RITE	48	22807	*1,000,000	1
90758	Hot Water Boiler	AO SMITH	HW300932	932K9634153	300,000	1
90758	Hot Water Boiler	PENNCO	1504HWG1	99152-0434-1	*1,000,000	1
90761	Hot Water Boiler	LOCHNVAR	RWN-270	E934712	270,000	1
90761	Hot Water Boiler	TELEDYNE LAARS	128417	921101700	*1,000,000	1
90802	Boiler	WEIL MCLAIN	WCR1-G-12	059362235	*1,000,000	1
90810	Hot Water Boiler	AJAX	WG0FD-1750	86502	*1,000,000	1
90815	Hot Water Boiler	LOCHNVAR	CWN 1350PM	K877784	1,350,000	1
90816	Boiler (Steam)	HURST	2S1	FB2251SSTM	*1,000,000	1
90822	Hot Water Boiler	AO SMITH	HW300952	932H9739619	300,000	1
90825	Hot Water Boiler	LOCHNVAR	CBMO475	1852847	475,000	1
90910	Heating Systems	Patterson Kelley Co.	1500	CE11911582	1,500,000	1
91020	Hot Water Boiler	LOCHNVAR	PFN0250PM	B910584	250,000	1
91020	Heating Systems	WEIL MCLAIN	LGBI2	1	1,430,000	1
91023	Hot Water Boiler	RHEEM	81SV30P	1095B28613	30,000	1
91025	Hot Water Boiler	CEC	Unknown		*1,000,000	1
91027	Hot Water Boiler	RHEEM	81V52D	0290B17719	52,000	1
91029	Boiler	BURNHAM	4FW-277-45-G-GP	19958	2,578,000	2
91029	Hot Water Boiler	RUUD	PE52-2	0291803898	52,000	1
91031	Heating Systems	AO SMITH	HW30932	C9844004	309,000	1
91031	Hot Water Boiler	LOCHNVAR	CRN200-100	GB8530734	200,000	1
91031	Hot Water Boiler	LOCHNVAR	LTVS5G0120-RJ	GA9423312	120,000	1
91033	Boiler	LOCHNVAR	RJS120	LM0750077	120,000	1
91033	Heating Systems	LOCHNVAR	RWN225	A941586	225,000	1
91035	Hot Water Boiler	RITE	150 WG	25240	150,000	2

Table 4-3 External Combustion Sources (continued)

Bldg	Item	Manufacturer	ProdNamModNum	SerialNum	BTU	Qty
91101	Heating Systems	TRANE	BAYHTRM310AB	M345RGDLD	*100,000	1
91112	Heating Systems	AO SMITH	HW420780J	780JG8663586	420,000	1
91120	Heating Systems	CARRIER	40RT900140		140,000	1
91127	Hot Water Boiler	SHARE SAME AS 91128	BLDG 91128		2,500,000	1
91128	Heating Systems	CLEAVER BROOKS	M4W-2500	G-15115-M4	2,500,000	1
91132	Heating Systems	BURNHAM	FD/2434000748		*100,000	1
91255	Heating Systems	NICKEL SHIELD	14N125A-G	049584956	*100,000	1
91255	Hot Water Boiler	RAYPAC	H1-1125C-CEARCAA	9512128043	1,125,000	1
91259	Heating Systems	RAYPAC	H1-3962C-CEARCAA	9704139419	3,962,000	1
91262	Heating Systems	RAYPAC	H1-1826C-CEARCAA	9704139456	1,826,000	2
91266	Hot Water Boiler	POLYSHIELD	40P250A-PG	109586317	*1,000,000	1
91266	Heating Systems	RAYPAC	H1-1223C-CEARCAA		1,223,000	2
91266	Heating Systems	RAYPAC	H10253LCEARBAA		1,025,000	1
91300	Heating Systems	RAYPAC	H3-263		263,000	1
91350	Hot Water Boiler	RHEEM	G76-75C	0695G02517	75,000	1
91500	Heating Systems	TRANE	BAYHTRW310AA	H31556750	310,000	1
91601	Heating Systems	A D SMITH	HW420932	932J9528861	420,000	1
MECH	Hot Water Boiler	A D SMITH	HW200P771	771PK8117576	200,000	1
Unknown	Hot Water Boiler	A D SMITH	HW200P771	77/PK8117576	200,000	1
Unknown	Hot Water Boiler	AMERICAN STANDARD	Unknown	UNLISTED	*1,000,000	1

* Maximum Btu/hr estimated - 1,000,000 Btu/hr for boilers and 100,000 Btu/hr for heating systems

Table 4-4 2003 Criteria Pollutant Emissions from External Combustion Units

Actual Emissions									
Location	**Fuel Type**	**Actual Fuel Burned**	**Fuel Units**	**CO (lb/yr)**	**Lead (lb/yr)**	**NO_X (lb/yr)**	**PM_{10} (lb/yr)**	**SO_X (lb/yr)**	**VOC (lb/yr)**
Family Housing Units	Natural Gas	14.97	10^6 ft^3/yr	598.8	7.5E-03	1,407.2	113.8	9.0	82.3
Remainder of Base	Natural Gas	92.39	10^6 ft^3/yr	7,760.8	4.6E-02	9,239.0	702.2	55.4	508.1
			Total (lb/yr)	**8,359.6**	**0.05**	**10,646.2**	**815.9**	**64.4**	**590.5**
			Total (tons/yr)	**4.18**	**2.7E-05**	**5.32**	**0.41**	**0.03**	**0.30**
Potential Emissions									
Location	**Fuel Type**	**Potential Fuel Burned**	**Fuel Units**	**CO (lb/yr)**	**Lead (lb/yr)**	**NO_X (lb/yr)**	**PM_{10} (lb/yr)**	**SO_X (lb/yr)**	**VOC (lb/yr)**
Remainder of Base	Natural Gas	375.00	10^6 ft^3/yr	31,500.0	1.9E-01	37,500.0	2,850.0	225.0	2,062.5
			Total (lb/yr)	**31,500.0**	**0.19**	**37,500.0**	**2,850.0**	**225.0**	**2,062.5**
			Total (tons/yr)	**15.75**	**9.4E-05**	**18.75**	**1.43**	**0.11**	**1.03**

Table 4-5 2003 HAP Emissions from External Combustion Units

Actual Emissions														
Location	**Fuel Type**	**Actual Fuel Burned**	**Fuel Units**	**Arsenic (lb/yr)**	**Benzene (lb/yr)**	**Beryllium (lb/yr)**	**Cadmium (lb/yr)**	**Chromium (lb/yr)**	**Cobalt (lb/yr)**	**Formaldehyde (lb/yr)**	**Hexane (lb/yr)**	**Naphthalene (lb/yr)**	**POM (lb/yr)**	**Toluene (lb/yr)**
Family Housing Units	Natural Gas	14.97	10^6 ft^3/yr	3.0E-03	3.1E-02	1.8E-04	1.6E-02	2.1E-02	1.3E-03	1.1E+00	2.7E+01	9.1E-03	1.3E-03	5.1E-02
Remainder of Base	Natural Gas	92.39	10^6 ft^3/yr	1.8E-02	1.9E-01	1.1E-03	1.0E-01	1.3E-01	7.8E-03	6.9E+00	1.7E+02	5.6E-02	8.1E-03	3.1E-01
			Total (lb/yr)	**0.02**	**0.23**	**1.3E-03**	**0.12**	**0.15**	**0.01**	**8.05**	**193.25**	**0.07**	**0.01**	**0.37**
			Total (tons/yr)	**1.1E-05**	**1.1E-04**	**6.4E-07**	**5.9E-05**	**7.5E-05**	**4.5E-06**	**4.0E-03**	**9.7E-02**	**3.3E-05**	**4.7E-06**	**1.8E-04**
Potential Emissions														
Location	**Fuel Type**	**Potential Fuel Burned[a]**	**Fuel Units**	**Arsenic (lb/yr)**	**Benzene (lb/yr)**	**Beryllium (lb/yr)**	**Cadmium (lb/yr)**	**Chromium (lb/yr)**	**Cobalt (lb/yr)**	**Formaldehyde (lb/yr)**	**Hexane (lb/yr)**	**Naphthalene (lb/yr)**	**POM (lb/yr)**	**Toluene (lb/yr)**
Remainder of Base	Natural Gas	375.00	10^6 ft^3/yr	7.5E-02	7.9E-01	4.5E-03	4.1E-01	5.3E-01	3.2E-02	2.8E+01	6.8E+02	2.3E-01	3.3E-02	1.3E+00
			Total (lb/yr)	**0.08**	**0.79**	**0.00**	**0.41**	**0.53**	**0.03**	**28.13**	**675.00**	**0.23**	**0.03**	**1.28**
			Total (tons/yr)	**3.8E-05**	**3.9E-04**	**2.3E-06**	**2.1E-04**	**2.6E-04**	**1.6E-05**	**1.4E-02**	**3.4E-01**	**1.1E-04**	**1.7E-05**	**6.4E-04**

SECTION 5
FUEL CELL MAINTENANCE

5.1 Background

In order to perform maintenance and/or repair of aircraft fuel cells, personnel of the Fuel Systems Repair Shop (16 CMS/MXMCF) must occasionally enter the fuel cells. Prior to entering the cells, the liquid fuel is removed and loaded into bowsers or tank trucks. The fuel cell is then purged with fresh air until both the Lower Explosive Level (LEL) and the oxygen level is acceptable. The fuel cell is then entered for maintenance and/or repair.

The emissions of concern from fuel cell maintenance operations are VOC's and individual organic HAP constituents found in the fuel. These emissions can originate from the following three activities: 1) loading the liquid fuel removed from the fuel cell into the bowsers and/or tank trucks, 2) purging the fuel-laden vapors inside the fuel cell with fresh air, and 3) drying of fire suppressing foam. The volume of fuel loaded into the bowsers/tank trucks for 2003 was not tracked; therefore the emissions were not calculated.

Summary information on the fuel cell maintenance activities performed at Hurlburt Field is provided in Table 5-1 below.

Table 5-1 2003 Fuel Cell Maintenance

Type of Aircraft	Fuel Cell Designation	Volume of Fuel Cell (gal)	Number of Cells Entered During 2003
AC130-H	# 1,2,3,4, AUX, EXT	1,360	30
AC-130U	# 1,2,3,4, AUX, EXT	1,360	56
MC-130H	# 1,2,3,4, AUX, EXT	1,360	40
MH53-J	#1, 2 Main Tanks	649	25

5.2 Emissions Calculation Method

VOC emissions from purging the fuel cell are calculated based on the assumption that two completely saturated volumes of fuel cell air are removed from the fuel cell. Emissions from purging a fuel cell are calculated by multiplying the saturation vapor density of JP-8 times twice the volume capacity of the fuel cell. The following equation is used: to calculate the annual emissions associated with maintenance of all fuel cells of a particular size:

$$E_{VOC\ (purge)} = (M_V * P_{VA} / R * T_{LA}) * V * 0.134 * 2 * NFC$$

Where,

$E_{VOC\ (purge)}$ = Annual VOC emissions associated with the purging of a specific size fuel cell (lb/yr)

M_V = vapor molecular weight (lb / lb-mole)

P_{VA} = vapor pressure at the daily average liquid surface temperature (psia)

R = ideal gas constant (10.731 psia*ft^3/lb-mole*°R)
T_{LA} = daily average liquid surface temperature (°R)
V = Volume capacity of the fuel cell (gallons/cell)
0.134 = Conversion factor (ft^3/gal)
2 = Number of saturated volumes of fuel cell air which are assumed to be purged prior to maintenance
NFC = Number of fuel cells with a volume equal to V which were entered for maintenance during the year (cells/yr)

Vapor molecular weights and vapor pressures can be found in Section 14, Table 14-2 and 14-3 in reference 1.

VOC Emissions associated with the air drying of the fire suppressant foam are calculated using a mass balance approach. This is done by weighing a typical foam block when it is saturated with JP-8 fuel and the weighing the same foam block again after it is air dried. The difference in the weight is the amount of JP-8, which evaporated, which in turn is equal to the VOC emissions. The following equation illustrates this mass balance:

$$E_{VOC\ (foam)} = [WFB_{(saturated)} - WFB_{(dried)}] * NFB * 80\% * NFC$$

Where,

$E_{VOC\ (foam)}$ = Annual VOC emissions associated with air drying fuel cell foam blocks (lb/yr)
$WFB_{(saturated)}$ = Weight of a typical foam block when saturated with liquid JP-8 (lb/block)
$WFB_{(dried)}$ = Weight of a typical foam block after it is air dried (lb/block)
NFB = Number of foam blocks which are air dried per cell (blocks/cell)
80% = Factor to depicts number of foam blocks containing fuel
NFC = Number of fuel cells which were entered for maintenance during the year (cells/year)

To accurately depict emissions from the foam blocks, only the bottom layer of foam blocks is assumed to contain fuel after the fuel has been drained. Therefore, the number of foam blocks per cell is reduced by 80%.

In conversation with Tsgt Kristi Lamb, of the 16 CMS Fuel Systems Repair shop, foam is removed from the auxiliary tanks 80% of the time, from the main tanks 15% of the time, and from the external tanks 50% of the time. These percentages are reflected in the calculations performed in Table 5-2 on page 5-4.

HAP speciation is provided in Appendix A, JP-8 speciation.

5.3 Sample Calculation

The following is an example calculation for determining emissions from fuel cell maintenance operations on the External Wing Tank of the AC-130H aircraft.

The first step is to calculate the VOC emissions associated with purging of the fuel cell:

$E_{VOC\ (purge)}$ = (M_V * P_{VA} / R * T_{LA}) * V * 0.134 * 2 * NFC
$E_{VOC\ (purge)}$ = (130 lb/lb-mole * 0.05 psia / 10.731 psia * ft^3/lb-mole * 529.67 °R) * 1,360 gal/cell * 0.134 * 2 * 30 cells/yr
$E_{VOC\ (purge)}$ = **12.50 lb/yr**

The next step is to calculate the VOC emissions associated with air drying of the fire suppressant foam:

$E_{VOC\ (foam)}$ = [$WFB_{(saturated)}$ – $WFB_{(dried)}$] * NFB * NFC
$E_{VOC\ (foam)}$ = [1.25 lb/block–1 lb/block] * 150 blocks/cell * 30 cells/yr
$E_{VOC\ (foam)}$ = **1,125 lb/yr**

$E_{VOC\ (total)}$ = $E_{VOC\ (purge)}$ + $E_{VOC\ (foam)}$
$E_{VOC\ (total)}$ = 12.50 lb/yr + 1,125.00 lb/yr
$E_{VOC\ (total)}$ = **1137.50 lb/yr**

The next step is to calculate the HAP emissions:

E_{HAP} = $E_{VOC\ (total)}$ * (%HAP/100)
$E_{Benzene}$ = 1,137.50 lb/yr * (0.20%/100) = 2.28 x 10^0 **lb/yr**
E_{Cumene} = 1,137.50 lb/yr * (0.29%/100) = 3.30 x 10^0 **lb/yr**
$E_{Ethylbenzene}$ = 1,137.50 lb/yr * (0.86%/100) = 9.78 x 10^0 **lb/yr**
E_{Hexane} = 1,137.50 lb/yr * (0.84%/100) = 9.56 x 10^0 **lb/yr**
$E_{Napthalene}$ = 1,137.50 lb/yr * (0.85%/100) = 9.67 x 10^0 **lb/yr**
$E_{Toluene}$ = 1,137.50 lb/yr * (1.65%/100) = 1.88 x 10^1 **lb/yr**
$E_{2,2,4\text{-}Trimethylpentane}$ = 1,137.50 lb/yr * (0.02%/100) = 2.28 x 10^{-1} **lb/yr**
E_{Xylene} = 1,137.50 lb/yr * (4.74%/100) = 5.39 x 10^1 **lb/yr**

5.4 Emissions Summary

Emissions from fuel cell maintenance operations are provided in Table 5-2, page 5-4.

5.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003), (Section 11&14), May 2001. IERA/RSEQ, Brooks AFB TX.

2. U.S. Air Force, *Inspection and Repair of Aircraft Integral Tanks and Fuel Cells*, Technical Order 1-1-3, 30 November 1994 (Change 7, 12 March CY2001).

Table 5-2 2003 Emissions from Fuel Cell Maintenance

Fuel Cell	VOC	Benzene	Cumene	Ethyl Benzene	Hexane	Naphthalene	Toluene	2,2,4-Trimethylpentane	Xylenes
AC-130H	722.75	1.45E+00	2.10E+00	6.22E+00	6.07E+00	6.14E+00	1.19E+01	1.45E-01	3.43E+01
AC-130U	475.54	9.51E-01	1.38E+00	4.09E+00	3.99E+00	4.04E+00	7.85E+00	9.51E-02	2.25E+01
MC130-H	923.67	1.85E+00	2.68E+00	7.94E+00	7.76E+00	7.85E+00	1.52E+01	1.85E-01	4.38E+01
MH53-J	351.09	7.02E-01	1.02E+00	3.02E+00	2.95E+00	2.98E+00	5.79E+00	7.02E-02	1.66E+01
Total (lb/yr)	**2,473.05**	**4.95E+00**	**7.17E+00**	**2.13E+01**	**2.08E+01**	**2.10E+01**	**4.08E+01**	**4.95E-01**	**1.17E+02**

SECTION 6
FUEL STORAGE

6.1 Background

During 2003, 36 tanks were used at Hurlburt Field to store liquid fuel (i.e., gasoline, JP-8, and distillate fuel). Of these storage tanks 34 were above ground horizontal fixed roof tanks, the remaining 2 tanks were internal floating roof tanks. Summary information on the horizontal fixed roof tanks and the internal fixed roof tanks is provided in Tables 6-1 and 6-2, on pages 6-4 and 6-5, respectively.

The emissions of concern from fuel storage include VOC and individual organic HAP constituents found in the fuel. Source Classification Codes most applicable to storage tanks at Hurlburt Field include the following:

- SCC 4-03-010-16 Petroleum and Solvent Evaporation; Petroleum Product Storage at Refineries; Fixed Roof Tanks (Varying Sizes); Jet Kerosene: Breathing Loss (67,000 Bbl. Tank Size)
- SCC 4-03-010-18 Petroleum and Solvent Evaporation; Petroleum Product Storage at Refineries; Fixed Roof Tanks (Varying Sizes); Jet Kerosene: Working Loss (Tank Diameter Independent)
- SCC 4-03-011-13 Petroleum and Solvent Evaporation; Petroleum Product Storage at Refineries; Floating Roof Tanks (Varying Sizes); Jet Kerosene: Standing Loss (67,000 Bbl. Tank Size)
- SCC 4-03-011-19 Petroleum and Solvent Evaporation; Petroleum Product Storage at Refineries; Floating Roof Tanks (Varying Sizes); Jet Kerosene: Withdrawal Loss
- SCC 4-04-001-03 Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Bulk Terminals; Gasoline RVP 7: Breathing Loss (67,000 Bbl Capacity) - Fixed Roof Tank
- SCC 4-04-001-04 Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Bulk Terminals; Gasoline RVP 7: Working Loss (Diameter Independent) - Fixed Roof Tank
- SCC 4-04-001-21 Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Bulk Terminals; Diesel Fuel: Standing Loss (Diameter Independent) - Fixed Roof Tank
- SCC 4-04-001-22 Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Bulk Terminals; Diesel Fuel: Working Loss (Diameter Independent) - Fixed Roof Tank

6.2 Emissions Calculation Method

Actual VOC emissions from fuel storage tanks (except gasoline service station tanks which are addressed under the "Gasoline Service Stations" section of this report) were calculated using the EPA's TANKS software program (Version 4.09b). The TANKS program calculates evaporative emissions from fuel storage tanks using EPA equations/algorithms found in Chapter 7 of AP-42. The EPA's TANKS program can be downloaded from the Internet at the following address: http://www.epa.gov/ttn/chief/tanks.html. Above ground horizontal convault tanks are masonry-insulated tanks, emissions from these tanks were calculated using the underground tank formula.

HAP emissions associated with evaporative losses from fuel storage of a specific fuel are calculated by multiplying the corresponding VOC emissions by the vapor-phase weight fraction (weight percent divided by 100) of each HAP in the fuel. The following equation is used:

$$E_{HAP} = E_{VOC} * (VWP_{HAP}/100)$$

Where,

E_{HAP} = Emissions of a specific HAP (lb/yr)
E_{VOC} = VOC emissions (lb/yr)
VWP_{HAP} = Weight percent of the HAP in the fuel vapor (%)
100 = Factor for converting weight percent into weight fraction

Vapor-phase HAP specification of JP-8 and diesel are found in Appendix A of this report.

Potential emissions are based on the ratio between maximum allowable usages of a product versus actual 2003 usage. The actual emissions for diesel usage were multiplied by a factor of 7.87 (1,000,000 gal/126,967 gal). Potential JP-8 emissions were calculated by using the same method (50,000,000/10,056,732); a factor of 4.97 was used.

6.3 Sample Calculation

The following is an example calculation for determining actual emissions from the storage of Diesel in Tank # 90005 located at Building 90005:

The first step is to open up the TANKS program and create a new record for a horizontal fixed roof tank, this tank is a vaulted tank, and so it is treated as an underground storage tank. Next, enter the data found in Table 6-1 applicable to this tank. Running the program reveals that VOC emissions due to working and breathing losses are **0.18 lb/yr**.

The final step is to calculate the HAP emissions:

$$E_{HAP} = E_{VOC} * (VWP_{HAP}/100)$$
$$E_{Benzene} = 0.18 \text{ lb/yr} * (7.20\ \%/100) = \mathbf{7.2 \times 10^{-4}\ lb/yr}$$
$$E_{Cumene} = 0.18 \text{ lb/yr} * (0.40\ \%/100) = \mathbf{4.0 \times 10^{-5}\ lb/yr}$$
$$E_{Ethylbenzene} = 0.18 \text{ lb/yr} * (0.70\ \%/100) = \mathbf{7.0 \times 10^{-5}\ lb/yr}$$
$$E_{Hexane} = 0.18 \text{ lb/yr} * (2.30\ \%/100) = \mathbf{2.3 \times 10^{-4}\ lb/yr}$$
$$E_{Toluene} = 0.18 \text{ lb/yr} * (4.10\ \%/100) = \mathbf{4.1 \times 10^{-4}\ lb/yr}$$
$$E_{Xylene} = 0.18 \text{ lb/yr} * (2.50\ \%/100) = \mathbf{2.5 \times 10^{-4}\ lb/yr}$$

6.4 Emissions Summary

Actual and potential emissions from fuel storage are provided in Tables 6-3 and 6-4, on pages 6-6 and 6-7, respectively. It's important to note that emissions from gasoline service stations tanks are addressed under the "Gasoline Service Stations" section of this report.

6.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003), (Sections 13), May 1999. IERA/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency, *TANKS* Software Program, Version 4.09b, 2000.

3. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 7.1, September 1997.

Table 6-1 Summary of Horizontal Fixed Roof Tanks

Tank ID	Bldg No.	Tank Type	UST	Fuel Type	Length (ft)	Diameter (ft)	Tank Volume (gal)	2003 Throughput (gal/yr)	Tank Color/ Shade	Tank Condition	Current Status	Date of Status
1	001	Horizontal Tank	No	Diesel	11	4	500	260	Tan	Good	Active	All of 2003
29068-13	29068	Horizontal Tank	No	Diesel	30.25	8	12,000	12,687	Tan	Good	Active	Jan - Mar
29068-14	29068	Horizontal Tank	No	Diesel	30.25	8	12,000	12,687	Tan	Good	Active	Jan - Mar
29068-13	29068	Horizontal Tank	No	B-20	30.25	8	12,000	30,569	Tan	Good	Active	Apr - Dec
29068-14	29068	Horizontal Tank	No	B-20	30.25	8	12,000	30,569	Tan	Good	Active	Apr - Dec
90005	90005	Convault Tank	*No	Diesel	11.167	5.67	1000	260	Tan	Good	Active	All of 2003
90036	90036	Convault Tank	*No	Diesel	7.67	3.75	300	260	Tan	Good	Active	All of 2003
90126	90126	Horizontal Tank	No	Off Spec	12.92	10.42	10,000	14,142	Tan	Good	Active	All of 2003
90132	90132	Horizontal Tank	No	JP-5	38.67	11	20,000	7,742	Tan	Good	Active	All of 2003
90215	90215	Convault Tank	*No	Diesel	11	4.5	500	260	Tan	Good	Active	All of 2003
90705-A	90705	Horizontal Tank	No	Diesel	6.25	3	250	260	Tan	Good	Active	All of 2003
90705-B	90705	Horizontal Tank	No	Diesel	6.25	3	250	260	Tan	Good	Active	All of 2003
90705-C	90705	Horizontal Tank	No	Diesel	6.25	3	250	260	Tan	Good	Active	All of 2003
90705-D	90705	Horizontal Tank	No	Diesel	6.25	3	250	260	Tan	Good	Active	All of 2003
90711-A	90711	Horizontal Tank	No	Diesel	4	2.33	200	260	Tan	Good	Active	All of 2003
90711-B	90711	Horizontal Tank	No	Diesel	4	2.33	200	260	Tan	Good	Active	All of 2003
90717-A	90711	Horizontal Tank	No	Diesel	5.25	2.58	200	260	Tan	Good	Active	All of 2003
90717-B	90711	Horizontal Tank	No	Diesel	5.25	2.58	200	260	Tan	Good	Active	All of 2003
90717-C	90711	Horizontal Tank	No	Diesel	5.25	2.58	200	260	Tan	Good	Active	All of 2003
90725	90725	Horizontal Tank	No	Diesel	11	5.67	1,000	260	Tan	Good	Active	All of 2003
90761	90761	Horizontal Tank	No	Diesel	11	4.5	500	260	Tan	Good	Active	All of 2003
90806-A	90806	Horizontal Tank	No	Diesel	4	3.58	250	260	Tan	Good	Active	All of 2003
90806-B	90806	Horizontal Tank	No	Diesel	4	3.58	250	260	Tan	Good	Active	All of 2003
90806-C	90806	Horizontal Tank	No	Diesel	4	3.58	250	260	Tan	Good	Active	All of 2003
90821-A	90821	Horizontal Tank	No	Diesel	12.33	5.33	2,000	12,687	Tan	Good	Active	All of 2003
90827-B	90821	Horizontal Tank	No	Diesel	12.33	5.33	12,000	1,684	Tan	Good	Active	All of 2003
90827-A	90826	Horizontal Tank	No	JP-8	30.17	8.25	12,000	78,343	Tan	Good	Active	All of 2003
91117	91117	Horizontal Tank	No	Diesel	12	5	2000	260	Tan	Good	Active	All of 2003
91312-A	91312	Horizontal Tank	No	Diesel	6.25	3.67	500	1,820	Tan	Good	Active	All of 2003
90747	90747	Horizontal Tank	No	Diesel	6.03	3.08	250		Tan	Good	Active	All of 2003
91143-A	91143	Horizontal Tank	No	Diesel	24.25	5.33	4,000	19,064	Tan	Good	Active	All of 2003
91252	90075	Horizontal Tank	No	JP-8	27.09	8	6,000	78,343	Tan	Good	Active	All of 2003
91515	91515	Horizintal Tank	No	Diesel	6.03	3.08	250		Tan	Good	Active	All of 2003
91545	91545	Horizontal Tank	No	Diesel	18.25	5.25	3,000	260	Tan	Good	Active	All of 2003

Table 6-2 Summary of Internal Floating Roof Tanks

Tank ID No.	90125-1	90125-2
Bldg No.	90125	90125
Type of Fuel Stored?	JP-8	JP-8
Tank Diameter (ft)	60	60
Tank Volume (gal)	845,000	845,000
Throughput During CY03 (gal)	4,939,081	4,939,081
Self-Supporting Roof (y or n)	Yes	Yes
Number of Columns	20	20
Effective Column Diameter (ft)	3.3	3.3
Internal Shell Condition	Good	Good
External Shell Color/Shade	Tan	Tan
External Shell Condition	Good	Good
Roof Color/Shade	Tan	Tan
Roof Paint Condition	Good	Good
Primary Rim Seal	Mechanical	Mechanical
Secondary Seal	N/A	N/A
Deck Type	Welded	Welded
Deck Fitting Category	Typical	Typical
Deck Construction	5' x 7'	5' x 7'

Table 6-3 2003 Actual Emissions from Fuel Storage Tanks

Tank ID	Fuel Type	VOC (lb/yr)	Benzene (lb/yr)	Cumene (lb/yr)	Ethyl Benzene (lb/yr)	Hexane (lb/yr)	Naphthalene (lb/yr)	Toluene (lb/yr)	2,2,4-Trimethyl-pentane (lb/yr)	Xylenes (lb/yr)
1	Diesel	0.28	2.0E-02	1.1E-03	2.0E-03	6.4E-03	N/A	1.1E-02	N/A	7.0E-03
29068-13	Diesel	3.07	2.2E-01	1.2E-02	2.1E-02	7.1E-02	N/A	1.3E-01	N/A	7.7E-02
29068-14	Diesel	3.07	2.2E-01	1.2E-02	2.1E-02	7.1E-02	N/A	1.3E-01	N/A	7.7E-02
29068-13	B-20	0.69	5.0E-02	2.8E-03	4.8E-03	1.6E-02	N/A	2.8E-02	N/A	1.7E-02
29068-14	B-20	0.69	5.0E-02	2.8E-03	4.8E-03	1.6E-02	N/A	2.8E-02	N/A	1.7E-02
90005	Diesel	0.01	7.2E-04	4.0E-05	7.0E-05	2.3E-04	N/A	4.1E-04	N/A	2.5E-04
90036	Diesel	0.18	1.3E-02	7.2E-04	1.3E-03	4.1E-03	N/A	7.4E-03	N/A	4.5E-03
90126	Off Spec	8.96	1.8E-02	2.6E-02	7.7E-02	7.5E-02	7.6E-02	1.5E-01	1.8E-03	4.2E-01
90132	JP-5	9.51	1.9E-02	2.8E-02	8.2E-02	8.0E-02	8.1E-02	1.6E-01	1.9E-03	4.5E-01
90215	Diesel	0.01	7.2E-04	4.0E-05	7.0E-05	2.3E-04	N/A	4.1E-04	N/A	2.5E-04
90705-A	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90705-B	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90705-C	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90705-D	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90711-A	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90711-B	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90717-A	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90717-B	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90717-C	Diesel	0.10	7.2E-03	4.0E-04	7.0E-04	2.3E-03	N/A	4.1E-03	N/A	2.5E-03
90725	Diesel	0.56	4.0E-02	2.2E-03	3.9E-03	1.3E-02	N/A	2.3E-02	N/A	1.4E-02
90761	Diesel	0.36	2.6E-02	1.4E-03	2.5E-03	8.3E-03	N/A	1.5E-02	N/A	9.0E-03
90806-A	Diesel	0.09	6.5E-03	3.6E-04	6.3E-04	2.1E-03	N/A	3.7E-03	N/A	2.3E-03
90806-B	Diesel	0.09	6.5E-03	3.6E-04	6.3E-04	2.1E-03	N/A	3.7E-03	N/A	2.3E-03
90806-C	Diesel	0.09	6.5E-03	3.6E-04	6.3E-04	2.1E-03	N/A	3.7E-03	N/A	2.3E-03
90821-A	Diesel	0.88	6.3E-02	3.5E-03	6.2E-03	2.0E-02	N/A	3.6E-02	N/A	2.2E-02
90827-B	Diesel	3.36	2.4E-01	1.3E-02	2.4E-02	7.7E-02	N/A	1.4E-01	N/A	8.4E-02
90827-A	JP-8	6.75	1.4E-02	2.0E-02	5.8E-02	5.7E-02	5.7E-02	1.1E-01	1.4E-03	3.2E-01
91117	Diesel	0.57	4.1E-02	2.3E-03	4.0E-03	1.3E-02	N/A	2.3E-02	N/A	1.4E-02
91312-A	Diesel	0.18	1.3E-02	7.2E-04	1.3E-03	4.1E-03	N/A	7.4E-03	N/A	4.5E-03
90747	Diesel	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	N/A	0.0E+00	N/A	0.0E+00
91143-A	Diesel	1.58	1.1E-01	6.3E-03	1.1E-02	3.6E-02	N/A	6.5E-02	N/A	4.0E-02
91252	JP-8	6.12	1.2E-02	1.8E-02	5.3E-02	5.1E-02	5.2E-02	1.0E-01	1.2E-03	2.9E-01
91515	Diesel	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	N/A	0.0E+00	N/A	0.0E+00
91545	Diesel	0.79	5.7E-02	3.2E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90125-1	JP-8	4091.83	8.2E+00	1.2E+01	3.5E+01	3.4E+01	3.5E+01	6.8E+01	8.2E-01	1.9E+02
90125-2	JP-8	4091.83	8.2E+00	1.2E+01	3.5E+01	3.4E+01	3.5E+01	6.8E+01	8.2E-01	1.9E+02
	Total	**8,232.45**	**1.8E+01**	**2.4E+01**	**7.1E+01**	**6.9E+01**	**7.0E+01**	**1.4E+02**	**1.6E+00**	**3.9E+02**

Table 6-4 Potential Emissions from Fuel Storage Tanks

Tank ID	Fuel Type	VOC (lb/yr)	Benzene (lb/yr)	Cumene (lb/yr)	Ethyl Benzene (lb/yr)	Hexane (lb/yr)	Naphthalene (lb/yr)	Toluene (lb/yr)	2,2,4-Trimethyl-pentane (lb/yr)	Xylenes (lb/yr)
1	Diesel	2.20	1.6E-01	8.8E-03	1.5E-02	5.1E-02	N/A	9.0E-02	N/A	5.5E-02
29068-13	Diesel	24.16	1.7E+00	9.7E-02	1.7E-01	5.6E-01	N/A	9.9E-01	N/A	6.0E-01
29068-14	Diesel	24.16	1.7E+00	9.7E-02	1.7E-01	5.6E-01	N/A	9.9E-01	N/A	6.0E-01
29068-13	B-20	5.43	3.9E-01	2.2E-02	3.8E-02	1.2E-01	N/A	2.2E-01	N/A	1.4E-01
29068-14	B-20	5.43	3.9E-01	2.2E-02	3.8E-02	1.2E-01	N/A	2.2E-01	N/A	1.4E-01
90005	Diesel	0.08	5.7E-03	3.1E-04	5.5E-04	1.8E-03	N/A	3.2E-03	N/A	2.0E-03
90036	Diesel	1.42	1.0E-01	5.7E-03	9.9E-03	3.3E-02	N/A	5.8E-02	N/A	3.5E-02
90126	Off Spec	70.52	5.1E+00	2.8E-01	4.9E-01	1.6E+00	N/A	2.9E+00	N/A	1.8E+00
90132	JP-5	47.26	2.9E-01	1.6E-01	1.3E-01	N/A	1.4E-03	5.4E-01	4.7E-03	8.9E-01
90215	Diesel	0.08	5.7E-03	3.1E-04	5.5E-04	1.8E-03	N/A	3.2E-03	N/A	2.0E-03
90705-A	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90705-B	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90705-C	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90705-D	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90711-A	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90711-B	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90717-A	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90717-B	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90717-C	Diesel	0.79	5.7E-02	3.1E-03	5.5E-03	1.8E-02	N/A	3.2E-02	N/A	2.0E-02
90725	Diesel	4.41	3.2E-01	1.8E-02	3.1E-02	1.0E-01	N/A	1.8E-01	N/A	1.1E-01
90761	Diesel	2.83	2.0E-01	1.1E-02	2.0E-02	6.5E-02	N/A	1.2E-01	N/A	7.1E-02
90806-A	Diesel	0.71	5.1E-02	2.8E-03	5.0E-03	1.6E-02	N/A	2.9E-02	N/A	1.8E-02
90806-B	Diesel	0.71	5.1E-02	2.8E-03	5.0E-03	1.6E-02	N/A	2.9E-02	N/A	1.8E-02
90806-C	Diesel	0.71	5.1E-02	2.8E-03	5.0E-03	1.6E-02	N/A	2.9E-02	N/A	1.8E-02
90821-A	Diesel	6.93	5.0E-01	2.8E-02	4.8E-02	1.6E-01	N/A	2.8E-01	N/A	1.7E-01
90827-B	Diesel	26.44	1.9E+00	1.1E-01	1.9E-01	6.1E-01	N/A	1.1E+00	N/A	6.6E-01
90827-A	JP-8	33.55	2.1E-01	1.1E-01	9.1E-02	N/A	1.0E-03	3.8E-01	3.4E-03	6.3E-01
91117	Diesel	4.49	3.2E-01	1.8E-02	3.1E-02	1.0E-01	N/A	1.8E-01	N/A	1.1E-01
91312-A	Diesel	1.42	1.0E-01	5.7E-03	9.9E-03	3.3E-02	N/A	5.8E-02	N/A	3.5E-02
90747	Diesel	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	N/A	0.0E+00	N/A	0.0E+00
91143-A	Diesel	12.43	9.0E-01	5.0E-02	8.7E-02	2.9E-01	N/A	5.1E-01	N/A	3.1E-01
91252	JP-8	30.42	1.9E-01	1.0E-01	8.2E-02	N/A	9.1E-04	3.5E-01	3.0E-03	5.7E-01
91515	Diesel	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	N/A	0.0E+00	N/A	0.0E+00
91545	Diesel	6.22	4.5E-01	2.5E-02	4.4E-02	1.4E-01	N/A	2.5E-01	N/A	1.6E-01
90125-1	JP-8	20,336.40	1.2E+02	6.7E+01	5.5E+01	N/A	6.1E-01	2.3E+02	2.0E+00	3.8E+02
90125-2	JP-8	20,336.40	1.2E+02	6.7E+01	5.5E+01	N/A	6.1E-01	2.3E+02	2.0E+00	3.8E+02
	Total (lb/yr)	**40,991.87**	**2.6E+02**	**1.4E+02**	**1.1E+02**	**4.8E+00**	**1.2E+00**	**4.7E+02**	**4.1E+00**	**7.7E+02**

SECTION 7
FUEL TRANSFER

7.1 Background

For air emission inventory purposes, fuel transfer operations involve the loading of fuel into tanker trucks, into motorized vehicles/equipment, and into bowsers. Although the loading of fuel into storage tanks can also be considered a type of fuel transfer operation, it is not addressed in this section because it is already covered under the "Fuel Storage" and the "Gasoline Service Stations" sections of this report. Likewise, the loading of gasoline into motor vehicles is covered under the "Gasoline Service Stations" section of this report. Loading of fuel into aircraft from a fuel delivery trucks and defueling of aircraft tanks into bowsers and trucks is considered by most states as a mobile emissions source, in that the fuel is being transferred from one mobile source to another mobile source. In the event that the State of Florida classifies these types of transfers as stationary sources, we have included these emissions in the inventory. A summary of the fuel loading operations performed at Hurlburt Field is provided in Table 7-1.

Table 7-1 Summary of 2003 Fuel Transfers

Fuel Type	Transfer Operation	Type of Loading	Fuel Transferred in CY 03 (10^3 gal/yr)
JP-8	Loading fuel into tank trucks at fill stands	Submerged Loading – Dedicated Normal Service	10,199.62
JP-8	Loading fuel into aircraft (flightline)	Submerged Loading - Dedicated Normal Service	10,500.55
JP-8	Transfer from aircraft to tanker trucks (aircraft defueling at flightline)	Submerged Loading - Dedicated Normal Service	909.00
JP-8	Transfer from aircraft to bowsers (aircraft defueling at flightline)	Splash Loading - Dedicated Normal Service	12.14
Diesel	Loading fuel into tanker trucks at fill stand	Submerged Loading - Dedicated Normal Service	226.70
Diesel	Loading fuel into vehicles at the Military Service Stations	Splash Loading - Dedicated Normal Service	135.22
MOGAS	Loading fuel into tanker trucks at fill stand (Bldg 496)	Submerged Loading - Dedicated Normal Service	4.79

The emissions of concern from fuel transfer operations include VOC and individual organic HAP constituents found in the fuel. Applicable Source Classification Codes include the following:

- SCC 4-06-001-31 Petroleum and Solvent Evaporation; Transportation and Marketing of Petroleum Products; Tank Cars and Trucks; Gasoline: Submerged Loading (Normal Services)
- SCC 4-06-001-34 Petroleum and Solvent Evaporation; Transportation and Marketing of Petroleum Products; Tank Cars and Trucks; Kerosene: Submerged Loading (Normal Services)

- SCC 4-06-001-35 Petroleum and Solvent Evaporation; Transportation and Marketing of Petroleum Products; Tank Cars and Trucks; Distillate Oil: Submerged Loading (Normal Services)
- SCC 4-06-001-39 Petroleum and Solvent Evaporation; Transportation and Marketing of Petroleum Products; Tank Cars and Trucks; Kerosene: Splash Loading (Normal Services)
- SCC 4-06-001-40 Petroleum and Solvent Evaporation; Transportation and Marketing of Petroleum Products; Tank Cars and Trucks; Distillate Oil: Splash Loading (Normal Services)

7.2 Emission Calculation Methods

VOC emissions from fuel transfer operations are calculated by the multiplying the amount of fuel loaded into a tank/bowser times the loading loss associated with the tank/bowser:

$$E_{VOC} = F_T * L_L$$

Where,

E_{VOC} = VOC emissions from the transfer of fuel into a tank or bowser (lb/yr)
F_T = Quantity of fuel transferred into the tank or bowser during year (10^3 gal/yr)
L_L = Loading loss associated with the tank or bowser (lb/10^3 gal)

The loading loss (L_L) associated with a tank or bowser is calculated using the following equation:

$$L_L = 12.46 * [(S * P * M)/T]$$

Where,

12.46 = constant
S = Saturation Factor [see Table 7-2 below]
P = True vapor pressure of liquid loaded (psia) [use the temperature of the bulk liquid loaded and Table 7-3 below]
M = Molecular weight of vapors (lb/lb-mole) [see Table 7-3 below]
T = Temperature of bulk liquid loaded (°R) [note: °R equals °F + 460]

The Saturation Factor (S) is dependent on the type of loading into the tank or bowser. Saturation Factors for different types of loading are listed in Table 7-2. For the Temperature (T), a value of 60 °F was used. In regards to the True Vapor Pressure (P) and the Molecular Weight (M) of the fuels, values for various petroleum liquids can be found in reference 1 section 14, Table 14-2 and Table 14-3. *Jet Kerosene* data was used for JP-8 and kerosene, *Distillate Fuel Oil No. 2* data was used for diesel, and *Gasoline (RVP 8)* data was used for MOGAS. Relevant data is provided in Table 7-3. For True Vapor Pressure, values listed at 60° F were used.

Table 7-2 Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses[a]

Mode of Operation	S Factor
Submerged loading of a clean (vapor-free) cargo tank	0.50
Submerged loading: dedicated normal service	0.60
Submerged loading: dedicated vapor balance service	1.00
Splash loading of a clean (vapor-free) cargo tank	1.45
Splash loading: dedicated normal service	1.45
Splash loading: dedicated vapor balance service	1.00

[a] Data is from Section 5.2 of AP-42.

Table 7-3 Properties of Selected Petroleum Liquids[a]

Petroleum Liquid	Vapor Molecular Weight at 60 °F (lb/lb-mole)	Liquid Density at 60 °F (lb/gal)	True Vapor Pressure (psi)						
			40 °F	50 °F	60 °F	70 °F	80 °F	90 °F	100 °F
Jet kerosene[b]	130	7.0	0.0041	0.0060	0.0085	0.011	0.015	0.021	0.029
Distillate fuel No. 2	130	7.1	0.0031	0.0045	0.0074	0.0090	0.012	0.016	0.022
Gasoline (RVP 8)	68	5.6	2.667	3.2973	4.0434	4.9203	5.944	7.1314	8.5006

[a] Data is from Section 7.1 of AP-42.
[b] Jet kerosene data used for both JP-8 and kerosene.

HAP emissions associated with evaporative losses from fuel transfer of a specific fuel are calculated by multiplying the corresponding VOC emissions by the vapor-phase weight fraction (weight percent divided by 100) of each HAP in the fuel. The following equation is used:

$$E_{HAP} = E_{VOC} * (VWP_{HAP}/100)$$

Where,

E_{HAP} = Emissions of a specific HAP (lb/yr)
E_{VOC} = VOC emissions (lb/yr)
VWP_{HAP} = Weight percent of the HAP in the fuel vapor (%)
100 = Factor for converting weight percent into weight fraction

Vapor-phase HAP speciation of JP-8, diesel, and gasoline are found in Appendix A of this report.

Potential emissions from fuel transfer operations are based on permit limitations on the maximum amount of fuel that can be purchased (50,000,000 gallons/year for JP-8 and 1,000,000 gallons/year for Diesel). It should be noted that potential emissions are only calculated from the bulk transfer of JP-8 and Diesel and that aircraft JP-8 defueling is not included, as the quantities are not tracked.

7.3 Sample Calculation

The following is an example calculation for determining actual emissions from the transfer of JP-8 fuel at the fill stands:

Quantity of fuel transferred during the year (10^3 gal/yr): 10,199.62
Saturation Factor (S): 0.60
True vapor pressure of liquid fuel (psia): 0.03
Molecular weight of fuel vapors (lb/lb-mole): 130
Temperature of liquid fuel (°R): 535

The first step is to calculate the Loading Loss (L_L):

$$L_L = 12.46 * [(S * P * M)/T]$$
$$L_L = 12.46 * [(0.60 * 0.03 * 130)/535] = 5.45x\ 10^{-2}\ lb/10^3\ gal$$

The next step is to calculate the VOC emissions:

$$E_{VOC} = F_T * L_L$$
$$E_{VOC} = (10{,}199.62 \times 10^3\ gal/yr) * 5.45x\ 10^{-2}\ lb/10^3\ gal = \mathbf{555.86\ lb/yr}$$

The final step is to calculate the HAP emissions:

$$E_{HAP} = E_{VOC} * (VWP_{HAP}/100)$$
$$E_{Benzene} = 556.86\ lb/yr * (0.20\ \%/100) = \mathbf{1.1x\ 10^0\ lb/yr}$$
$$E_{Cumene} = 556.86\ lb/yr * (0.29\ \%/100) = \mathbf{1.6\ x\ 10^0\ lb/yr}$$
$$E_{EthylBenzene} = 556.86\ lb/yr * (0.86\ \%/100) = \mathbf{4.8\ x\ 10^0\ lb/yr}$$
$$E_{Hexane} = 556.86\ lb/yr * (0.84\ \%/100) = \mathbf{4.7\ x\ 10^0\ lb/yr}$$
$$E_{Napthalene} = 556.86\ lb/yr * (0.85\ \%/100) = \mathbf{2.1\ x\ 10^0\ lb/yr}$$
$$E_{Toluene} = 556.86\ lb/yr * (1.65\ \%/100) = \mathbf{9.2\ x\ 10^0\ lb/yr}$$
$$E_{2,2,4\text{-}Trimethylpentane} = 556.86\ lb/yr * (0.02\ \%/100) = \mathbf{1.1\ x\ 10^{-1}\ lb/yr}$$
$$E_{Xylene} = 556.86\ lb/yr * (4.74\ \%/100) = \mathbf{2.6\ x\ 10^1\ lb/yr}$$

7.4 Emissions Summary

Emissions from fuel transfer operations are provided in Table 7-4, page 7-5.

7.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003), (Section 14), May 1999. AFIOH/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 5.2, January 1995.

3. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 7.1, September 1997.

4. U.S. Environmental Protection Agency, *TANKS* Software Program, Version 4.097.

5. Southwest Research Institute. *JP-8 Volatility Study*, Project No. 03-3148, March 2001

Table 7-4 2003 Emissions from Fuel Transfers

Fuel Transfer Operations	VOC (lb/yr)	Benzene (lb/yr)	Cumene (lb/yr)	Ethyl Benzene (lb/yr)	Hexane (lb/yr)	Methyl tert-butyl ether (lb/yr)	Naphthalene (lb/yr)	Toluene (lb/yr)	2,2,4-Trimethylpentane (lb/yr)	Xylenes (lb/yr)
Loading JP-8 into tank trucks at fill stands	555.86	1.1E+00	1.6E+00	4.8E+00	4.7E+00	N/A	2.1E+00	9.2E+00	1.1E-01	2.6E+01
Loading JP-8 into aircraft (flightline)	572.26	1.1E+00	1.7E+00	4.9E+00	4.8E+00	N/A	2.2E+00	9.4E+00	1.1E-01	2.7E+01
Transfer JP-8 from aircraft to tanker trucks (aircraft defueling at flightline)	49.54	9.9E-02	1.4E-01	4.3E-01	4.2E-01	N/A	1.9E-01	8.2E-01	9.9E-03	2.3E+00
Transfer JP-8 from aircraft to bowsers (aircraft defueling at flightline)	1.60	3.2E-03	4.6E-03	1.4E-02	1.3E-02	N/A	6.1E-03	2.6E-02	3.2E-04	7.6E-02
Loading diesel into tanker trucks at fill stand	3.71	2.7E-01	1.5E-02	2.6E-02	8.5E-02	N/A	N/A	1.5E-01	N/A	9.3E-02
Loading diesel into vehicles at the Military Service Stations	5.34	3.8E-01	2.1E-02	3.7E-02	1.2E-01	N/A	N/A	2.2E-01	N/A	1.3E-01
Loading MOGAS into tanker trucks at fill stand	19.77	1.2E-01	4.0E-03	7.9E-03	9.9E-02	9.1E-01	N/A	1.4E-01	1.4E-01	4.0E-02
Total Emissions	**1,208.07**	**3.1E+00**	**3.5E+00**	**1.0E+01**	**1.0E+01**	**9.1E-01**	**4.5E+00**	**2.0E+01**	**3.7E-01**	**5.6E+01**

N/A = Not Applicable

SECTION 8
GASOLINE STORAGE AND DISPENSING OPERATIONS

8.1 Background

There are seven above ground gasoline storage tanks (ASTs) located throughout Hurlburt Field. Six tanks are horizontal fixed roof tanks with one vaulted horizontal fixed roof tank. The vaulted tank is a masonry-insulated tank that has similar emissions to an underground tank. A summary table of the ASTs used for MOGAS storage and dispensing is provided in Table 8-2 on page 8-4.

There is one government vehicle fueling station at Hurlburt Field. MOGAS (gasoline) is delivered to the facility by a private contractor and then dispensed to individual vehicles at the installation. The tanks are equipped with submerged fill device. MOGAS at the Marina (Building 94222) is delivered by a private contractor and then dispensed to individual boats. The Marina tank is equipped with a submerged fill device. There are five other MOGAS tanks located at various locations at Hurlburt Field. These tanks are all submerged filled with Stage I vapor controls in place during tank filling.

It is important to note that the AAFES service station is not included in this inventory, as it possesses its own permit to operate and is not permitted under Hurlburt Field's air operating permit.

8.2 Emission Calculation Method

Tank emissions were calculated using EPA's TANK program. Dispensing and spillage losses were calculated EPA promulgated methods and emission factors. In the absence of adequate information, assumptions were applied as specified in Section 7.1 of AP-42, Fifth Edition, Supplement A, in order to complete the emissions calculations. The following assumptions were used to calculate tank emissions:

- Tank shell color/shade and condition were assumed to be light gray and good, respectively.
- Vacuum and pressure settings were defaulted to –0.03 and 0.03 psig, respectively.
- Emissions from the convault tank are similar to underground storage tank emissions.

The following equations are used to calculate the VOC emissions:

$E_{VOC\text{-}Total}$ = $E_{VOC\text{-}Fill} + E_{VOC\text{-}B\&E} + E_{VOC\text{-}VD} + E_{VOC\text{-}S}$
$E_{VOC\text{-}Fill}$ = EPA TANKS program output
$E_{VOC\text{-}B\&E}$ = EPA TANKS program output
$E_{VOC\text{-}VD}$ = GD * $EF_{VOC\text{-}VD}$
$E_{VOC\text{-}S}$ = GD * $EF_{VOC\text{-}S}$

Where,

$E_{VOC\text{-}Total}$ = Total VOC emissions from a gasoline service station (lb/yr)

$E_{VOC\text{-}Fill}$ = VOC emissions associated with filling of the storage tanks (lb/yr)
$E_{VOC\text{-}B\&E}$ = VOC emissions associated with breathing and emptying losses from the storage tanks (lb/yr)
$E_{VOC\text{-}VD}$ = VOC emissions associated with vapor displacement from vehicle tanks during refueling (lb/yr)
$E_{VOC\text{-}S}$ = VOC emissions associated with spillage during vehicle refueling (lb/yr)
GD = Quantity of gasoline dispensed (10^3 gal/yr)
$EF_{VOC\text{-}Fill}$ = VOC emission factor associated with filling of the storage tanks (lb/10^3 gal)
$EF_{VOC\text{-}B\&E}$ = VOC emission factor associated with breathing and emptying losses from the storage tanks (lb/10^3 gal)
$EF_{VOC\text{-}VD}$ = VOC emission factor associated with vapor displacement from vehicle tanks during refueling (lb/10^3 gal)
$EF_{VOC\text{-}S}$ = VOC emission factor associated with spillage during vehicle refueling (lb/10^3 gal)

Table 8-1 VOC Emission Factors for Gasoline Service Stations

Emission Source	**VOC Emission Factor (lb/10^3 gal)**
Filling storage tank	
Submerged filling	7.3
Splash filling	11.5
Balanced submerged filling (Stage I controls)	0.3
Underground storage tank breathing and emptying	1.0
Vehicle refueling operations	
Displacement losses (uncontrolled)	11.0
Displacement losses (Stage II controls)	1.1
Spillage	0.7

HAP emissions associated with gasoline vehicle refueling are calculated by using both the vapor-phase and the liquid-phase speciation of the gasoline. The vapor-phase speciation is used to calculate the HAP emissions associated with the tanks (both the storage tanks and vehicle tanks), while the liquid-phase speciation is used to calculate emissions associated with spillage losses. The following equations are used:

$$E_{HAP\text{-}Total} = E_{HAP\text{-}Tanks} + E_{HAP\text{-}S}$$
$$E_{HAP\text{-}Tanks} = (E_{VOC\text{-}B\&E} + E_{VOC\text{-}Fill} + E_{VOC\text{-}VD}) * (\%HAP_{vapor}/100)$$
$$E_{HAP\text{-}S} = E_{VOC\text{-}S} * (\%HAP_{liquid}/100)$$

Where,

$E_{HAP\text{-}Total}$ = Total emissions of a HAP from vehicle refueling (lb/10^3 gal)
$E_{HAP\text{-}Tanks}$ = Emissions of the HAP from the storage tanks and vehicle tanks (lb/10^3 gal)
$E_{HAP\text{-}S}$ = Emissions of the HAP from gasoline spillage during vehicle refueling (lb/10^3 gal)
$\%HAP_{vapor}$ = Weight percent of the HAP constituent in the fuel vapor
$\%HAP_{liquid}$ = Weight percent of the HAP constituent in the liquid fuel

Vapor-phase and liquid-phase speciation of gasoline can be found in Appendix A of this report.

8.3 Sample Calculations

The following is an example calculation for determining actual emissions from tank 29064-11 operated at Building 29064:

The first step is to calculate the VOC emissions:

$E_{VOC\text{-}Total} = E_{VOC\text{-}Fill} + E_{VOC\text{-}B\&E} + E_{VOC\text{-}VD} + E_{VOC\text{-}S}$
$E_{VOC\text{-}Total} = [GD * EF_{VOC\text{-}Fill}] + [GD * EF_{VOC\text{-}B\&E}] + [GD * EF_{VOC\text{-}VD}] + [GD * EF_{VOC\text{-}S}]$
$E_{VOC\text{-}Total} = [(156.69 \times 10^3 \text{ gal/yr}) * (0.3 \text{ lb}/10^3 \text{ gal})] +$
$[(156.69 \times 10^3 \text{ gal/yr}) * (1.0 \text{ lb}/10^3 \text{ gal})] +$
$[(156.69 \times 10^3 \text{ gal/yr}) * (11.0 \text{ lb}/10^3 \text{ gal})] +$
$[(156.69 \times 10^3 \text{ gal/yr}) * (0.7 \text{ lb}/10^3 \text{ gal})] =$
47.01 lb/yr + 156.69 lb/yr + 1,723.55 lb/yr + 109.68 lb/yr =
2,036.92 lb/yr

The next step is to calculate the HAP emissions:

$E_{HAP\text{-}Total} = E_{HAP\text{-}Tanks} + E_{HAP\text{-}S}$
$E_{HAP\text{-}Total} = [E_{VOC\text{-}Tanks} * (\%HAP_{vapor}/100)] + [E_{VOC\text{-}S} * (\%HAP_{liquid}/100)]$
$E_{Benzene} = [(47.01 \text{ lb/yr} + 156.69 \text{ lb/yr} + 1{,}723.55 \text{ lb/yr}) * (0.6\%/100)] +$
$[109.68 \text{ lb/yr} * (1.8\%/100)] = \mathbf{1.4 \times 10^1 \text{ lb/yr}}$
$E_{Cumene} = [1{,}927.25 \text{ lb/yr} * (0.02\%/100)] + [109.68 \text{ lb/yr} * (0.5\%/100)] = \mathbf{9.3 \times 10^{-1} \text{ lb/yr}}$
$E_{Ethylbenzene} = [1{,}927.25 \text{ lb/yr} * (0.04\%/100)] + [109.68 \text{ lb/yr} * (1.4\%/100)] = \mathbf{2.3 \times 10^0 \text{ lb/yr}}$
$E_{Hexane} = [1{,}927.25 \text{ lb/yr} * (0.50\%/100)] + [109.68 \text{ lb/yr} * (1.0\%/100)] = \mathbf{1.1 \times 10^1 \text{ lb/yr}}$
$E_{Methyl\ tert\text{-}butyl\ ether} = [1{,}927.25 \text{ lb/yr} * (4.60\%/100)] + [109.68 \text{ lb/yr} * (4.5\%/100)] = \mathbf{9.4 \times 10^1 \text{ lb/yr}}$
$E_{Naphthalene} = [1{,}927.25 \text{ lb/yr} * (0.00\%/100)] + [109.68 \text{ lb/yr} * (0.3\%/100)] = \mathbf{3.3 \times 10^{-1} \text{ lb/yr}}$
$E_{Toluene} = [1{,}927.25 \text{ lb/yr} * (0.70\%/100)] + [109.68 \text{ lb/yr} * (7.0\%/100)] = \mathbf{2.1 \times 10^1 \text{ lb/yr}}$
$E_{2,2,4\text{-}Trimethylpentane} = [1{,}927.25 \text{ lb/yr} * (0.70\%/100)] + [109.68 \text{ lb/yr} * (4.0\%/100)] = \mathbf{1.8 \times 10^1 \text{ lb/yr}}$
$E_{Xylenes} = [1{,}927.25 \text{ lb/yr} * (0.20\%/100)] + [109.68 \text{ lb/yr} * (7.0\%/100)] = \mathbf{1.2 \times 10^1 \text{ lb/yr}}$

8.4 Emissions Summary

The actual MOGAS VOC and HAP emissions are shown in Tables 8-3 and 8-4 on page 8-5.

8.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003), (Section 15) May 1999. AFIOH/RSEQ, Brooks AFB TX.

2. U.S. EPA, Storage Tanks Emission Calculation Software (Tanks), Version 4.097.

Table 8-2 Summary of Gasoline ASTs

Tank ID	Bldg No.	Tank Type	Fill Method	Length (ft)	Diameter (ft)	Tank Volume (gal)	CY 03 Throughput (gal/yr)	Tank Color/ Shade	Tank Condition	Current Status	Date of Status
29064-11	29064	Horizontal Fixed Roof	Submerged Fill	30.25	8	12,000	156,686	Tan	Good	Active	All of 2003
29064-12	29064	Horizontal Fixed Roof	Submerged Fill	30.25	8	12,000	156,686	Tan	Good	Active	All of 2003
90827-C	90827	Horizontal Fixed Roof	Submerged Fill	9.25	5.42	1,500	1,500	Tan	Good	Active	All of 2003
91143-B	91143	Horizontal Fixed Roof	Submerged Fill	12.25	5.33	2,000	19,064	Tan	Good	Active	All of 2003
91301	91301	*Convault Horizontal Tank	Submerged Fill	11	5.67	1000	1000	Tan	Good	Active	All of 2003
91312-B	91312	Horizontal Fixed Roof	Submerged Fill	6.25	3.67	500	1,820	Tan	Good	Active	All of 2003
92422	92422	Horizontal Fixed Roof	Submerged Fill	15.42	5.92	3000	3000	Tan	Good	Active	All of 2003

* Tank is vaulted and emission are similar to underground tanks.

Table 8-3 2003 VOC Emissions from Gasoline ASTs

Tank Number	Throughput (10^3 gal/yr)	Filling Losses (lb/yr)	Breathing Losses (lb/yr)	Displacement Losses (lb/yr)	Spillage Losses (lb/yr)	Total Losses (lb/yr)
29064-11	156.69	1,688.80	3,691.47	1,723.55	109.68	7,213.50
29064-12	156.69	1,688.80	3,691.47	1,723.55	109.68	7,213.50
90827-C	1.50	16.17	640.52	16.50	1.05	674.24
91143-B	19.06	205.48	827.13	209.70	13.34	1,255.66
91301	1.00	9.34	0.00	11.00	0.70	21.04
91312-B	1.82	19.62	236.29	20.02	1.27	277.20
92422	3.00	32.33	1,218.09	33.00	2.10	1,285.52
					Total (lb/yr)	**17,940.66**

Table 8-4 2003 HAP Emissions from Gasoline ASTs

Tank Number	Total VOC Emissions	Benzene (lb/yr)	Cumene (lb/yr)	Ethyl Benzene (lb/yr)	Hexane (lb/yr)	Metyl Tert-Butyl Ether (lb/yr)	Naphthalene (lb/yr)	Toluene (lb/yr)	2,2,4 Trimethyl pentane (lb/yr)	Xylene (lb/yr)
29064-11	7,213.50	1.4E+01	9.3E-01	2.3E+00	1.1E+01	9.4E+01	3.3E-01	2.1E+01	1.8E+01	1.2E+01
29064-12	7,213.50	1.4E+01	9.3E-01	2.3E+00	1.1E+01	9.4E+01	3.3E-01	2.1E+01	1.8E+01	1.2E+01
90827-C	674.24	1.3E-01	8.9E-03	2.2E-02	1.0E-01	9.0E-01	3.2E-03	2.0E-01	1.7E-01	1.1E-01
91143-B	1,255.66	1.6E+00	1.1E-01	2.8E-01	1.3E+00	1.1E+01	4.0E-02	2.6E+00	2.2E+00	1.4E+00
91301.00	21.04	8.6E-02	6.0E-03	1.5E-02	6.9E-02	6.0E-01	2.1E-03	1.4E-01	1.1E-01	7.4E-02
91312-B	277.20	1.6E-01	1.1E-02	2.7E-02	1.2E-01	1.1E+00	3.8E-03	2.5E-01	2.1E-01	1.3E-01
92422	1,285.52	2.6E-01	1.8E-02	4.4E-02	2.1E-01	1.8E+00	6.3E-03	4.1E-01	3.4E-01	2.2E-01
	17,940.66	**2.9E+01**	**2.0E+00**	**5.0E+00**	**2.3E+01**	**2.0E+02**	**7.1E-01**	**4.6E+01**	**3.9E+01**	**2.5E+01**

Filling, Breathing, and Displacement Losses are calculated using the vapor-phase HAP speciation

Spillage Losses are calculated using the liquid-phase HAP speciation

SECTION 9
LABORATORY CHEMICALS

9.1 Background

Laboratory activities are conducted in the Fuels Lab to ensure that fuel properties meet proper requirements. Lab testing is performed under a laboratory hood to minimize excess emissions of VOC and HAP pollutants. A summary describing these operations can be found below. Activities that had no significant emissions of regulated pollutants in calendar year 2003 are not addressed, such as the Dental laboratories.

16 LRS/LGRFIL Fuels Lab (Building 90133). Fuel analyses are conducted within enclosed laboratory hoods that are not equipped with control devices. Emissions include VOCs; no HAPs are emitted from these activities.

9.2 Emissions Calculation Methods

Activity supervisors familiar with the processes provided chemical usage information, which was supplemented by review of the activities' EMIS authorization listings and Forms 2761. Manufacturers' MSDS sheets, product labels, and Forms 2761 were used to identify regulated constituents and physical/chemical properties. Calculation of VOC and HAP emissions were determined by multiplying the total quantity used by the weight percent of VOC and HAPs in the material. The density of the material in pounds per gallon was used to convert from gallons to pounds. The actual quantification of laboratory emissions is difficult because of the manner in which the chemicals are used. Professional research on this issue by independent universities has resulted in an emission factor of 13% (by weight) for typical laboratory processes. The following equation was used to determine VOC and volatile HAP emissions:

$$E_{pol} = QC * D * 0.13 * (WP/100)$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
QC = Quantity of a particular chemical/reagent used (gal/yr)
D = Density of the chemical/reagent (lb/gal)
0.13 = Emission factor (unitless)
WP = Weight percent of regulated pollutant in the chemical/reagent (%)
100 = Factor for converting weight percent to weight fraction

9.3 Sample Calculation

The following is an example calculation for determining actual VOC emissions associated with the use of petroleum ether at the fuels laboratory:

$$E_{pol} = QC * D * 0.13 * (WP/100)$$

E_{VOC} = 19.5 gal/yr * 5.36 lb/gal * 0.13 * (100%/100) = **13.59 lb/yr**

9.4 Emissions Summary

Actual emissions from miscellaneous chemicals are provided in Table 9-1 below.

Table 9-1 2003 Emissions from Lab Chemicals

Laboratory	Chemical	Usage (gal/yr)	VOC Emissions (lb/yr)
Fuels Lab	Petroleum Ether	19.5	13.59
	Isopropyl Alcohol	2.0	1.7
	Total Emissions		**15.29**

9.5 Reference

U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 18), May 1999. AFIOH/RSEQ, Brooks AFB TX.

SECTION 10
LANDFILL EMISSIONS

10.1 Background

Hurlburt Field has eight closed landfills where various wastes, including: POL, solvents, domestic wastes, treatment plant sludges, tires, and construction debris were disposed. The landfills range in size from 1.19 to 13.29 acres. The landfills were closed between 1958 and 1979.

A summary of the landfills is provided in Table 10-1.

Table 10-1 Landfills

Landfill ID	LF-13	LF-14	LF-15	LF-16
Landfill Status	Closed	Closed	Closed	Closed
Date Closed	1979	1968	1966	1964
Date Open	1972	1966	1964	1962
Size (Acres)	13.29	10.26	4.07	6.83
Assumed Depth (ft)	4	4	4	4
Material Disposed	POL, solvents, pesticides, PCBs	Putrescible garbage, waste treatment sludge	Tires, wood, steel	Waste treatment sludge, municipal garbage, construction debris
Site Description	Trench and fill	No description	Trench and fill	Trench and fill
Landfill ID	LF-17	LF-18	LF-19	LF-20
Landfill Status	Closed	Closed	Closed	Closed
Date Closed	1958	1960	1962	1972
Date Open	1956	1958	1960	1968
Size (Acres)	1.19	2.85	7.32	2.96
Assumed Depth (ft)	4	4	4	4
Material Disposed	Municipal garbage, hardfill materials, drums	Construction debris, empty drums	Municipal garbage	Municipal wastes, automotive parts, drummed material
Site Description	No description	Trench and fill	Trench and fill	Trench and fill

10.2 Emissions Calculation Method

VOC and HAP emissions from the Hurlburt Field landfills were estimated using EPA's Landfill Air Emissions Model (LAEM), Windows version 2.01. The LAEM is an emissions screening tool that uses a simple first-order decay equation to estimate VOC, HAP, and ozone depleting substances. Limited availability of data prevented use of a more sophisticated calculation method. The LAEM was used with site-specific data provided by personnel at Hurlburt Field concerning rates of acceptance, quantity in place, and waste collection rates. Default AP-42 values were used for methane generation rates (0.02/year), methane generation potential (100 m^3/Mg of refuse), and the pollutant concentration in the landfill gas (varies by pollutant).

For this report, an average depth of 20 feet was assumed for each landfill. Surface areas of the landfills were given from maps included in the *2002 Management Action Plan, Hurlburt Field*., however, no landfill depths were given.

10.3 Emissions Summary

Emissions for each landfill and pollutant are provided in Table 10-2 on page 10-3. It is important to note that complete delineation for each landfill was not provided. With better landfill data, the volume of waste in each landfill could change drastically. It is important to note that NMOC totals were used for total VOC emissions.

10.4 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 19), May 1999. AFIERA/RSEQ, Brooks AFB, TX.

2. EPA's Landfill Air Emissions Model, Version 2.01, August 2002.

Table 10-2 2003 Emissions from Landfills

Landfill ID	Pollutant Classification	LF-13	LF-14	LF-15	LF-16	LF-17	LF-18	LF-19	LF-20	Total (Mg/yr)	Total (lb/yr)
Methane		3.9E+01	1.4E+01	5.1E+00	1.2E+01	2.2E+00	2.8E+00	1.2E+01	6.9E+00	**9.3E+01**	**206,110.2**
Carbon Dioxide		1.1E+02	3.8E+01	1.4E+01	3.3E+01	6.1E+00	7.7E+00	3.3E+01	1.9E+01	**2.6E+02**	**565,426.3**
NMOC		2.5E-01	8.9E-02	3.2E-02	7.7E-02	9.6E-02	1.8E-02	7.6E-02	4.4E-02	**6.8E-01**	**1,498.0**
1,1,1-Trichloroethane	VOC	3.1E-04	1.1E-04	4.0E-05	9.6E-05	1.8E-05	2.2E-05	9.5E-05	5.5E-05	**7.5E-04**	**1.6E+00**
1,1,2,2-Tetrachloroethane	HAP/VOC	9.0E-04	3.2E-04	1.2E-04	2.8E-04	5.2E-05	6.5E-05	2.8E-04	1.6E-04	**2.2E-03**	**4.8E+00**
1,1,2-Trichloroethane	HAP/VOC	6.4E-05	2.3E-05	8.4E-06	2.0E-05	3.7E-06	4.6E-06	2.0E-05	1.1E-05	**1.6E-04**	**3.4E-01**
1,1-Dichloroethane	HAP/VOC	1.1E-03	4.0E-04	1.5E-04	3.5E-04	6.5E-05	8.1E-05	3.5E-04	2.0E-04	**2.7E-03**	**6.0E+00**
1,1-Dichloroethene	HAP/VOC	9.4E-05	3.3E-05	1.2E-05	2.9E-05	5.4E-06	6.8E-06	2.9E-05	1.7E-05	**2.3E-04**	**5.0E-01**
1,2-Dichloroethane	HAP/VOC	2.0E-04	7.0E-05	2.6E-05	6.1E-05	1.1E-05	1.4E-05	6.0E-05	3.5E-05	**4.7E-04**	**1.0E+00**
1,2-Dichloropropane	HAP/VOC	9.8E-05	3.5E-05	1.3E-05	3.0E-05	5.7E-06	7.1E-06	3.0E-05	1.8E-05	**2.4E-04**	**5.2E-01**
2-Propanol	VOC	1.5E-02	5.2E-03	1.9E-03	4.5E-03	8.4E-04	1.0E-03	4.5E-03	2.6E-03	**3.5E-02**	**7.7E+01**
Acetone		2.0E-03	7.0E-04	2.6E-04	6.1E-04	1.1E-04	1.4E-04	6.0E-04	3.5E-04	**4.7E-03**	**1.0E+01**
Acrylonitrile	HAP/VOC	1.6E-03	5.8E-04	2.1E-04	5.0E-04	9.4E-05	1.2E-04	5.0E-04	2.9E-04	**3.9E-03**	**8.6E+00**
Benzene	HAP/VOC	7.2E-04	2.6E-04	9.4E-05	2.2E-04	4.2E-05	5.2E-05	2.2E-04	1.3E-04	**1.7E-03**	**3.8E+00**
Bromodichloromethane	VOC	2.5E-03	8.9E-04	3.2E-04	7.7E-04	1.4E-04	1.8E-04	7.6E-04	4.4E-04	**6.0E-03**	**1.3E+01**
Butane	VOC	1.4E-03	5.0E-04	1.8E-04	4.4E-04	8.1E-05	1.0E-04	4.3E-04	2.5E-04	**3.4E-03**	**7.5E+00**
Carbon Disulfide	HAP/VOC	2.1E-04	7.6E-05	2.8E-05	6.6E-05	1.2E-05	1.5E-05	6.6E-05	3.8E-05	**5.1E-04**	**1.1E+00**
Carbon Monoxide		1.9E-02	6.8E-03	2.5E-03	5.9E-03	1.1E-03	1.4E-03	5.9E-03	3.4E-03	**4.6E-02**	**1.0E+02**
Carbon Tetrachloride	HAP/VOC	3.0E-06	1.1E-06	3.9E-07	9.2E-07	1.7E-07	2.1E-07	9.1E-07	5.3E-07	**7.2E-06**	**1.6E-02**
Carbonyl Sulfide	HAP/VOC	1.4E-04	5.1E-05	1.9E-05	4.4E-05	8.2E-06	1.0E-05	4.4E-05	2.5E-05	**3.4E-04**	**7.6E-01**
Chlorobenzene	HAP/VOC	1.4E-04	4.9E-05	1.8E-05	4.2E-05	7.8E-06	9.8E-06	4.2E-05	2.4E-05	**3.3E-04**	**7.2E-01**
Chlorodifluoromethane	VOC	5.4E-04	1.9E-04	7.1E-05	1.7E-04	3.1E-05	3.9E-05	1.7E-04	9.7E-05	**1.3E-03**	**2.9E+00**
Chloroethane	HAP/VOC	3.9E-04	1.4E-04	5.1E-05	1.2E-04	2.2E-05	2.8E-05	1.2E-04	6.9E-05	**9.4E-04**	**2.1E+00**
Chloroform	HAP/VOC	1.4E-05	4.9E-06	1.8E-06	4.3E-06	8.0E-07	1.0E-06	4.3E-06	2.5E-06	**3.3E-05**	**7.4E-02**
Chloromethane	HAP/VOC	2.9E-04	1.1E-04	3.9E-05	9.2E-05	1.7E-05	2.1E-05	9.1E-05	5.3E-05	**7.1E-04**	**1.6E+00**
Dichlorobenzene	HAP/VOC	1.5E-04	5.3E-05	2.0E-05	4.6E-05	8.6E-06	1.1E-05	4.6E-05	2.7E-05	**3.6E-04**	**7.9E-01**
Dichlorodifluoromethane	VOC	9.2E-03	3.3E-03	1.2E-03	2.8E-03	5.3E-04	6.6E-04	2.8E-03	1.6E-03	**2.2E-02**	**4.9E+01**
Dichlorofluoromethane	VOC	1.3E-03	4.7E-04	1.7E-04	4.0E-04	7.5E-05	9.4E-05	4.0E-04	2.3E-04	**3.1E-03**	**6.9E+00**
Dichloromethane	HAP	5.9E-03	2.1E-03	7.7E-04	1.8E-03	3.4E-04	4.2E-04	1.8E-03	1.0E-03	**1.4E-02**	**3.1E+01**
Dimethyl Sulfide	VOC	2.3E-03	8.4E-04	3.1E-04	7.3E-04	1.4E-04	1.7E-04	7.2E-04	4.2E-04	**5.7E-03**	**1.2E+01**
Ethane		1.3E-01	4.6E-02	1.7E-02	4.0E-02	7.4E-03	9.3E-03	4.0E-02	2.3E-02	**3.1E-01**	**6.9E+02**
Ethanol	VOC	6.1E-03	2.2E-03	7.9E-04	1.9E-03	3.5E-04	4.4E-04	1.9E-03	1.1E-03	**1.5E-02**	**3.2E+01**
Ehtylbenzene	HAP/VOC	2.4E-03	8.5E-04	3.1E-04	7.3E-04	1.4E-04	1.7E-04	7.3E-04	4.2E-04	**5.7E-03**	**1.3E+01**
Ethylene Dibromide	HAP/VOC	9.1E-07	3.2E-07	1.2E-07	2.8E-07	5.2E-08	6.5E-08	2.8E-07	1.6E-07	**2.2E-06**	**4.8E-03**
Ethyl Mercaptan	VOC	3.7E-04	1.3E-04	4.9E-05	1.2E-04	2.2E-05	2.7E-05	1.2E-04	6.7E-05	**9.1E-04**	**2.0E+00**
Fluorotrichloromethane	VOC	5.0E-04	1.8E-04	6.6E-05	1.6E-04	2.9E-05	3.6E-05	1.5E-04	9.0E-05	**1.2E-03**	**2.7E+00**
Hexane	HAP/VOC	2.7E-03	9.8E-04	3.6E-04	8.5E-04	1.6E-04	2.0E-04	8.4E-04	4.9E-04	**6.6E-03**	**1.5E+01**
Hydrogen Sulfide		5.8E-03	2.1E-03	7.6E-04	1.8E-03	3.4E-04	4.2E-04	1.8E-03	1.0E-03	**1.4E-02**	**3.1E+01**
Mercury	HAP	2.5E-07	8.8E-08	3.2E-08	7.6E-08	1.4E-08	1.8E-08	7.5E-08	4.4E-08	**5.9E-07**	**1.3E-03**
Methyl Ethyl Ketone	HAP/VOC	2.5E-03	8.8E-04	3.2E-04	7.7E-04	1.4E-04	1.8E-04	7.6E-04	4.4E-04	**6.0E-03**	**1.3E+01**
Methyl Isoutyl Ketone	HAP/VOC	9.0E-04	3.2E-04	1.2E-04	2.8E-04	5.2E-05	6.5E-05	2.8E-04	1.6E-04	**2.2E-03**	**4.8E+00**
Methyl Mercaptan	VOC	5.8E-04	2.1E-04	7.6E-05	1.8E-04	3.3E-05	4.2E-05	1.8E-04	1.0E-04	**1.4E-03**	**3.1E+00**
Pentane	VOC	1.1E-03	4.1E-04	1.5E-04	3.6E-04	6.6E-05	8.3E-05	3.5E-04	2.0E-04	**2.8E-03**	**6.1E+00**
Perchloroethylene	HAP/VOC	3.0E-03	1.1E-03	3.9E-04	9.3E-04	1.7E-04	2.2E-04	9.2E-04	5.3E-04	**7.2E-03**	**1.6E+01**
Propane	VOC	2.4E-03	8.5E-04	3.1E-04	7.3E-04	1.4E-04	1.7E-04	7.3E-04	4.2E-04	**5.7E-03**	**1.3E+01**
Toluene	HAP/VOC	1.7E-02	6.3E-03	2.3E-03	5.4E-03	1.0E-03	1.3E-03	5.4E-03	3.1E-03	**4.2E-02**	**9.3E+01**
Trichloroethene	HAP/VOC	1.8E-03	6.4E-04	2.3E-04	5.6E-04	1.0E-04	1.3E-04	5.5E-04	3.2E-04	**4.3E-03**	**9.5E+00**
t-1,2-Dichloroethene		1.3E-03	4.8E-04	1.7E-04	4.1E-04	7.7E-05	9.6E-05	4.1E-04	2.4E-04	**3.2E-03**	**7.1E+00**
Vinyl Chloride	HAP/VOC	2.2E-03	7.9E-04	2.9E-04	6.9E-04	1.3E-04	1.6E-04	6.8E-04	3.9E-04	**5.3E-03**	**1.2E+01**
Xylene	HAP/VOC	6.2E-03	2.2E-03	8.1E-04	1.9E-03	3.6E-04	4.5E-04	1.9E-03	1.1E-03	**1.5E-02**	**3.3E+01**

SECTION 11
MISCELLANEOUS CHEMICALS

11.1 Background

Miscellaneous chemicals include all volatile chemicals used on base except the following chemical items which are addressed under other sections of this report: laboratory chemicals, chemicals used inside a paint booth, architectural coatings, and solvent cleaning tanks.

The pollutants of concern from miscellaneous chemical usage include VOC and organic HAPs. These pollutants are generated from the evaporation of the solvent portion of the chemicals.

Summary information on the various miscellaneous chemicals used at Hurlburt Field in 2003 is provided in Table 11-1, beginning on page 11-3. This information includes the applicable shop office symbol, the chemical name, chemical stock number, a representative manufacturer, estimated quantity used in 2003, density, VOC content, and HAPs content (if applicable).

Chemical usage information at Hurlburt Field was obtained from the Environmental Management Information System (EMIS) chemical usage listings for each applicable shop. It's important to note that only chemicals listed in EMIS are addressed in this section. Chemicals purchased using the International Merchant Purchase Authorization Card (IMPAC) may not be included.

Specific information on each chemical product (e.g., specific gravity or density, VOC content, organic HAP content, etc.) was obtained either directly from Material Safety Data Sheets (MSDSs) or derived from information in the MSDSs. AFIOH/RSEQ obtained most MSDSs from either the DoD Hazardous Material Information System (HMIS), the University of Vermont's MSDS Internet site, or from the manufacturer. In many cases the VOC content of the chemical product was not listed on the MSDS. Therefore, the VOC content for these products was estimated by identifying all ingredients that meet the definition of VOC (found in 40 CFR 51.100) and then summing up their weight percents.

Although there are many Source Classification Codes which apply to "Miscellaneous Chemicals," the one which best describes the source category is as follows:

- SCC 4-01-888-99 Petroleum and Solvent Evaporation; Organic Solvent Evaporation; Fugitive Emissions

11.2 Emissions Calculation Methods

VOC and organic HAP emissions associated with miscellaneous chemical usage are calculated using a mass balance approach in which it is assumed the entire solvent portion of a coating evaporates. The following equation is used:

$$E_{pol} = VC * D * (WP/100)$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr) [note: pollutant must be VOC or an organic HAP]
VC = Volume of chemical used (gal/yr)
D = Density of the chemical (lb/gal)
WP = Weight percent of the pollutant in the chemical (%)
100 = Factor for converting "percent" into a fraction

11.3 Sample Calculations

The following is an example calculation for determining actual emissions from the use of Fel-Pro Chemical Products Gasket Adhesive by the 16 CRS/LGMP.

Quantity of chemical used in 2003: 0.1875 gal
Chemical Density: 6.58 lb/gal
VOC and organic HAP weight percents: VOC (80%), Methyl Ethyl Ketone (60%)

E_{pol} = VC * D * (WP/100)
E_{VOC} = 0.1875 gal/yr * 6.58 lb/gal * (80%/100) = **0.987 lb/yr**
E_{MEK} = 0.1875 gal/yr * 6.58 lb/gal * (60%/100) = **0.740 lb/yr**

11.4 Emissions Summary

Emissions from miscellaneous chemicals are provided in Table 11-2, beginning on page 11-8.

11.5 Reference

U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 20), May 1999. AFIOH/RSEQ, Brooks AFB TX.

Table 11-1 2003 Summary of Miscellaneous Chemicals Used

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
801000092146	Orange Fluourescent Spray, 1954 830	Rust-Oleum Corp	16 LRS/LGS	0.88	7.48	15.00														5.00	5.00	
803000087207	Sealing Compound	Pre-Desoto Intl.,Inc.	16 EMS/ LGMFE	1.66	15.00	12.04	25.00						40.00							10.00		
1430012056877	Falcon Dust-off XL, Model DPNXL, DYMEL 134A	Falcon Safety Products	16 EMS/LGMJ	3.19	10.91	99.00																
1430012056877	Perfect Duster II	Perfect Data Corp	16 HGS/LGMJT	9.47	9.95	99.00																
1430012056877	Falcon Dust-Off XL, Model DPNXL, DYMEL 134 A	Falcon Safety Products Inc	16 LRS/LGS	12.00	9.95	99.00																
3439000695815	611 Mildly Activated Rosin Flux	R&D Metals & Chemical Inc	16 EMS/LGMG	0.25	7.50	60.00																
3439013737966	RMA 201 Paste Flux	R & D Metals & Chemicals Inc	16 HGS/LGMJT	0.06	8.33	45.00																
6810002056786	E-Z Denatured Solvent Alcohol	E.E. Zimmerman Company	16 EMS/LGMMW	1.00	6.75	99.00								57.00								
6810002056786	E-Z Denatured Solvent Alcohol	LHB Industries	16 EMS/LGMWPE	1.00	6.79	99.00								57.00								
6810002270410	Isopropanol 99%	Aaper Alcohol & Chemical Co	16 EMS/LGMJ	60.00	6.56	99.00																
6810002270410	Isopropanol 99%	Aaper Alcohol & Chemical Co	16 EMS/LGMR	2.00	6.56	99.00																
6810002270410	Isopropanol 99%	Aaper Alcohol and Chemical Co	16 HGS/DART	24.00	6.56	99.00																
6810002270410	Isopropanol 99%	Aaper Alcohol and Chemical Co	16 HMXS/MXAGW	4.00	6.56	99.00																
6810002270410	Isopropanol 99%	Aaper Alcohol and Chemical Co	16 MOS/LG	4.00	6.56	99.00																
6810005437415	Spec Dentured Ethyl Alcohol	Grain Processing Corp	16 EMS/LGMMW	1.00	6.91	99.00																
6810005437415	Specially Denatured Alcohol	Aaper Alcohol and Chemical Co	16 LRS/LGTM	10.00	6.79	92.80								4.70								
6810005843079	Petroleum Ether, ACS	Van Waters and Rogers	16 LRS/LGSFI	42.00	5.33	99.00					0.20											
6810008556160	Isopropanol 99%	Pharmco Products Inc	16 HGS/DART	60.00	6.58	99.00																
6810008556160	Isopropanol 99%	Pharmco Products Inc	16 HGS/LGMJT	25.00	6.54	99.00																
6830005843041	LP-175-005G Turner Tornado	Cooper Group/Turner Div	16 LRS/LGTM	0.33	4.25	98.75																
6850001817594	EZE 429	Space Chemical Inc	16 HGS/LGMJT	10.00	7.91	50.00																
6850002246663	Rifle Bore Cleaner	International Lubricates Inc	16 HMXS/MXAGW	1.00	7.00	5.00																
6850003630841	LPS 3 Heavy Duty Rust Inhibitor	LPS Laboratories Inc	16 HGS/DART	2.00	6.91	70.00																
6850009262275	So Sure Windshield Cleaner	LHB Industries	16 EMS/LGMG	9.00	7.33	49.29								72.68								
6850010150834	51-5-118 Tiotech Blue Toolmakers Ink	Tioga Coating Corporation	16 HGS/DART	0.50	7.14	35.00											2.50			20.00	2.50	
6850012110986	EB-1 Engine Brite Heavy Duty Engine Cleaner	Radiator Specialty Co	16 LRS/LGTM	11.44	1.20	2.00				2.00												
6850012788273	Heavy Duty Engine Cleaner	Radiator Specialty Co	16 LRS/LGTM	1.50	7.16	10.00				1.00												
6850013718048	365-1, Electron (A)	Ecolink Inc	16 EMS/LGMG	3.00	6.75	98.77																

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
6850013949514	Tuner Renu 2000	Chemtronics Inc	16 HGS/LGMJT	0.66	13.08	73.50																
6850014649152	Fleet Charge Antifreeze & Coolant	Old World Ind Inc	16 EMS/LGMG	110.00	9.33	95.00			95.00													
6850014649152	Fleet Charge Antifreeze & Coolant	Leader Automotive	16 LRS/LGTM	110.00	9.33	92.50			92.50													
7510004199564	Stencil Ink White	LHB Industries	16 EMS/LGMWMI	1.88	6.54	73.00														41.13	2.28	
7510004697910	So Sure Stencil Ink Blk 37038 (394-390)	LHB Industries	16 EMS/LGMWMI	1.88	6.21	52.09														27.83	5.15	
7510004697910	So Sure Stencil Ink Blk 37038 (394-390)	LHB Industries	16 EMS/LGMWPE	0.75	6.21	59.83								2.58				5.15			27.83	
7930000606040	Sheila Shine Liquid	Sheila Shine Inc	16 SVS/SVMF	2.00	7.71	30.00									10.00						19.00	
7930009353794	Plastic Polish, Liq, Type I IAW P-P-560B	Stemar Ltd Inc	16 EMS/LGMJ	2.00	8.33	6.55																
7930009353794	Plastic, Polish, Liquid, Type 1 IAW P-P-560B	Stemar Ltd Inc	16 HGS/LGMJT	2.00	8.38	6.55																
7930013465283	Spray Nine	Knight Marketing Corporation	16 SVS/SVML	36.00	8.50	1.57				10.00												
7930013971376	F-381 RAM	Grace-Lee Products Inc	16 EMS/LGMG	2.00	9.50	4.50																
7930013980906	9030 Hurrisafe Original	PCI of America	16 LRS/LGTM	55.00	8.50	1.57				10.00												
7930014712724	Cleaning Compound	Home Oil Co	16 EMS / MXMG	55.00	7.92	30.19								1.00						8.15	12.30	
7930014712724	Earth Soap Cleaner/Degreaser	Knight Marketing Corp	16 EMS/LGMG	220.00	8.65	6.00																
7930014712724	Earth Soap Cleaner/Degreaser	Knight Marketing Corporation	16 EMS/MXMMC	110.00	8.65	6.00																
7930014712724	Earth Soap Cleaner/Degreaser	Knight Marketing Corporation	16 HGS/LGMJT	55.00	8.65	3.00																
8010001818080	T-210 Polyurthane Thinner	Niles Chemical Paint Co/ Dyna Match Div	16 HGS/DART	6.00	7.42	88.00											27.00			11.00	7.00	
8010002906158	Paint TTL54C/A1 Type I Black	Lenmar, Inc	16 LRS/LGTM	2.00	7.50	54.33											21.20			8.00	3.90	
8010005824743	So Sure Brown Obliterating Compound	LHB Industries	16 EMS/LGMWMI	3.25	8.48	28.20														10.90	2.73	
8010006169181	So-Sure Light Gray Primer (0234-382)	LHB Industries	16 EMS/LGMG	5.91	8.66	47.12														11.99		
8010006169181	So Sure Light Gray Primer (0234-382)	LHB Industries	16 EMS/LGMWPE	0.66	6.67	42.87														11.99		
8010006410427	Walkway Nonslip Black G-9126	Akron Pain and Varnish Inc	16 HGS/LGMJT	11.00	11.12	3.00															3.00	
8010007219479	So Sure Orange 12215, 0014-121	LHB Industries	16 EMS/LGMWMI	0.94	6.31	47.60														24.77		
8010008489272	So Sure ID 54-341-P, Olive Drab 34088	LHB Industries	16 EMS/LGMWMI	5.74	7.91	81.00		1.75												14.66	3.50	
8010011462649	Mil-c-85285B, 36231, Type II (03GY236)	Deft Inc Chemical Coating Div	16 HGS/DART	2.50	11.54	5.10		0.05										5.00			0.05	
8010012659143	Cat, Mil-C-85285B	Deft Inc Chemical Coating Div	16 HGS/DART	8.00	8.12	39.94		0.03										25.00				45.00
8010012659143	Mil-C-85285B, 17925 P/C 03W127A	Deft Inc Chemical Coating Div	16 HGS/DART	8.00	12.27	13.21		0.05									0.05			2.50		
8010012659143	Cat, Mil-C-85285B	Deft Inc Chemical Coating Div	16 LRS/LGTM	14.00	8.12	95.03		0.03										25.00				

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010012659143	Mil-C-85285B, 17925 P/C 03W127A	Deft Inc Chemical Coating Div	16 LRS/LGTM	14.00	12.27	7.60		0.05												2.50	0.05	
8010013055551	Mil-C-85285B, 36118, G/S Ty I, 03GY330	Deft Inc Chemical Coating Div	16 HGS/DART	8.00	10.10	27.71		0.50									2.50	2.50		0.50	0.50	
8010013297263	Mil-C-85285B, 12197 PC 03OR047	Deft Inc Chemical Coating Div	16 LRS/LGTM	8.00	9.71	3.16		0.03												0.50	0.08	
8010013297263	12197 Clear Gloss 03OR047Cat	Deft Inc Chemical Coating Div	16 LRS/LGTM	8.00	7.78	55.00												40.00		15.00		
8010013316107	Eco Sure Black 17038 (674-190) Aerosol	LHB Industries	16 EMS/LGMG	1.88	8.58	65.00												1.46			11.05	
8010013316108	Eco-Sure Black 37038	LHB Industries	16 EMS/LGMJ	0.50	9.91	48.46												1.62		15.24	1.62	
8010013316108	Eco Sure Blk, 37038 (0674-390), 0672D899	LHB Industries	16 EMS/LGMMS	0.25	9.90	60.00												3.24		15.24	3.24	
8010013316108	Eco Sure, Blk 37038 (0674-390), 0672D899	LHB Industries	16 EMS/LGMR	0.38	9.90	60.00											3.24			15.24	3.24	
8010013316108	Eco Sure, Black, 37038 (0674-390), 0672D899	LHB Industries	16 HGS/DART	3.75	9.90	43.28												1.62		15.24	1.62	
8010013316108	Eco Sure, Black, 37038 (0674-390), 0672D899	LHB Industries	16 HMXS/MXAGW	0.63	9.90	48.46												1.62		15.24	1.62	
8010013316108	VOC Compiant Spray Paint (Aerosol)	LHB Industries	16 LRS/LGS	1.00	9.90	69.49																
8010013316109	Eco Sure Red 11136 (674-111) 0672D811	LHB Industries	16 EMS/LGMG	2.02	8.83	65.00												1.46			10.91	
8010013316109	Eco Sure Red 11136, (0674-111), 0672D811	LHB Industries	16 EMS/LGMWMI	0.17	8.85	65.00												2.93			21.82	
8010013316112	Eco Sure Olive Drab 24064, Voc Complaint	LHB Industries	16 EMS/LGMWPE	30.00	6.82	67.00												2.92			19.84	
8010013316112	Eco Sure Olive Drab 26=4064	LHB Industries	16 HGS/LGMJT	0.88	6.82	65.00												2.92			9.92	
8010013316112	Eco Sure Olive Drab 2604064	LHB Industries	16 HMXS/MXAGW	1.25	6.82	47.84												2.92			9.92	
8010013316115	Eco Sure Yellow 13538 (0674-130), 0672D830	LHB Industries	16 EMS/LGMMS	0.93	8.80	65.00												2.94			21.00	
8010013323745	Eco Sure Yellow 33538 (0674-330)	LHB Industries	16 EMS/LGMWMI	1.75	8.12	41.50												3.32		12.96	3.32	
8010013363033	MIL-C-85285B, 16473 PC 03GY277	Deft Inc Chemical Coating Div	16 HGS/DART	4.00	11.63	3.02														3.02		
8010013365062	Eco Sure Gray 16099 (0674-180)	LHB Industries	16 EMS/LGMMS	1.50	7.43	44.97												2.92			22.16	
8010013483060	Enamel Aerosol Gray 36118	LHB Industries	16 EMS/LGMJ	0.63	6.83	67.00																
8010013483060	Enamel, Aerosol, Gray 36118	LHB Industries	16 HGS/DART	3.00	6.82	47.84												2.92			9.92	
8010013505259	Eco Sure Red 11136 (0664-111) Aerosol	LHB Industries	16 EMS/LGMR	0.13	8.54	47.00																
8010013623876	Cat, Mil-C-85285B, 14052	Deft Inc Chemical Coating Div	16 LRS/LGTM	52.00	8.37	78.33											18.08					0.25
8010013682633	So Sure Primer Yellow 33637 P/N 782-831	LHB Industries	16 EMS/LGMMS	0.75	10.25	60.00		3.32												11.96	9.97	
8010013871033	Epoxy Comp A, MIL-P-23377G	Deft Inc Chemical Coating Div	16 HGS/DART	2.19	11.20	26.00		0.50													0.50	
8010013871033	Polyamide Comp B, MIL-P-23377G	Deft Inc Chemical Coating Div	16 HGS/DART	2.19	7.75	20.89																
8010014166556	A MIL-PRF-23377G	Deft Inc Chemical Coating Div	16 HGS/DART	10.00	11.23	18.62	35.00	1.00													1.00	

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010014166556	B MIL-PRF-23377G	Deft Inc Chemical Coating Div	16 HGS/DART	10.00	7.70	20.16															1.00	
8010014166557	MIL-P-23377, 02 Y 040	Deft Inc Chemical Coating Div	16 HGS/DART	10.00	11.20	18.66	35.00	1.00													1.00	
8010014166557	MIL-P-23377, 02 Y 040	Deft Inc Chemical Coating Div	16 HGS/DART	10.00	7.70	20.16																
8010014416006	HS SG Green Base Cmpd	PRC-Desoto Intl, Inc	16 EMS/LGMG	0.25	11.25	39.60																
8010014416021	Polyisocyanate 930G017	Courtaulds Aerospace	16 HGS/DART	0.51	8.79	10.55														2.50	2.50	
8010014416030	Epoxy 513X419	Courtaulds Aerospace	16 HGS/DART	0.82	12.60	15.07	20.00										5.00	5.00		5.00		
8010014416030	910X942 HS Primer Activator	Courtaulds Aerospace	16 HGS/DART	0.51	8.00	55.00											10.00				5.00	
8010014416030	Epoxy 513X419	Courtaulds Aerospace	16 HGS/LGMJT	0.82	12.60	15.07	20.00										5.00	5.00		5.00		
8010014416030	910X942 HS Primer Activator	Courtaulds Aerospace	16 HGS/LGMJT	0.51	8.00	55.00											10.00				5.00	
8030000087196	Sealing Compound,Base	Courtaulds Aerospace	16 EMS / LGMJ	0.50	11.75	15.38														10.00		
8030000087196	Pro-Seal 870 A-2 Part B	PRC-Desoto Intl, Inc	16 EMS/LGMJ	0.50	11.75	11.57														20.00		
8030000087196	Pro-Seal 870 A-2 Part A	PRC-Desoto Intl, Inc	16 EMS/LGMJ	0.50	11.75	11.57																
8030000087196	Pro-Seal 870 A-2 Part B	PRC-Desoto Intl, Inc	16 HGS/DART	12.50	11.75	8.50														20.00		
8030000087196	Pro-Seal 870 A-2 Part A	PRC-Desoto Intl, Inc	16 HGS/DART	12.50	15.00	15.00														10.00		
8030000650957	Alodine 1201	Henkel Corp	16 HGS/DART	0.25	8.33	0.00																
8030000812339	Rite-Lok Mila-10	Hernon MFG Inc	16 EMS/LGMG	10.00	9.16	12.05																
8030001520022	142810 Accelerator, Manganese Dioxide	PRC-Desoto Intl, Inc	16 HGS/LGMJT	0.02	16.41	30.00																
8030005468621	Rubberized Undercoating	Sprayway, Inc	16 LRS/LGTM	9.84	7.50	12.50														12.50		
8030005468637	Corrosion Preventive	LHB Industries	16 AGS/LGMHC	1.25	6.75	0.38																
8030007235345	Sealing Compound (Part 1)	Flamemaster Corp	16 EMS/LGMFE	3.00	10.00	32.00											15.00	10.00				
8030007235345	Sealing Compound (Part 2)	Flamemaster Corp	16 EMS/LGMFE	3.00	8.41	25.00																
8030007235345	Sealing Compound (Part 1)	Flamemaster Corp	16 EMS/LGMFS	2.44	10.00	32.00											15.00	10.00				
8030008387789	LPS 2 Industrial Strength Lubricant	LPS Laboratories, Inc	16 SVS/SUMP	0.75	7.00	70.00																
8030009030931	NOX Rust X0110	Daubert Chemical Co	16 EMS/LGMJ	0.13	7.33	3.40																
8030009369940	Scotchcal Brand Edge Sealer 3950	Minnesota Mining & Mfg Co	16 EMS/LGMG	0.81	7.25	46.98		3.00												0.10	55.00	
8030009381947	So Sure Corrosion Preventive Compound	LHB Industries	16 EMS/LGMJ	0.25	3052.00	85.00																
8030009381947	So Sure Corrosion Preventive Compound	LHB Industries	16 HGS/LGMJT	0.13	7.69	26.14																
8030010251692	Instabond S-100	Accrabond, Inc	16 EMS/LGMR	0.25	9.16	3.12			3.00													

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011840328	Sealing Compound, Aircraft	PRC-Desoto Intl, Inc	16 EMS/LGMJ	0.94	11.66	3.38														5.00		
8030011840328	Pro Seal 870 B-1/2 (0870B1) Base	PRC-Desoto Intl, Inc	16 EMS/LGMJ	5.78	12.33	3.19														5.00		
8030011840328	Sealing Compound, Aircraft	PRC-Desoto Intl, Inc	16 HGS/DART	1.64	11.66	7.50														2.50		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Base	PRC-Desoto Intl, Inc	16 HGS/DART	4.92	12.33	5.00														2.50		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Accelerator	PRC-Desoto Intl, Inc	16 HGS/DART	4.92	16.08	30.00																
8030011840328	Sealing Compound, Aircraft	PRC-Desoto Intl, Inc	16 HGS/LGMJT	0.94	11.66	7.50													5.00	2.50		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Base	PRC-Desoto Intl, Inc	16 HGS/LGMJT	4.22	12.33	5.00														2.50		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Accelerator	PRC-Desoto Intl, Inc	16 HGS/LGMJT	4.22	16.08	30.00																
8030011840329	0870B1 Pro Seal 870 B1/2 Base Compound	PRC-Desoto Intl, Inc	16 EMS/LGMJ	13.50	12.67	3.11																
8030011840329	0870B1 Pro Seal 870 B1/2 Accelerator Compound	PRC-Desoto Intl, Inc	16 EMS/LGMJ	13.50	16.08	2.45																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	PRC-Desoto Intl, Inc	16 EMS/MXMMC	12.94	12.67	10.00														10.00		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	PRC-Desoto Intl, Inc	16 HGS/DART	5.77	12.67	10.00														10.00		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Accelerator	PRC-Desoto Intl, Inc	16 HGS/DART	5.77	16.08	2.56																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	PRC-Desoto Intl, Inc	16 HGS/LGMJT	10.69	12.67	10.00														10.00		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Accelerator	PRC-Desoto Intl, Inc	16 HGS/LGMJT	10.69	16.08	30.00																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	PRC-Desoto Intl, Inc.	16 MOS/MXOT	0.94	12.33	3.19														10.00		
8030012905137	Sealent TO 1-1-3 Part 1	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	3.72	7.00	86.00											70.00					
8030012905137	Sealent TO 1-1-3 Part 2	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	5.63	6.83	86.00											70.00					
8030012905138	Sealing Compound Part 2	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	0.32	6.66	6.00											5.00					
8030012905138	Sealing Compound Part 1	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	0.32	6.83	87.00											70.00					
8030012905139	Sealing Cmpd Part 1	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	2.25	11.33	5.00											5.00					
8030013470979	Corrosion Preventative Compound	LHB Industries	16 MOS/LG	2.19	7.00	43.78														2.18		
8040001178510	3145 RTV Adhesive Sealant	Dow Corning Corp	16 EMS/LGMG	1.99	9.33	5.00																
8040001178510	3145 RTV Adhesive Sealant-Clear	Dow Corning Corporation	16 HGS/LGMJT	0.47	9.33	7.00																
8040001178510	3145 RTV Adhesive Sealant-Clear	Dow Corning Corporation	16 MOS/MXOT	0.02	9.16	27.56																
8040001658614	Adhesive, E-1293	Ralrube Inc	16 EMS/MXMMC	4.25	6.78	32.50																
8040001817188	DEH ® 52 Epoxy Curing Agent, #19199	Dow Chemcial USA	16 HGS/DART	4.00	8.50	75.00																
8040001817761	62-4491-4930-0, Super 74 Foam Fast Adhesive	3M General Offices	16 EMS/LGMJ	0.73	6.04	54.37																

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8040001817761	Adhesive	3M General Offices	16 HGS/DART	5.63	8.33	35.00																
8040001817761	Adhesive	3M General Offices	16 HGS/LGMJT	2.44	6.04	70.00																
8040001817761	Adhesive	3M General Offices	16 LRS/LGTTF	15.75	0.00	75.00																
8040002009190	Pliobond 20	Ashland Chemical Co	16 CRS/LGMP	0.25	7.23	78.00											78.00					
8040002660824	Adhesive	3 M Co.	16 AGS/LGMA	1.50	7.33	73.50											65.00					
8040002738717	Fastbond 10 Neutral Contact Adhesive	Steven Industries	16 EMS/LGMJ	0.63	6.91	35.34																
8040002738717	Neutral Contact Adhesive Brushable	Steven Industries	16 HGS/LGMJT	0.25	6.91	50.00					10.00								10.00	15.00		
8040003907959	Scotch-grip 847 Rubber and Gasket Adhesive	3M General Offices	16 HGS/DART	1.50	7.58	10.00																
8040004555359	3M Weatherstrip Adhesive	3M Automotive Trades Div	16 LRS/LGTM	2.00	6.83	30.05					15.00								3.00	3.00		
8040005152246	Adhesive, Rubber (Part 1)	Tacc International	16 EMS/LGMFS	0.67	7.12	63.00					45.00									45.00		
8040005152246	FA-1030 Accelerator	Clifton Adhesive Inc	16 SOS/DOL	0.25	9.25	77.00																
8040005152246	FA-1030 Neutral	Clifton Adhesive Inc	16 SOS/DOL	0.25	9.25	77.00					31.50									45.50		
8040005437170	Adhesive	Ashland Chemical Co	16 CRS/LGMAF	1.25	7.41	72.00											69.00					
8040008226430	Epon ® Resin 828	Shell Oil Company	16 HGS/DART	18.00	9.75	100.00																
8040008263535	Instabond S-100	Accrabond Inc	16 HGS/DART	0.50	8.66	0.55																
8040008419773	R-373 Rubber Insul. Adhesive #373	Rubatex Corp Sub of Great American Industries	16 EMS/LGMJ	0.13	6.66	56.85														16.00		
8040009363275	Scotch-Weld 2214 Regular Epoxy	3M General Offices	16 HGS/LGMJT	0.05	12.00	50.00													45.00			
9150013601905	Aerosol 27 A (MIL L 46147 A Type II)	Sandstrom Products	16 EMS/LGMMS	0.13	7.67	53.83											30.00					
79300141223681	B & B TC-100N-3-RTU	B and B Tritech Inc	16 HGS/LGMJT	660.00	9.16	3.00																
3439000695815	Flux Soldering	R& D Metals	16 EMS/LGMG	0.25	7.42	32.38																
3439010075494	197 Rosin Flux	Litton Systems	16 CRS / LGMVG	0.13	7.42	56.00																
3439013737966	Flux Soldering	R & D Metals	16 CRS/LGMAF	0.19	7.33	70.00																
5330004792847	Gasket Adhesive	Fel-Pro Chemical	16 CRS/LGMP	0.19	6.58	80.00											60.00					
5970009015331	Insulating Varnish	GC Electronics	16 CMS/MXMCE	2.00	8.33	1.00															62.00	
5970009904924	Humiseal Aerosol	Humiseal Industries	16 CRS/LGMVE	0.13	7.33	71.00														30.00	1.00	
6810002010906	Denatured Alcohol	Hol Industries Inc.	16 AGS/LGMHC	14.00	7.33	71.00																
6810002056786	Denatured Alcohol	Home Oil Co	16 EMS /LGMMW	1.00	6.80	35.35								4.61						2.91		
6810002056790	Denatured Alcohol	US Industrial Chemicals	16 AGS/LGMU	2.00	6.80	99.00																

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
6810002056790	Denatured Alcohol	Home Oil Co	16 CRS/ LGMVSH	6.00	6.61	99.00																
68100022332739	Acetone Technical	Ashland Chemical Co	16 CRS/LGMP	4.00	6.58	2.00																
6810002270410	Isopropyl Alcohol	Shell Chemical Co	16 CRS/LGMAF	7.00	6.58	99.00																
6810002270410	Isopropyl Alcohol	AAPER Chemical	16 EMS / LGMJ	60.00	6.58	99.00																
6810002812002	Toluene	CSD Inc.	16 EMS/ MXMFS	1.00	7.25	31.40														99.00		
6810002812785	Methyl Ethyl Ketone	CSD Inc.	16 CRS/LGMAF	10.00	6.75	99.00											100.00					
6810002865435	Isopropyl Alcohol	Shell Chemical Co	16 CRS/LGMAF	6.00	6.58	99.00																
6810007534993	Isopropyl Alcohol	Everkleen Enterprises	16 AGS/LGMHC	5.00	6.58	99.00								100.00								
6810008556160	Isopropyl Alcohol	Arco Chemical Co	16 AGS/LGMU	8.00	6.50	99.00																
6810008556160	Isopropyl Alcohol	Arco Chemical Co	16 CRS/LGMVE	10.00	6.50	99.00																
6810008556160	Isopropyl Alcohol	Arco Chemical Co	16 CS/SCMG	2.00	6.50	99.00																
6810008556160	Isopropyl Alcohol	Arco Chemical Co	16 EMS / LGMFN	5.00	6.50	57.22																
6810P3103G	Acetone-MEK Solvent	Kim-Ko.	16 CRS/LGMVSH	4.00	8.08	99.00								1.00			50.00					
684000F007575	Pre-Emergent Grass & Weed Herbicide	PBI/Gordon Corp	16 SVS/SVBG	7.50	3.60	9.90		1.60													8.30	
684000F045602	Lesco Spreader-Sticker	Lesco Inc	16 SVS/SVBG	5.00	8.25	3.00																
684000N035802	Lesco MSMA 6.6	Lesco Inc	16 SVS/SVBG	7.50	0.60	25.00																
684000N083102	Illoxan 3EC Herbicide	Hoechst-Roussel	16 SVS/SVBG	2.00	8.33	58.50		1.50													7.50	
684000N084860	Raid Ant & Roach Killer (Aerosol)	S C Johnson & Son Inc	16 SVS/SVML	6.56	6.58	1.50																
6840LP264437	Herbicide Buctril	Rhone-Polenc AG Co	16 SVS/SVBG	10.00	8.66	13.20		2.20													11.00	
6850009262275	Windshield Cleaner	LHB Industries	16 EMS/LGMG	2.00	7.32	32.82								72.70								
6850009739091	Penetrating Fluid	LHB Industries	16 EMS/LGMG	0.50	8.41	28.56																
685000D002807	Gumout Carburetor and Choke Cleaner	Penzoil Co	16 LRS/LGTM	9.00	7.50	87.50											15.00				62.50	
685000D003017	M38-15 Thrust Quick Start Fluid	Radiator Specialty Co	16 LRS/LGTM	4.00	5.58	80.00																
685000F026417	A-One #1269	ZEP Mfg Co	16 SVS/SVML	18.00	9.16	20.00																
685000N033061	0675, Zep Lemonex	ZEP Mfg Co	16 SVS/SUMP	16.00	8.83	3.00																
685000N033061	0675, Zep Lemonex	ZEP Mfg Co	16 SVS/SVML	32.00	8.83	3.00																
685000N033740	Formula 5O #0859	ZEP Mfg Co	16 SVS/SVML	21.00	8.75	5.00				5.00												
685000N063271	Isopropyl Alcohol	Tech Spray	16 CMS/ BAE	8.00	6.58	100.00																

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
6850013980987	Contact Cleaner	LPS Laboratories Inc	16 CRS/ LGMVSH	0.50	10.08	3.00																
6850PNF180	F180 Air Fair Sprmnt Conc & F183 Lemon	ZEP Mfg Co	16 SVS/SUMP	3.00	8.33	10.00																
6850PNF180	F180 Air Fair Sprmnt Conc & F183 Lemon	ZEP Mfg Co	16 SVS/SVML	18.00	8.33	10.00																
7510004199564	Ink Marking Stencil	LHB Industries	16 EMS /LGMWPM	2.63	8.10	85.00														41.13	2.73	
7510004697910	S0-Sure Stencil Ink	LHB Industries	16 EMS/ MXMFS	0.88	6.66	36.06														40.00	4.00	
793000D007473	817-1212 Simple Green (1 Gal)	Sunshine Makers, Inc R&D Div	16 SVS/SVMF	1.00	8.66	2.00			2.00													
793000F014151	Honor Guard Edge Dressing, Black	Kiwi Brands Inc.	16 SVS/LGMJP	0.19	7.50	74.00								1.00						51.00		
793000F034678	SSS Dust Mop Treatment (Aerosol)	Standard Sanitation Systems, Inc	16 SVS/SUMP	7.50	7.58	12.00																
7930014712724	Cleaning Compound	Knight Marketing	16 AGSOC/CEF	55.00	12.00	49.00																
7930PN1052	Zep Concentrated Glass Clnr	ZEP Mfg Co	16 SVS/SUMP	1.25	8.00	25.00																
7930PN5822	Floor Treatment	Spartan Chemical Company, Inc	16 SVS/SUMP	5.00	8.57	17.50																
8010001412952	Spray Paint, Aerosol	LHB Industries	16 CRS / LGMPS	0.25	7.89	72.00											6.84			35.79		
8010001412952	Spray Paint, Aerosol	LHB Industries	16 EMS /LGMMW	0.25	7.89	30.46											6.84			35.79		
8010001412952	Spray Paint, Aerosol	LHB Industries	16 EMS/ LGMFE	5.00	7.89	72.00											6.84			35.79		
80100014229273	Paint Stripper	Ralrube Inc	16 EMS/ LGMFE	32.00	10.00	33.08																
8010001818080	C S D Inc Thinner, Aircraft Coating	C S D Inc	16EMS/LGMFE	34.00	7.08	32.14											30.50			10.50	7.00	
8010001818080	C S D Inc Thinner, Aircraft Coating	C S D Inc	823 RH/LGTMA	4.00	7.08	32.14											30.50			10.50	7.00	
8010002906984	Aerosol Lacquer Black	LHB Industries	16 CRS / LGMVG	1.00	7.22	73.00														24.68		
8010002906984	Aerosol Lacquer Black	LHB Industries	16 CRS /LGMSH	0.25	7.22	73.00														24.68		
8010003487716	Paint Remover	INTEX Chemical	16 CES / CEOHH	6.00	8.83	75.00										52.00						
8010005824743	Paint,Rubber	Loctite Corp	16 CRS / LGMPS	11.63	8.48	85.00														10.90	2.73	
8010005824743	Paint,Rubber	LHB Industries	16 EMS /LGMWPM	7.13	8.48	85.00														10.90	2.73	
8010005825382	So-Sure Flat Black	LHB Industries	16 CRS / LGMVG	0.75	6.42	61.00			1.25								3.75			28.46	1.25	
8010005825382	So-Sure Flat Black	LHB Industries	16 EMS/ LGMFE	8.25	6.42	61.00			1.25								3.75			28.46	1.25	
8010005825383	So Sure Flat Black	LHB Industries	16 AGS/LGMHC	0.25	7.27	33.00																
8010005843150	So-Sure White	LHB Industries	16 CRS / LGMVG	0.25	6.54	56.00														11.58		
8010006169143	So-Sure Black 37038	LHB Industries	16 CRS/LGMVSH	0.16	6.51	57.00														14.66		

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010006169181	So-Sure Gray Primer	LHB Industries	16 EMS / MXMG	2.13	8.33	20.51														8.00	12.00	
8010006641914	So-Sure Gray Primer	LHB Industries	16 CRS /LGMVCS	2.00	8.51	38.47														5.16	1.72	
8010006641914	So-Sure Gray Primer	LHB Industries	16 CRS/LGMP	1.00	8.51	85.00		1.72												5.16	1.72	
8010006641914	So-Sure Gray Primer	LHB Industries	16 EMS / LGMWPE	4.00	8.50	28.28														5.16	1.72	
8010007219751	So-Sure Lacquer	LHB Industries	16 EMS /LGMWPM	4.00	7.06	52.96														26.62		
8010009881458	So-Sure Blue	LHB Industries	16 EMS /LGMWPM	2.00	8.00	55.00		5.00												15.00		
801000F014161	7300 Zip-Strip Water Rinsable	Star Bronze Company	16 SVS/LGRO	2.00	9.82	87.00								2.00		80.00						
801000F040683	20004 Flat Black Wal-Mart Spray Enamel	United Coatings Inc	16 LRS/LGSFI	1.50	6.89	47.50														15.00		
801000F041315	Rust-Oleum Professional Coating	Rust-Oleum Corp	16 LRS/LGS	0.38	8.33	45.00		3.50									1.50			17.50	20.00	
801000F051424	230 Red/Orange Flourescent	Aervoe-Pacific Co Inc	16 SVS/SUMP	0.63	6.66	48.94															14.00	
801000LP05975	Paint Buster Hand Cleaner, 5975	3M General Offices	16 LRS/LGTM	0.08	9.50	5.50								0.50								
801000LPV6V79	Acrylic Urethane, V6V769	3M General Offices	16 LRS/LGTM	1.00	8.83	25.60																
801000N010234	Mineral Spirits	LHB Industries	16 EMS /LGMWPM	2.25	7.06	100.00																
801000N064813	Auto Spray Colors	Dupli-Color Products Co	16 LRS/LGS	0.25	8.33	88.00											6.00			8.00		
80100133116119	Eco-Sure Blue	LHB Industries	16 EMS / MXMG	2.00	7.41	23.04												2.99			20.72	
8010013316108	Eco Sure,Black	LHB Industries	16 EMS / LGMWPE	0.50	9.91	24.24														15.24	3.24	
8010013316108	Eco-Sure Black	LHB Industries	16 EMS / MXMG	1.88	9.90	17.26												2.85			24.22	
8010013316108	Eco-Sure Black	LHB Industries	16 EMS /LGMWPM	5.00	9.90	17.26												2.85			24.22	
8010013316109	Eco-Sure Red	LHB Industries	16 EMS / MXMG	2.00	8.85	19.29												2.93			21.82	
8010013316111	Enamel Aerosol,OD	LHB Industries	16 CRS/ LGMPS	3.00	8.75	52.00												2.91			20.62	
8010013316111	Enamel Aerosol,OD	LHB Industries	16 CRS/LGMVE	5.00	8.75	52.00											5.70	5.70			19.93	
8010013316114	Eco-Sure Yellow	LHB Industries	16 EMS /LGMWPM	1.75	6.73	65.00												5.88			15.87	
8010013363980	Eco-Sure Green	LHB Industries	16 EMS /LGMWPM	2.63	8.31	67.00												3.01			20.27	
8010013483060	Eco-Sure,Gray	LHB Industries	16 EMS / LGMJ	2.00	6.82	67.00												2.92			19.84	
80100135004746	Eco-Sure,Black	LHB Industries	16 CRS /LGMVCS	0.13	7.16	46.00																
8010013504747	Eco-Sure,Black	LHB Industries	16 CRS /LGMVCS	0.13	10.25	44.00																
8010013504747	Eco Sure Black	LHB Industries	16 CRS/LGMP	0.68	10.25	44.00																
8010013505250	Eco Sure, Olive	LHB Industries	16 EMS/LGMWPM	0.38	10.47	47.00				4.33												

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010013505259	Eco Sure, Red	LHB Industries	16 AGS/LGMU	1.25	8.54	47.00				4.33												
8010013505259	Eco-Sure Red	LHB Industries	16 EMS /LGMWPM	6.00	10.25	44.00																
8010013505259	Eco Sure, Red	LHB Industries	16 EMS/LGMMS	0.25	8.54	47.00				4.33												
8010013505260	Eco Sure, Red	LHB Industries	16 EMS/LGMWMI	1.25	10.43	44.00				4.33												
8010014166556	Epoxy Primer	DEFT Chemical	16 EMS/ LGMFE	30.50	11.16	45.10																
8010014416006	835G073 24052 Green	Pre-Desoto Intl.,Inc.	16 EMS / MXMG	2.00	11.25	15.19															5.00	
8010014416006	835G073 24052 Green	Courtaulds Aerospace Inc	16 EMS/LGMG	1.88	11.25	30.00															5.00	
801001446030	Epoxy Primer	Pre-Desoto Intl.,Inc.	16 EMS / LGMJ	0.25	8.50	55.00																
8010014828620	Epoxy Primer	Loctite Corp	16 EMS/ LGMFE	55.00	11.16	45.10		1.00													1.00	
80100LPV6V241	Acrylic Hardener	Sherwin Williams	16 CRS/LGMAF	40.00	8.00	96.00					65.00										20.00	
80100LPV6V241	Polasol Hardener, V^ V241	Sherwin Williams Co	16 LRS/LGTM	48.00	8.58	90.00		4.00													20.00	1.00
8010AB692M	Aerosol Lacquer Black	Rust-Oleum Corp.	16 CES/ CEOFA	6.13	7.22	73.00								0.95						15.00	15.00	
8010HM0013	Olympic Fasthid Int S/G White #78011	PPG Industries Inc	16 LRS/LGS	15.00	9.16	45.00																
8010LP53725	Ultra 7000 Basecoat System	Sherwin Williams Co	16 LRS/LGTM	0.50	6.66	27.50		3.50												2.50	19.50	
8010LPPN7604	Universal Urethane Activator 7601, 7604	Tremco Autobody Technologies	16 LRS/LGTM	2.00	9.16	38.70		8.00										9.00			33.00	
8010LPUS3GL	US3/ Ultrasystem Reducer	Sherwin Williams Co	16 LRS/LGTM	3.00	7.25	41.00											40.00	1.00				
8010LPUW556	Hi-Glo Synthetic Enamel	Western Automotive Finishers	16 LRS/LGTM	2.00	9.41	5.00														5.00		
8010LPWS85100	Hi-Glo Synthetic Enamel Reducers	Western Automotive Finishers	16 LRS/LGTM	4.00	9.41	26.00														26.00		
8010PN1863	Paint, Red	Rust-Oleum Corp.	16 CES / CEOIE	10.00	9.15	46.00														15.00		
8010-PW-KND-358	Weekend Spray Enamel 358 Gloss Black	Sherwin-Williams Co	16 LRS/LGTTF	15.00	8.33	49.00		3.00													19.00	
8010-U7-468-29S	Sherwin Williams	Sherwin Williams Co	16 LRS/LGTM	0.50	7.27	4.10																
8030000087196	Sealing Compound (Base)	Courtaulds Aerospace Inc	16 AGS/LGMHC	0.75	11.75	15.37														10.00		
8030000087196	Sealing Compound (Accelerator)	Courtaulds Aerospace Inc	16 AGS/LGMHC	0.75	15.00	40.00	25.00						40.00									
8030000087196	Sealing Compound (Base)	Courtaulds Aerospace Inc	16 CRS/LGMPC	0.25	11.75	15.37														10.00		
8030000087196	Sealing Compound (Accelerator)	Courtaulds Aerospace Inc	16 CRS/LGMPC	0.25	15.00	40.00	25.00						40.00									
80300000LP334	Bondo UV Body Filter	Dynatron/Bondo Corp	16 LRS/LGTM	2.00	10.00	13.74																
803000087200	Pro-Seal 870 B-2	PRC Desoto Int	16 AGS/LGMHC	0.50	11.99	15.00											5.00			5.00		
8030001180666	PLS-3 Heavy Duty Rust Inhibitor	LPS Laboratories Inc	16 HGS/LGMJT	0.20	6.91	90.00																

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030001487362	Sealing Compound (Part A)	Flamemaster Corp	16 AGS/LGHMC	0.25	13.99	1.86														2.00		
8030001487362	Sealing Compound	Flamemaster Corp	16 CMS/LGMP	0.75	13.99	3.00														2.00		
8030001487362	Sealing Compound (Part A)	Flamemaster Corp	16 CRS/LGMP	0.50	13.99	1.86														2.00		
8030001520022	Sealing Compound	Pre-Desoto Intl.,Inc.	16 EMS / MXMG	0.43	16.41	10.41								40.00								
8030002523391	GS-3 Gasket Sealer	Fel-Pro Chemical Products	16 EMS/LGMG	0.20	10.41	35.00																
8030005997753	Form-A-Gasket	Loctite Corp	16 AGS/LGMA	0.06	9.16	40.00																
8030005997753	Form-A-Gasket	Loctite Corp	16 AGS/LGMHC	0.11	9.16	40.00																
8030005997753	Form-A-Gasket	Loctite Corp	16 AGS/LGMU	0.11	9.16	40.00																
8030005997753	Form-A-Gasket	Loctite Corp	16 CRS/LGMP	0.13	9.16	40.00																
8030005997753	Form-A-Gasket	Loctite Corp	16 CRS/LGMPS	0.13	9.16	40.00																
8030007235345	Sealing Compound Part1	Flamemaster Corp	16 EMS /LGMFS	2.44	10.00	32.00												15.00		10.00		
8030007235345	Sealing Compound Part2	Flamemaster Corp	16 EMS /LGMFS	2.44	8.41	25.00																
8030007235345	Sealing Compound,Part 1	Flamemaster Corp	16 EMS/ LGMFE	3.00	10.00	32.00											15.00	10.00				
8030007235345	Sealing Compound,Part 2	Flamemaster Corp	16 EMS/ LGMFE	3.00	8.41	25.00																
8030007535008	Sealing Compound (Part 1)	Flamemaster Corp	16 CRS/LGMAF	0.94	12.50	6.49														10.00		
8030007535008	Sealing Compound (Part 2)	Flamemaster Corp	16 EMS/LGMFS	2.44	8.41	25.00																
8030009030931	NOX Rust	Daubert	16 CRS/LGMP	1.00	7.33	91.00																
8030009030931	NOX Rust	Daubert	16 HGS/LGHJ	0.25	7.33	91.00																
8030009369940	Sealing Compound	3 M Co.	16 EMS / MXMG	0.31	8.08	45.01		5.00												0.10	70.00	
8030009369940	Sealing Compound	3M Co	16 EMS/LGMG	1.25	8.08	42.14		5.00												0.10	70.00	
8030009381947	Corrosion Preventive	LHB Industries	16 AGS/LGMU	1.50	7.69	38.00																
8030009381947	Corrosion Preventative	LHB Industries	16 CRS / LGMVG	0.25	7.69	38.00																
8030009381947	Corrosion Preventive	LHB Industries	16 CRS/LGMP	0.25	7.69	38.00																
8030009381947	Corrosion Preventative	LHB Industries	16 EMS /LGMWPM	1.50	7.69	38.00																
8030009381947	Corrosion Preventive	LHB Industries	16 EMS/LGMWPM	0.25	7.69	38.00																
803000N065394	Corrosion Block Non-Flammale Aerosol	Lear Chemical	16 SVS/SUMP	1.50	7.16	2.00																
8030011250055	Sealing Compound	Organic Products	16 AGS/LGMHC	0.08	8.50	55.00																
8030011250055	Sealing Compound	Organic Products	16 CRS/LGMVCN	0.35	8.50	55.00								40.00								

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011250055	Sealing Compound	Organic Products	16 CRS/LGMVSH	0.04	8.50	55.00								40.00								
80300118400329	Sealing Compound Part 1	Pre-Desoto Intl.,Inc.	16 EMS/MXMMC	13.00	11.50	35.00																
80300118400329	Sealing Compound Part 2	Pre-Desoto Intl.,Inc.	16 EMS/MXMMC	13.00	11.66	15.00											5.00					
8030011840328	Sealing Compound Part1	Prc-Desoto Intl, Inc	16 AGS/LGMA	1.82	11.50	35.00																
8030011840328	Sealing Compound Part2	Prc-Desoto Intl,Inc.	16 AGS/LGMA	1.82	11.50	5.00														5.00		
8030011840328	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 AGS/LGMHC	3.22	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 AGS/LGMHC	3.22	11.50	5.00														5.00		
8030011840328	Sealing Compound Part2	Prc-Desoto Intl.,Inc.	16 CRS/ LGMAP	0.43	11.50	5.00														5.00		
8030011840328	Sealing Compound Part1	Prc-Desoto Intl.,Inc.	16 CRS/LGMAP	0.43	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 CRS/LGMFE	3.51	11.50	5.00														5.00		
8030011840328	Sealing Compound (Part 1)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMP	2.15	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMP	2.15	11.50	5.00														5.00		
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 CRS/LGMR	1.50	11.50	5.00														5.00		
8030011840328	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 CRS/LGMVE	11.53	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 CRS/LGMVE	11.53	11.50	5.00														5.00		
8030011840328	Sealing Compound	Pre-Desoto Intl.,Inc.	16 EMS / LGMJ	0.47	11.50	55.00														5.00		
8030011840328	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 EMS/LGMFE	3.51	11.50	35.00																
8030011840328	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 EMS/LGMR	1.50	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 HGS/LGMJ	55.75	11.50	5.00														5.00		
8030011840328	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 HGS/LGMJT	6.99	11.50	35.00																
8030011840328	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 HGS/LGMJT	6.99	11.50	5.00														5.00		
8030011840328	Sealing Compound Part2	Prc-Desoto Intl.,Inc.	16CRS/LGMVE	11.53	11.50	5.00														5.00		
8030011840329	Sealing Compound (Part 1)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 AGS/LGMA	3.38	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 AGS/LGMA	3.38	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 AGS/LGMHC	11.25	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 AGS/LGMHC	11.25	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 AGS/LGMU	6.52	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Prc-Desoto Intl, Inc (Formally Courtaulds	16 AGS/LGMU	6.52	11.66	15.00											5.00					

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011840329	Sealing Compound Part1	Prc-Desoto Intl.,Inc	16 CRS/LGMP	4.00	11.50	35.00																
8030011840329	Sealing Compound Part2	Prc-Desoto Intl.,Inc.	16 CRS/LGMP	0.47	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 CRS/LGMP	8.00	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 CRS/LGMP	8.00	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 CRS/LGMVE	11.52	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 CRS/LGMVE	11.52	11.66	15.00											5.00					
8030011840329	Sealing Compound Part1	Pre-Desoto Intl.,Inc.	16 EMS / LGMJ	13.50	11.50	31.64														5.00		
8030011840329	Sealing Compound Part2	Pre-Desoto Intl.,Inc.	16 EMS / LGMJ	13.50	11.50	31.64																
8030011840329	Sealing Compound Part 1	Pre-Desoto Intl.,Inc.	16 EMS/ LGMFE	15.00	11.50	35.00																
8030011840329	Sealing Compound Part 2	Pre-Desoto Intl.,Inc.	16 EMS/ LGMFE	15.00	11.66	28.35												5.00				
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 EMS/LGMFE	15.09	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 EMS/LGMFE	15.09	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 EMS/LGMMC	15.25	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 EMS/LGMMC	15.25	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 HGS/DART	6.68	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 HGS/DART	6.68	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 HGS/LGMJ	2.25	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 HGS/LGMJ	2.25	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 HGS/LGMJT	11.11	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 HGS/LGMJT	11.11	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Courtaulds Aerospace Inc	16 LSS/LGLT	3.14	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Courtaulds Aerospace Inc	16 LSS/LGLT	3.14	11.66	15.00											5.00					
8030011840329	Sealing Compound (Part 1)	Prc-Desoto Intl, Inc (Formally Courtaulds	6 SOS/UFLT	0.75	11.50	35.00																
8030011840329	Sealing Compound (Part 2)	Prc-Desoto Intl, Inc (Formally Courtaulds	6 SOS/UFLT	0.75	11.66	15.00											5.00					
8030012905135	Sealing Compound (Part 2)	Products Research	16 AGS/LGMHC	0.03	11.83	2.00											2.00					
8030012905135	Sealing Compound	Products Research	16 CRS/LGMVE	1.00	6.58	100.00																
8030012905135	Sealing Compound	Products Research	16CRS/LGMAF	0.88	11.83	2.00											2.00					
8030012905139	Sealing Cmpd part 2	Prc-Desoto Intl, Inc (Formally Courtaulds	16 CRS/LGMAF	2.25	12.10	5.50											5.00					

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030013470980	Corrosion Preventive Compound	LHB Industries	16 CRS/LGMAE	0.66	12.68	76.00														5.19		
8030013470980	Corrosion Preventative	LHB Industries	16 EMS / LGMWPE	0.25	12.66	18.98														5.19		
8030013871131	Corrosion Preventive Compound	Eureka Chemical Co	16 HGS/DART	1.25	7.08	27.00																
8030013871131	Corrosion Preventive Compound	Eureka Chemical Co	16 HGS/LGMJ	0.88	7.08	27.00																
8040000168662	Adhesive	Dow Corning Corp	16 CRS/LGMVE	0.84	9.33	7.00																
8040001658614	Rubber Adhesive	Tacc International	16 AGS/LGMA	0.25	6.75	22.00					3.00									7.00		
8040001658614	Rubber Adhesive	Tacc International	16 CRS/ LGMVSH	0.25	6.75	22.00					3.00									7.00		
8040001658614	Rubber Adhesive	Tacc International	16 EMS/LGMFE	0.25	6.75	22.00					3.00									7.00		
8040001658614	Rubber Adhesive	Tacc International	16 EMS/LGMMC	3.75	6.75	22.00					3.00									7.00		
8040001817761	Adhesive	3M Co	16 AGS/LGMA	1.31	6.04	63.00																
8040001817761	Adhesive	3M Co	16 AGS/LGMU	3.75	6.04	63.00																
8040001817761	Adhesive	3M Co	16 EMS/LGMWPM	1.31	6.04	63.00																
8040001817761	Adhesive	3M Co	16 HGS/DART	1.50	6.04	63.00																
8040001817761	Adhesive	3M Co	16 HGS/LGMJ	8.00	6.04	63.00																
8040001817761	Adhesive	3M Co	16 TRNS/LGTTF	24.56	6.04	63.00																
8040002009190	Pliobond 20	Ashland Chemical Co	16 CRS/LGMAP	0.25	7.23	78.00																
8040002629011	Adhesive	Tacc International	16 AGS/LGMA	0.13	7.54	7.00											5.00			1.00		
8040002629011	Adhesive	Ralrube Inc	16 AGS/LGMA	1.50	7.54	7.00											5.00			1.00		
8040002629011	Adhesive	Tacc International	16 AGS/LGMU	0.13	7.54	7.00											5.00			1.00		
8040002629011	Adhesive	Tacc International	16 CRS/LGMAP	0.13	7.54	7.00											5.00			1.00		
8040002629011	Adhesive	Ralrube Inc	16 CRS/LGMAP	0.13	7.54	7.00											5.00			1.00		
8040002660824	Adhesive	3 M Co.	16 EMS /LGMFS	0.25	7.33	73.50											65.00					
8040002738717	Adhesive	Tacc International	16 HGS/LGMJ	0.50	6.78	50.50					35.00									12.50		
8040005152246	Adhesive, Rubber (Part 2)	Tacc International	16 EMS/LGMFS	0.67	7.18	63.00					45.00									45.00		
8040005152246	Adhesive FA-1030	Ralrube Inc	16 EMS/LGMFS	0.25	7.16	76.00								76.00								
8040005152246	Adhesive, Rubber (Part 1)	Tacc International	16 SOS/DOL	0.50	7.12	63.00					45.00									45.00		
80400099557080	Adhesive	3 M Co.	16 EMS /LGMWPM	1.31	8.91	70.00					30.00											
8040009957080	Adhesive	3M Co	16 AGS/LGMA	1.31	8.91	70.00					30.00											

Table 11-1 2003 Summary of Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	CY 03 Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt%)	HAP Pollutants (Wt%)															
							Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8040009957080	Adhesive	3M Co	16 AGS/LGMU	3.75	8.91	70.00					30.00											
8040009957080	Spray Trim Adhesive	3M Co	16 TRANS/LGTM	0.56	8.91	70.00																
8040009957080	Spray Trim Adhesive	3M Co	23 STS/LGP	0.25	8.91	70.00																
8040-00-995-7080	Spray Trim Adhesive	Minnesota Mining and Mfg Co	16 LRS/LGTM	2.81	6.83	70.00					40.00											
80400099757080	Spray Trim Adhesive	3 M Co.	16 EMS /LGMJ	0.56	7.54	5.46					30.00									16.00		
8040013757855	Adhesive	Clifton Adhesives Inc.	16 EMS/LGMG	0.13	7.25	33.16											36.00					
8040014509187	Protective Tape Adhesive Promotor	3M Co	16 EMS LGMFE	1.40	7.33	70.00					25.00											
8040PNEC776SR	EC-776-SR Industrial Sealant	3M General Offices	16 HGS/DART	0.25	7.33	91.00												80.00				
80930011840328	Sealing Compound Part2	Prc-Desoto Intl,Inc	16 CRS/LGMP	2.15	11.50	5.00														5.00		
852000N085531	Natural Orange Lotion Hand Cleaner	GOJO Industries Inc	16 SVS/SUMP	4.00	8.50	10.00																
915000D002650	L2 Liquid Wrench	Liquid Wrench	16 TRANS/LGTM	0.38	6.83	100.00																
915000N008812	Solder Seal Liquid Wrench 1	Radiator Specialty Co	16 LRS/LGTM	2.38	6.83	90.00																
915000N008812	Solder Seal Lquid Wrench	Liquid Wrench	16 TRANS/LGTM	0.13	6.83	98.00																
91500113601905	Perma-Slik G Aerosol	E/M Corporation	16 EMS/LGMR	2.00	8.30	85.00										75.00	10.00					
9150012602534	Perma-Slik G Aerosol	E/M Corporation	16 AGS/LGMA	0.38	7.33	20.00						5.00				65.00	10.00				10.00	
9150012602534	Perma-Slik G Aerosol	E/M Corporation	16 CRS/LGMP	0.13	8.33	20.00						5.00				65.00	10.00				10.00	
9150012602534	Perma-Slik G Aerosol	E/M Corporation	16 EMS/LGMG	6.38	8.33	20.00						5.00				65.00	10.00				10.00	
9150012602534	Perma-Slik G Aerosol	E/M Corporation	16 EMS/LGMMC	4.75	8.33	20.00										65.00	10.00				10.00	
9150012602534	Perma-Slik G Aerosol	E/M Corporation	16 EMS/LGMRH	3.70	7.33	20.00						5.00				65.00	10.00				10.00	
9150013601905	Perma-Slik G Aerosol	E/M Corporation	16 EMS/LGMR	1.50	8.30	49.76										75.00	10.00				10.00	
99990LP514530	P/N 51430 Preval Spray Gun	Precision Valve Corp	16 LRS/LGTM	0.17	5.00	100.00																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
801000092146	Orange Fluourescent Spray, 1954 830	16 LRS/LGS	0.98														0.33	0.33	
803000087207	Sealing Compound	16 EMS/ LGMFE	3.00	6.23						9.96							2.49		
1430012056877	Model DPNXL, DYMEL 134A	16 EMS/LGMJ	34.46																
1430012056877	Perfect Duster II	16 HGS/LGMJT	93.25																
1430012056877	Model DPNXL, DYMEL 134 A	16 LRS/LGS	118.16																
3439000695815	611 Mildly Activated Rosin Flux	16 EMS/LGMG	1.12																
3439013737966	RMA 201 Paste Flux	16 HGS/LGMJT	0.23																
6810002056786	E-Z Denatured Solvent Alcohol	16 EMS/LGMMW	6.68								3.85								
6810002056786	E-Z Denatured Solvent Alcohol	16 EMS/LGMWPE	6.72								3.87								
6810002270410	Isopropanol 99%	16 EMS/LGMJ	389.41																
6810002270410	Isopropanol 99%	16 EMS/LGMR	12.98																
6810002270410	Isopropanol 99%	16 HGS/DART	155.76																
6810002270410	Isopropanol 99%	16 HMXS/MXAGW	25.96																
6810002270410	Isopropanol 99%	16 MOS/LG	25.96																
6810005437415	Spec Dentured Ethyl Alcohol	16 EMS/LGMMW	6.84																
6810005437415	Specially Denatured Alcohol	16 LRS/LGTM	63.00								3.19								
6810005843079	Petroleum Ether, ACS	16 LRS/LGSFI	221.67					0.45											
6810008556160	Isopropanol 99%	16 HGS/DART	390.89																
6810008556160	Isopropanol 99%	16 HGS/LGMJT	161.92																
6830005843041	LP-175-005G Turner Tornado	16 LRS/LGTM	1.38																
6850001817594	EZE 429	16 HGS/LGMJT	39.57																
6850002246663	Rifle Bore Cleaner	16 HMXS/MXAGW	0.35																
6850003630841	LPS 3 Heavy Duty Rust Inhibitor	16 HGS/DART	9.68																
6850009262275	So Sure Windshield Cleaner	16 EMS/LGMG	32.52								47.95								

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
6850010150834	51-5-118 Tiotech Blue Toolmakers Ink	16 HGS/DART	1.25											0.09			0.71	0.09	
6850012110986	EB-1 Engine Brite Heavy Duty Engine Cleaner	16 LRS/LGTM	0.27				0.27												
6850012788273	Heavy Duty Engine Cleaner	16 LRS/LGTM	1.07				0.11												
6850013718048	365-1, Electron (A)	16 EMS/LGMG	19.99																
6850013949514	Tuner Renu 2000	16 HGS/LGMJT	6.31																
6850014649152	Fleet Charge Antifreeze & Coolant	16 EMS/LGMG	974.94			974.94													
6850014649152	Fleet Charge Antifreeze & Coolant	16 LRS/LGTM	949.29			949.29													
7510004199564	Stencil Ink White	16 EMS/LGMWMI	8.95														5.04	0.28	
7510004697910	So Sure Stencil Ink Blk 37038 (394-390)	16 EMS/LGMWMI	6.07														3.24	0.60	
7510004697910	So Sure Stencil Ink Blk 37038 (394-390)	16 EMS/LGMWPE	2.79								0.12				0.24			1.30	
7930000606040	Sheila Shine Liquid	16 SVS/SVMF	4.63									1.54						2.93	
7930009353794	Plastic Polish, Liq, Type I IAW P-P-560B	16 EMS/LGMJ	1.09																
7930009353794	Plastic, Polish, Liquid, Type 1 IAW P-P-560B	16 HGS/LGMJT	1.10																
7930013465283	Spray Nine	16 SVS/SVML	4.79				30.59												
7930013971376	F-381 RAM	16 EMS/LGMG	0.85																
7930013980906	9030 Hurrisafe Original	16 LRS/LGTM	7.33				46.73												
7930014712724	Cleaning Compound	16 EMS / MXMG	131.54								4.36						35.51	53.59	
7930014712724	Earth Soap Cleaner/Degreaser	16 EMS/LGMG	114.24																
7930014712724	Earth Soap Cleaner/Degreaser	16 EMS/MXMMC	57.12																
7930014712724	Earth Soap Cleaner/Degreaser	16 HGS/LGMJT	14.28																
8010001818080	T-210 Polyurthane Thinner	16 HGS/DART	39.19											12.02			4.90	3.12	
8010002906158	Paint TTL54C/A1 Type I Black	16 LRS/LGTM	8.15											3.18			1.20	0.58	
8010005824743	So Sure Brown Obliterating Compound	16 EMS/LGMWMI	7.77														3.00	0.75	
8010006169181	So-Sure Light Gray Primer (0234-382)	16 EMS/LGMG	24.11														6.13		

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010006169181	So Sure Light Gray Primer (0234-382)	16 EMS/LGMWPE	1.88														0.53		
8010006410427	Walkway Nonslip Black G 9126	16 HGS/LGMJT	3.67															3.67	
8010007219479	So Sure Orange 12215, 0014-121	16 EMS/LGMWMI	2.82														1.47		
8010008489272	So Sure ID 54-341-P, Olive Drab 34088	16 EMS/LGMWMI	36.81		0.80												6.66	1.59	
8010011462649	Mil-c-85285B, 36231, Type II (03GY236)	16 HGS/DART	1.47		0.01										1.44			0.01	
8010012659143	Cat, Mil-C-85285B	16 HGS/DART	25.94		0.02										16.24				29.23
8010012659143	Mil-C-85285B, 17925 P/C 03W127A	16 HGS/DART	12.97		0.05									0.05			2.45		
8010012659143	Cat, Mil-C-85285B	16 LRS/LGTM	108.03		0.03										28.42				
8010012659143	Mil-C-85285B, 17925 P/C 03W127A	16 LRS/LGTM	13.06		0.09												4.29	0.09	
8010013055551	Mil-C-85285B, 36118, G/S Ty I, 03GY330	16 HGS/DART	22.39		0.40									2.02	2.02		0.40	0.40	
8010013297263	Mil-C-85285B, 12197 PC 03OR047	16 LRS/LGTM	2.45		0.02												0.39	0.06	
8010013297263	12197 Clear Gloss 03OR047Cat	16 LRS/LGTM	34.23												24.90		9.34		
8010013316107	Eco Sure Black 17038 (674-190) Aerosol	16 EMS/LGMG	10.46												0.23			1.78	
8010013316108	Eco-Sure Black 37038	16 EMS/LGMJ	2.40												0.08		0.76	0.08	
8010013316108	Eco Sure Blk, 37038 (0674-390), 0672D899	16 EMS/LGMMS	1.48												0.08		0.38	0.08	
8010013316108	Eco Sure, Blk 37038 (0674-390), 0672D899	16 EMS/LGMR	2.23											0.12			0.57	0.12	
8010013316108	Eco Sure, Black, 37038 (0674-390), 0672D899	16 HGS/DART	16.06												0.60		5.66	0.60	
8010013316108	Eco Sure, Black, 37038 (0674-390), 0672D899	16 HMXS/MXAGW	3.00												0.10		0.94	0.10	
8010013316108	VOC Compiant Spray Paint (Aerosol)	16 LRS/LGS	6.88																
8010013316109	Eco Sure Red 11136 (674-111) 0672D811	16 EMS/LGMG	11.57												0.26			1.94	
8010013316109	Eco Sure Red 11136, (0674-111), 0672D811	16 EMS/LGMWMI	0.97												0.04			0.32	
8010013316112	Eco Sure Olive Drab 24064, Voc Complaint	16 EMS/LGMWPE	137.13												5.98			40.61	
8010013316112	Eco Sure Olive Drab 26=4064	16 HGS/LGMJT	3.88												0.17			0.59	
8010013316112	Eco Sure Olive Drab 2604064	16 HMXS/MXAGW	4.08												0.25			0.85	

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010013316115	Eco Sure Yellow 13538 (0674-130), 0672D830	16 EMS/LGMMS	5.32												0.24			1.72	
8010013323745	Eco Sure Yellow 33538 (0674-330)	16 EMS/LGMWMI	5.90												0.47		1.84	0.47	
8010013363033	MIL-C-85285B, 16473 PC 03GY277	16 HGS/DART	1.40														1.40		
8010013365062	Eco Sure Gray 16099 (0674-180)	16 EMS/LGMMS	5.01												0.33			2.47	
8010013483060	Enamel Aerosol Gray 36118	16 EMS/LGMJ	2.86																
8010013483060	Enamel, Aerosol, Gray 36118	16 HGS/DART	9.79												0.60			2.03	
8010013505259	Eco Sure Red 11136 (0664-111) Aerosol	16 EMS/LGMR	0.50																
8010013623876	Cat, Mil-C-85285B, 14052	16 LRS/LGTM	340.92											78.69					1.09
8010013682633	So Sure Primer Yellow 33637 P/N 782-831	16 EMS/LGMMS	4.61		0.26												0.92	0.77	
8010013871033	Epoxy Comp A, MIL-P-23377G	16 HGS/DART	6.37		0.12													0.12	
8010013871033	Polyamide Comp B, MIL-P-23377G	16 HGS/DART	3.54																
8010014166556	A MIL-PRF-23377G	16 HGS/DART	20.90	39.31	1.12													1.12	
8010014166556	B MIL-PRF-23377G	16 HGS/DART	15.52															0.77	
8010014166557	MIL-P-23377, 02 Y 040	16 HGS/DART	20.90	39.21	1.12													1.12	
8010014166557	MIL-P-23377, 02 Y 040	16 HGS/DART	15.52																
8010014416006	HS SG Green Base Cmpd	16 EMS/LGMG	1.10																
8010014416021	Polyisocyanate 930G017	16 HGS/DART	0.47														0.11	0.11	
8010014416030	Epoxy 513X419	16 HGS/DART	1.57	2.08										0.52	0.52		0.52		
8010014416030	910X942 HS Primer Activator	16 HGS/DART	2.23											0.41				0.20	
8010014416030	Epoxy 513X419	16 HGS/LGMJT	1.57	2.08										0.52	0.52		0.52		
8010014416030	910X942 HS Primer Activator	16 HGS/LGMJT	2.23											0.41				0.20	
8030000087196	Sealing Compound,Base	16 EMS / LGMJ	0.90														0.59		
8030000087196	Pro-Seal 870 A-2 Part B	16 EMS/LGMJ	0.68														1.17		
8030000087196	Pro-Seal 870 A-2 Part A	16 EMS/LGMJ	0.68																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030000087196	Pro-Seal 870 A-2 Part B	16 HGS/DART	12.49														29.38		
8030000087196	Pro-Seal 870 A-2 Part A	16 HGS/DART	28.13														18.75		
8030000650957	Alodine 1201	16 HGS/DART	0																
8030000812339	Rite-Lok Mila-10	16 EMS/LGMG	11.04																
8030001520022	142810 Accelerator, Manganese Dioxide	16 HGS/LGMJT	0.10																
8030005468621	Rubberized Undercoating	16 LRS/LGTM	9.22														9.22		
8030005468637	Corrosion Preventive	16 AGS/LGMHC	0.03																
8030007235345	Sealing Compound (Part 1)	16 EMS/LGMFE	9.60											4.50	3.00				
8030007235345	Sealing Compound (Part 2)	16 EMS/LGMFE	6.31																
8030007235345	Sealing Compound (Part 1)	16 EMS/LGMFS	7.80											3.66	2.44				
8030008387789	LPS 2 Industrial Strength Lubricant	16 SVS/SUMP	3.67																
8030009030931	NOX Rust X0110	16 EMS/LGMJ	0.03																
8030009369940	Scotchcal Brand Edge Sealer 3950	16 EMS/LGMG	2.77		0.18												0.01	3.24	
8030009381947	So Sure Corrosion Preventive Compound	16 EMS/LGMJ	648.55																
8030009381947	So Sure Corrosion Preventive Compound	16 HGS/LGMJT	0.25																
8030010251692	Instabond S-100	16 EMS/LGMR	0.07			0.07													
8030011840328	Sealing Compound, Aircraft	16 EMS/LGMJ	0.37														0.55		
8030011840328	Pro Seal 870 B-1/2 (0870B1) Base	16 EMS/LGMJ	2.28														3.56		
8030011840328	Sealing Compound, Aircraft	16 HGS/DART	1.43														0.48		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Base	16 HGS/DART	3.03														1.52		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Accelerator	16 HGS/DART	23.74																
8030011840328	Sealing Compound, Aircraft	16 HGS/LGMJT	0.82													0.55	0.27		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Base	16 HGS/LGMJT	2.60														1.30		
8030011840328	Pro-Seal 870 B-1/2 (0870B1) Accelerator	16 HGS/LGMJT	20.35																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011840329	0870B1 Pro Seal 870 B1/2 Base Compound	16 EMS/LGMJ	5.32																
8030011840329	B1/2 Accelerator Compound	16 EMS/LGMJ	5.32																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	16 EMS/MXMMC	16.39														16.39		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	16 HGS/DART	7.31														7.31		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Accelerator	16 HGS/DART	2.38																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	16 HGS/LGMJT	13.54														13.54		
8030011840329	0870B1 Pro-Seal 870 B-1/2 Accelerator	16 HGS/LGMJT	51.55																
8030011840329	0870B1 Pro-Seal 870 B-1/2 Base Compound	16 MOS/MXOT	0.37														1.16		
8030012905137	Sealent TO 1-1-3 Part 1	16 CRS/LGMAF	22.39											18.22					
8030012905137	Sealent TO 1-1-3 Part 2	16 CRS/LGMAF	33.04											26.90					
8030012905138	Sealing Compound Part 2	16 CRS/LGMAF	0.13											0.11					
8030012905138	Sealing Compound Part 1	16 CRS/LGMAF	1.90											1.53					
8030012905139	Sealing Cmpd Part 1	16 CRS/LGMAF	1.27											1.27					
8030013470979	Corrosion Preventative Compound	16 MOS/LG	6.70														0.33		
8040001178510	3145 RTV Adhesive Sealant	16 EMS/LGMG	0.93																
8040001178510	3145 RTV Adhesive Sealant-Clear	16 HGS/LGMJT	0.31																
8040001178510	3145 RTV Adhesive Sealant-Clear	16 MOS/MXOT	0.06																
8040001658614	Adhesive, E-1293	16 EMS/MXMMC	9.37																
8040001817188	DEH ® 52 Epoxy Curing Agent, #19199	16 HGS/DART	25.49																
8040001817761	62-4491-4930-0, Super 74 Foam Fast Adhesive	16 EMS/LGMJ	2.38																
8040001817761	Adhesive	16 HGS/DART	16.40																
8040001817761	Adhesive	16 HGS/LGMJT	10.30																
8040001817761	Adhesive	16 LRS/LGTTF	0.00																
8040002009190	Pliobond 20	16 CRS/LGMP	1.41											1.41					

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8040002660824	Adhesive	16 AGS/LGMA	8.08											7.15					
8040002738717	Fastbond 10 Neutral Contact Adhesive	16 EMS/LGMJ	1.53																
8040002738717	Neutral Contact Adhesive Brushable	16 HGS/LGMJT	0.86					0.17								0.17	0.26		
8040003907959	Scotch-grip 847 Rubber and Gasket Adhesive	16 HGS/DART	1.14																
8040004555359	3M Weatherstrip Adhesive	16 LRS/LGTM	4.11					2.05								0.41	0.41		
8040005152246	FA-1030 Accelerator	16 SOS/DOL	1.78					2.15									2.15		
8040005152246	FA-1030 Neutral	16 SOS/DOL	1.78																
8040005437170	Adhesive	16 CRS/LGMAF	6.67					0.73									1.05		
8040008226430	Epon ® Resin 828	16 HGS/DART	175.43											6.39					
8040008263535	Instabond S-100	16 HGS/DART	0.02																
8040008419773	R-373 Rubber Insul. Adhesive #373	16 EMS/LGMJ	0.47																
8040009363275	Scotch-Weld 2214 Regular Epoxy	16 HGS/LGMJT	0.28														0.13		
9150013601905	Aerosol 27 A (MIL L 46147 A Type II)	16 EMS/LGMMS	0.52													0.25			
79300141223681	B & B TC-100N-3-RTU	16 HGS/LGMJT	181.43											0.29					
3439000695815	Flux Soldering	16 EMS/LGMG	0.60																
3439010075494	197 Rosin Flux	16 CRS / LGMVG	0.52																
3439013737966	Flux Soldering	16 CRS/LGMAF	0.96																
5330004792847	Gasket Adhesive	16 CRS/LGMP	0.99																
5970009015331	Insulating Varnish	16 CMS/MXMCE	0.17											0.74					
5970009904924	Humiseal Aerosol	16 CRS/LGMVE	0.65															10.33	
6810002010906	Denatured Alcohol	16 AGS/LGMHC	72.86														0.27	0.01	
6810002056786	Denatured Alcohol	16 EMS /LGMMW	2.40																
6810002056790	Denatured Alcohol	16 AGS/LGMU	13.46								0.31						0.20		
6810002056790	Denatured Alcohol	16 CRS/ LGMVSH	39.28																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
68100022332739	Acetone Technical	16 CRS/LGMP	0.53																
6810002270410	Isopropyl Alcohol	16 CRS/LGMAF	45.60																
6810002270410	Isopropyl Alcohol	16 EMS / LGMJ	390.89																
6810002812002	Toluene	16 EMS/ MXMFS	2.28																
6810002812785	Methyl Ethyl Ketone	16 CRS/LGMAF	66.80														7.17		
6810002865435	Isopropyl Alcohol	16 CRS/LGMAF	39.09											67.47					
6810007534993	Isopropyl Alcohol	16 AGS/LGMHC	32.57																
6810008556160	Isopropyl Alcohol	16 AGS/LGMU	51.46								32.90								
6810008556160	Isopropyl Alcohol	16 CRS/LGMVE	64.32																
6810008556160	Isopropyl Alcohol	16 CS/SCMG	12.86																
6810008556160	Isopropyl Alcohol	16 EMS / LGMFN	18.59																
6810P3103G	Acetone-MEK Solvent	16 CRS/LGMVSH	32.00																
684000F007575	Pre-Emergent Grass & Weed Herbicide	16 SVS/SVBG	2.67								0.32			16.16					
684000F045602	Lesco Spreader-Sticker	16 SVS/SVBG	1.24		0.43													2.24	
684000N035802	Lesco MSMA 6.6	16 SVS/SVBG	1.13																
684000N083102	Illoxan 3EC Herbicide	16 SVS/SVBG	9.75																
684000N084860	Raid Ant & Roach Killer (Aerosol)	16 SVS/SVML	0.65		0.25													1.25	
6840LP264437	Herbicide Buctril	16 SVS/SVBG	11.44																
6850009262275	Windshield Cleaner	16 EMS/LGMG	4.81		1.91													9.53	
6850009739091	Penetrating Fluid	16 EMS/LGMG	1.20								10.65								
685000D002807	Gumout Carburetor and Choke Cleaner	16 LRS/LGTM	59.04																
685000D003017	M38-15 Thrust Quick Start Fluid	16 LRS/LGTM	17.86											10.12				42.17	
685000F026417	A-One #1269	16 SVS/SVML	32.99																
685000N033061	0675, Zep Lemonex	16 SVS/SUMP	4.24																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
685000N033061	0675, Zep Lemonex	16 SVS/SVML	8.48																
685000N033740	Formula 5O #0859	16 SVS/SVML	9.18																
685000N063271	Isopropyl Alcohol	16 CMS/ BAE	52.65				9.18												
6850013980987	Contact Cleaner	16 CRS/ LGMVSH	0.15																
6850PNF180	F180 Air Fair Sprmnt Conc & F183 Lemon	16 SVS/SUMP	2.50																
6850PNF180	F180 Air Fair Sprmnt Conc & F183 Lemon	16 SVS/SVML	14.99																
7510004199564	Ink Marking Stencil	16 EMS /LGMWPM	18.07																
7510004697910	S0-Sure Stencil Ink	16 EMS/ MXMFS	2.10														8.74	0.58	
793000D007473	817-1212 Simple Green (1 Gal)	16 SVS/SVMF	0.17														2.33	0.23	
793000F014151	Honor Guard Edge Dressing, Black	16 SVS/LGMJP	1.04			0.17													
793000F034678	SSS Dust Mop Treatment (Aerosol)	16 SVS/SUMP	6.82								0.01						0.72		
7930014712724	Cleaning Compound	16 AGSOC/CEF	323.27																
7930PN1052	Zep Concentrated Glass Clnr	16 SVS/SUMP	2.50																
7930PN5822	Floor Treatment	16 SVS/SUMP	7.50																
8010001412952	Spray Paint, Aerosol	16 CRS / LGMPS	1.42																
8010001412952	Spray Paint, Aerosol	16 EMS /LGMMW	0.60											0.13			0.71		
8010001412952	Spray Paint, Aerosol	16 EMS/ LGMFE	28.40											0.13			0.71		
80100014229273	Paint Stripper	16 EMS/ LGMFE	105.81											2.70			14.12		
8010001818080	C S D Inc Thinner, Aircraft Coating	16EMS/LGMFE	77.38																
8010001818080	C S D Inc Thinner, Aircraft Coating	823 RH/LGTMA	9.10											73.42			25.28	16.85	
8010002906984	Aerosol Lacquer Black	16 CRS / LGMVG	5.27											8.64			2.97	1.98	
8010002906984	Aerosol Lacquer Black	16 CRS /LGMSH	1.32														1.78		
8010003487716	Paint Remover	16 CES / CEOHH	39.73														0.45		
8010005824743	Paint,Rubber	16 CRS / LGMPS	83.79										27.55						

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010005824743	Paint,Rubber	16 EMS /LGMWPM	51.36														10.75	2.69	
8010005825382	So-Sure Flat Black	16 CRS / LGMVG	2.94														6.59	1.65	
8010005825382	So-Sure Flat Black	16 EMS/ LGMFE	32.32			0.06								0.18			1.37	0.06	
8010005825383	So Sure Flat Black	16 AGS/LGMHC	0.60			0.66								1.99			15.08	0.66	
8010005843150	So-Sure White	16 CRS / LGMVG	0.92																
8010006169143	So-Sure Black 37038	16 CRS/LGMVSH	0.59														0.19		
8010006169181	So-Sure Gray Primer	16 EMS / MXMG	3.63														0.15		
8010006641914	So-Sure Gray Primer	16 CRS /LGMVCS	6.55														1.42	2.12	
8010006641914	So-Sure Gray Primer	16 CRS/LGMP	7.24														0.88	0.29	
8010006641914	So-Sure Gray Primer	16 EMS / LGMWPE	9.61		0.15												0.44	0.15	
8010007219751	So-Sure Lacquer	16 EMS /LGMWPM	14.96														1.75	0.58	
8010009881458	So-Sure Blue	16 EMS /LGMWPM	8.80														7.52		
801000F014161	7300 Zip-Strip Water Rinsable	16 SVS/LGRO	17.09		0.80												2.40		
801000F040683	20004 Flat Black Wal-Mart Spray Enamel	16 LRS/LGSFI	4.91								0.39		15.71						
801000F041315	Rust-Oleum Professional Coating	16 LRS/LGS	1.41														1.55		
801000F051424	230 Red/Orange Flourescent	16 SVS/SUMP	2.04		0.11									0.05			0.55	0.62	
801000LP05975	Paint Buster Hand Cleaner, 5975	16 LRS/LGTM	0.04															0.58	
801000LPV6V79	Acrylic Urethane, V6V769	16 LRS/LGTM	2.26								0.00								
801000N010234	Mineral Spirits	16 EMS /LGMWPM	15.89																
801000N064813	Auto Spray Colors	16 LRS/LGS	1.83																
80100133116119	Eco-Sure Blue	16 EMS / MXMG	3.42											0.12			0.17		
8010013316108	Eco Sure,Black	16 EMS / LGMWPE	1.20												0.44			3.07	
8010013316108	Eco-Sure Black	16 EMS / MXMG	3.20														0.76	0.16	
8010013316108	Eco-Sure Black	16 EMS /LGMWPM	8.54												0.53			4.49	

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010013316109	Eco-Sure Red	16 EMS / MXMG	3.42												1.41			11.98	
8010013316111	Enamel Aerosol,OD	16 CRS/ LGMPS	13.64												0.52			3.86	
8010013316111	Enamel Aerosol,OD	16 CRS/LGMVE	22.74												0.76			5.41	
8010013316114	Eco-Sure Yellow	16 EMS /LGMWPM	7.66											2.49	2.49			8.72	
8010013363980	Eco-Sure Green	16 EMS /LGMWPM	14.61												0.69			1.87	
8010013483060	Eco-Sure,Gray	16 EMS / LGMJ	9.14												0.66			4.42	
80100135004746	Eco-Sure,Black	16 CRS /LGMVCS	0.41												0.40			2.71	
8010013504747	Eco-Sure,Black	16 CRS /LGMVCS	0.59																
8010013504747	Eco Sure Black	16 CRS/LGMP	3.04																
8010013505250	Eco Sure, Olive	16 EMS/LGMWPM	1.85																
8010013505259	Eco Sure, Red	16 AGS/LGMU	5.02				0.17												
8010013505259	Eco-Sure Red	16 EMS /LGMWPM	27.05				0.46												
8010013505259	Eco Sure, Red	16 EMS/LGMMS	1.00																
8010013505260	Eco Sure, Red	16 EMS/LGMWMI	5.74				0.09												
8010014166556	Epoxy Primer	16 EMS/ LGMFE	153.54				0.56												
8010014416006	835G073 24052 Green	16 EMS / MXMG	3.42																
8010014416006	835G073 24052 Green	16 EMS/LGMG	6.33															1.12	
801001446030	Epoxy Primer	16 EMS / LGMJ	1.17															1.05	
8010014828620	Epoxy Primer	16 EMS/ LGMFE	276.88																
80100LPV6V241	Acrylic Hardener	16 CRS/LGMAF	307.08		6.14													6.14	
80100LPV6V241	Polasol Hardener, V^ V241	16 LRS/LGTM	370.65					207.92										63.97	
8010AB692M	Aerosol Lacquer Black	16 CES/ CEOFA	32.29		16.47													82.37	4.12
8010HM0013	Olympic Fasthid Int S/G White #78011	16 LRS/LGS	61.85								0.42						6.64	6.64	
8010LP53725	Ultra 7000 Basecoat System	16 LRS/LGTM	0.92																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8010LPPN7604	Universal Urethane Activator 7601, 7604	16 LRS/LGTM	7.09		0.12												0.08	0.65	
8010LPUS3GL	US3/ Ultrasystem Reducer	16 LRS/LGTM	8.91		1.47										1.65			6.05	
8010LPUW556	Hi-Glo Synthetic Enamel	16 LRS/LGTM	0.94											8.70	0.22				
8010LPWS85100	Hi-Glo Synthetic Enamel Reducers	16 LRS/LGTM	9.79														0.94		
8010PN1863	Paint, Red	16 CES / CEOIE	42.07														9.79		
8010-PW-KND-358	Weekend Spray Enamel 358 Gloss Black	16 LRS/LGTTF	61.23														13.72		
8010-U7-468-29S	Sherwin Williams	16 LRS/LGTM	0.15		3.75													23.74	
8030000087196	Sealing Compound (Base)	16 AGS/LGMHC	1.36																
8030000087196	Sealing Compound (Accelerator)	16 AGS/LGMHC	4.50														0.88		
8030000087196	Sealing Compound (Base)	16 CRS/LGMPC	0.45	2.81						4.50									
8030000087196	Sealing Compound (Accelerator)	16 CRS/LGMPC	1.50														0.29		
80300000LP334	Bondo UV Body Filter	16 LRS/LGTM	2.75	0.94						1.50									
803000087200	Pro-Seal 870 B-2	16 AGS/LGMHC	0.90																
8030001180666	PLS-3 Heavy Duty Rust Inhibitor	16 HGS/LGMJT	1.24											0.30			0.30		
8030001487362	Sealing Compound (Part A)	16 AGS/LGHMC	0.07																
8030001487362	Sealing Compound	16 CMS/LGMP	0.31														0.07		
8030001487362	Sealing Compound (Part A)	16 CRS/LGMP	0.13														0.21		
8030001520022	Sealing Compound	16 EMS / MXMG	0.73														0.14		
8030002523391	GS-3 Gasket Sealer	16 EMS/LGMG	0.73								2.82								
8030005997753	Form-A-Gasket	16 AGS/LGMA	0.22																
8030005997753	Form-A-Gasket	16 AGS/LGMHC	0.40																
8030005997753	Form-A-Gasket	16 AGS/LGMU	0.40																
8030005997753	Form-A-Gasket	16 CRS/LGMP	0.46																
8030005997753	Form-A-Gasket	16 CRS/LGMPS	0.46																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030007235345	Sealing Compound Part1	16 EMS /LGMFS	7.80																
8030007235345	Sealing Compound Part2	16 EMS /LGMFS	5.13												3.66		2.44		
8030007235345	Sealing Compound,Part 1	16 EMS/ LGMFE	9.60																
8030007235345	Sealing Compound,Part 2	16 EMS/ LGMFE	6.31											4.50	3.00				
8030007535008	Sealing Compound (Part 1)	16 CRS/LGMAF	0.76																
8030007535008	Sealing Compound (Part 2)	16 EMS/LGMFS	5.13														1.17		
8030009030931	NOX Rust	16 CRS/LGMP	6.67																
8030009030931	NOX Rust	16 HGS/LGHJ	1.67																
8030009369940	Sealing Compound	16 EMS / MXMG	1.14																
8030009369940	Sealing Compound	16 EMS/LGMG	4.26		0.13												0.00	1.77	
8030009381947	Corrosion Preventive	16 AGS/LGMU	4.38		0.51												0.01	7.07	
8030009381947	Corrosion Preventative	16 CRS / LGMVG	0.73																
8030009381947	Corrosion Preventive	16 CRS/LGMP	0.73																
8030009381947	Corrosion Preventative	16 EMS /LGMWPM	4.38																
8030009381947	Corrosion Preventive	16 EMS/LGMWPM	0.73																
803000N065394	Corrosion Block Non-Flammale Aerosol	16 SVS/SUMP	0.21																
8030011250055	Sealing Compound	16 AGS/LGMHC	0.37																
8030011250055	Sealing Compound	16 CRS/LGMVCN	1.64																
8030011250055	Sealing Compound	16 CRS/LGMVSH	0.19								1.19								
80300118400329	Sealing Compound Part 1	16 EMS/MXMMC	52.30								0.14								
80300118400329	Sealing Compound Part 2	16 EMS/MXMMC	22.74																
8030011840328	Sealing Compound Part1	16 AGS/LGMA	7.32											7.58					
8030011840328	Sealing Compound Part2	16 AGS/LGMA	1.05																
8030011840328	Sealing Compound (Part 1)	16 AGS/LGMHC	12.96														1.05		

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011840328	Sealing Compound (Part 2)	16 AGS/LGMHC	1.85																
8030011840328	Sealing Compound Part2	16 CRS/ LGMAP	0.25														1.85		
8030011840328	Sealing Compound Part1	16 CRS/LGMAP	1.73														0.25		
8030011840328	Sealing Compound (Part 2)	16 CRS/LGMFE	2.02																
8030011840328	Sealing Compound (Part 1)	16 CRS/LGMP	8.65														2.02		
8030011840328	Sealing Compound (Part 2)	16 CRS/LGMP	1.24																
8030011840328	Sealing Compound (Part 2)	16 CRS/LGMR	0.86														1.24		
8030011840328	Sealing Compound (Part 1)	16 CRS/LGMVE	46.39														0.86		
8030011840328	Sealing Compound (Part 2)	16 CRS/LGMVE	6.63																
8030011840328	Sealing Compound	16 EMS / LGMJ	2.96														6.63		
8030011840328	Sealing Compound (Part 1)	16 EMS/LGMFE	14.12														0.27		
8030011840328	Sealing Compound (Part 1)	16 EMS/LGMR	6.04																
8030011840328	Sealing Compound (Part 2)	16 HGS/LGMJ	32.04																
8030011840328	Sealing Compound (Part 1)	16 HGS/LGMJT	28.12														32.04		
8030011840328	Sealing Compound (Part 2)	16 HGS/LGMJT	4.02																
8030011840328	Sealing Compound Part2	16CRS/LGMVE	6.63														4.02		
8030011840329	Sealing Compound (Part 1)	16 AGS/LGMA	13.60														6.63		
8030011840329	Sealing Compound (Part 2)	16 AGS/LGMA	5.91																
8030011840329	Sealing Compound (Part 1)	16 AGS/LGMHC	45.26											1.97					
8030011840329	Sealing Compound (Part 2)	16 AGS/LGMHC	19.68																
8030011840329	Sealing Compound (Part 1)	16 AGS/LGMU	26.23											6.56					
8030011840329	Sealing Compound (Part 2)	16 AGS/LGMU	11.41																
8030011840329	Sealing Compound Part1	16 CRS/LGMP	16.09											3.80					
8030011840329	Sealing Compound Part2	16 CRS/LGMP	0.82																

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030011840329	Sealing Compound (Part 1)	16 CRS/LGMP	32.19											0.27					
8030011840329	Sealing Compound (Part 2)	16 CRS/LGMP	13.99																
8030011840329	Sealing Compound (Part 1)	16 CRS/LGMVE	46.35											4.66					
8030011840329	Sealing Compound (Part 2)	16 CRS/LGMVE	20.15																
8030011840329	Sealing Compound Part1	16 EMS / LGMJ	49.09											6.72					
8030011840329	Sealing Compound Part2	16 EMS / LGMJ	49.09														7.76		
8030011840329	Sealing Compound Part 1	16 EMS/ LGMFE	60.35																
8030011840329	Sealing Compound Part 2	16 EMS/ LGMFE	49.60																
8030011840329	Sealing Compound (Part 1)	16 EMS/LGMFE	60.71												8.75				
8030011840329	Sealing Compound (Part 2)	16 EMS/LGMFE	26.40																
8030011840329	Sealing Compound (Part 1)	16 EMS/LGMMC	61.36											8.80					
8030011840329	Sealing Compound (Part 2)	16 EMS/LGMMC	26.68																
8030011840329	Sealing Compound (Part 1)	16 HGS/DART	26.86											8.89					
8030011840329	Sealing Compound (Part 2)	16 HGS/DART	11.68																
8030011840329	Sealing Compound (Part 1)	16 HGS/LGMJ	9.05											3.89					
8030011840329	Sealing Compound (Part 2)	16 HGS/LGMJ	3.94																
8030011840329	Sealing Compound (Part 1)	16 HGS/LGMJT	44.70											1.31					
8030011840329	Sealing Compound (Part 2)	16 HGS/LGMJT	19.43																
8030011840329	Sealing Compound (Part 1)	16 LSS/LGLT	12.63											6.48					
8030011840329	Sealing Compound (Part 2)	16 LSS/LGLT	5.49																
8030011840329	Sealing Compound (Part 1)	6 SOS/UFLT	3.02											1.83					
8030011840329	Sealing Compound (Part 2)	6 SOS/UFLT	1.31																
8030012905135	Sealing Compound (Part 2)	16 AGS/LGMHC	0.01											0.44					
8030012905135	Sealing Compound	16 CRS/LGMVE	6.58											0.01					

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8030012905135	Sealing Compound	16CRS/LGMAF	0.21																
8030012905139	Sealing Cmpd part 2	16 CRS/LGMAF	1.50											0.21					
8030013470980	Corrosion Preventive Compound	16 CRS/LGMAE	6.36											1.36					
8030013470980	Corrosion Preventative	16 EMS / LGMWPE	0.60														0.43		
8030013871131	Corrosion Preventive Compound	16 HGS/DART	2.39														0.16		
8030013871131	Corrosion Preventive Compound	16 HGS/LGMJ	1.67																
8040000168662	Adhesive	16 CRS/LGMVE	0.55																
8040001658614	Rubber Adhesive	16 AGS/LGMA	0.37																
8040001658614	Rubber Adhesive	16 CRS/ LGMVSH	0.37					0.05									0.12		
8040001658614	Rubber Adhesive	16 EMS/LGMFE	0.37					0.05									0.12		
8040001658614	Rubber Adhesive	16 EMS/LGMMC	5.57					0.05									0.12		
8040001817761	Adhesive	16 AGS/LGMA	4.98					0.76									1.77		
8040001817761	Adhesive	16 AGS/LGMU	14.27																
8040001817761	Adhesive	16 EMS/LGMWPM	4.98																
8040001817761	Adhesive	16 HGS/DART	5.71																
8040001817761	Adhesive	16 HGS/LGMJ	30.44																
8040001817761	Adhesive	16 TRNS/LGTTF	93.44																
8040002009190	Pliobond 20	16 CRS/LGMAP	1.41																
8040002629011	Adhesive	16 AGS/LGMA	0.07																
8040002629011	Adhesive	16 AGS/LGMA	0.79											0.05			0.01		
8040002629011	Adhesive	16 AGS/LGMU	0.07											0.57			0.11		
8040002629011	Adhesive	16 CRS/LGMAP	0.07											0.05			0.01		
8040002629011	Adhesive	16 CRS/LGMAP	0.07											0.05			0.01		
8040002660824	Adhesive	16 EMS /LGMFS	1.35											0.05			0.01		

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
8040002738717	Adhesive	16 HGS/LGMJ	1.71											1.19					
8040005152246	Adhesive, Rubber (Part 2)	16 EMS/LGMFS	3.03					1.19									0.42		
8040005152246	Adhesive FA-1030	16 EMS/LGMFS	1.36					2.16									2.16		
8040005152246	Adhesive, Rubber (Part 1)	16 SOS/DOL	2.24								1.36								
80400099557080	Adhesive	16 EMS /LGMWPM	8.17					1.60									1.60		
8040009957080	Adhesive	16 AGS/LGMA	8.17					3.50											
8040009957080	Adhesive	16 AGS/LGMU	23.40					3.50											
8040009957080	Spray Trim Adhesive	16 TRANS/LGTM	3.49					10.03											
8040009957080	Spray Trim Adhesive	23 STS/LGP	1.56																
8040-00-995-7080	Spray Trim Adhesive	16 LRS/LGTM	13.45																
80400099757080	Spray Trim Adhesive	16 EMS /LGMJ	0.23					7.68											
8040013757855	Adhesive	16 EMS/LGMG	0.31					1.27									0.68		
8040014509187	Protective Tape Adhesive Promotor	16 EMS LGMFE	7.18											0.34					
8040PNEC776SR	EC-776-SR Industrial Sealant	16 HGS/DART	1.67					2.57											
80930011840328	Sealing Compound Part2	16 CRS/LGMP	1.24												1.47				
852000N085531	Natural Orange Lotion Hand Cleaner	16 SVS/SUMP	3.40														1.24		
915000D002650	L2 Liquid Wrench	16 TRANS/LGTM	2.56																
915000N008812	Solder Seal Liquid Wrench 1	16 LRS/LGTM	14.60																
915000N008812	Solder Seal Lquid Wrench	16 TRANS/LGTM	0.84																
91500113601905	Perma-Slik G Aerosol	16 EMS/LGMR	14.10																
9150012602534	Perma-Slik G Aerosol	16 AGS/LGMA	0.56										12.45	1.66					
9150012602534	Perma-Slik G Aerosol	16 CRS/LGMP	0.21						0.14				1.81	0.28				0.28	
9150012602534	Perma-Slik G Aerosol	16 EMS/LGMG	10.62						0.05				0.68	0.10				0.10	
9150012602534	Perma-Slik G Aerosol	16 EMS/LGMMC	7.91						2.66				34.52	5.31				5.31	

Table 11-2 Actual 2003 Emissions from Miscellaneous Chemicals Used (continued)

Chemical NSN (without dashes)	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)															
				Chromium	Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Hexane	Lead	Manganese	Methanol	Methyl Chloroform	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Phenol	Toluene	Xylenes	Hexamethyl 1,6-Diisocyanate
9150012602534	Perma-Slik G Aerosol	16 EMS/LGMRH	5.42										25.72	3.96				3.96	
9150013601905	Perma-Slik G Aerosol	16 EMS/LGMR	6.19						1.36				17.63	2.71				2.71	
99990LP514530	P/N 51430 Preval Spray Gun	16 LRS/LGTM	0.85										9.33	1.24				1.24	
		TOTAL	**1.15E+04**	**9.27E+01**	**3.64E+01**	**1.93E+03**	**8.82E+01**	**2.48E+02**	**2.85E+00**	**1.60E+01**	**1.14E+02**	**1.54E+00**	**1.18E+02**	**4.46E+02**	**1.16E+02**	**1.38E+00**	**4.39E+02**	**4.82E+02**	**3.44E+01**

SECTION 12
OPEN DETONATION OF ENERGETIC MATERIALS

12.1 Background

Open Detonation (OD) is the method used to dispose of waste energetic material at Hurlburt Field. Energetic materials include items such as small arms ammunition, demolition charges, blasting caps, time blasting fuses, time blasting igniters, detonating cord, bulk explosives (e.g., TNT, Dynamite), etc. Table 12-1 on page 12-4 provides summary information on the energetic materials open detonated at Hurlburt Field during 2003.

12.2 Emissions Calculation Methods

Emissions from OD are best calculated by multiplying the quantity of energetic material contained in an item times emission factors that are specific to that item. Although some item-specific emission factors have been developed from studies performed by the Army and Environmental Protection Agency (EPA), very few are available for the types of items which are open detonated at Hurlburt Field. Therefore, more general emission factors (obtained from References 1 & 2) can be used. These general emission factors are listed in Tables 12-2 and 12-3 below.

Table 12-2 Average Emission Factors for Selected Open Detonation Pollutants

Pollutant	Category	No. of Sample Values[a]	Mean Emission Factor (lb/lb)[b]
PM_{10}	Encapsulated	12	0.30
	Bulk	8	0.13
Total Hydrocarbons	Encapsulated	11	8.6×10^{-4}
	Bulk	8	1.8×10^{-4}
Benzene	Encapsulated	11	6.9×10^{-5}
	Bulk	8	9×10^{-6}
Toluene	Encapsulated	11	2.6×10^{-5}
	Bulk	8	4×10^{-6}

[a] All samples are from Bang Box testing
[b] Pound pollutant emitted per pound of energetic material detonated

Table 12-3 Average Co and NO_X Emission Factors for Open Detonation

Pollutant	Mean Emission Factor
CO	0.0394 pounds per pound of carbon in energetic material detonated
NO_X	0.0178 pounds per pound of nitrogen in energetic material detonated

Before emissions from open burning or open detonation of a particular item can be calculated, the total Mass of Energetic Material (MEM) associated with that item must be determined. For bulk items, such as TNT or C-4, the total MEM is usually provided directly. However, for encapsulated items the total MEM usually must be calculated based on the MEM per item and

the total number of items open detonated during the year. The following equation is used for each different encapsulated item:

$$MEM_{total} = MEM_{item} * NI * 0.002205$$

Where,

MEM_{total} = Total mass of energetic material open burned or open detonated during the year (lb/yr)
MEM_{item} = Mass of energetic material in a single item (grams/item)
NI = Number of items burned or detonated during the year (items/yr)
0.002205 = Conversion factor to go from grams to pounds (lb/gm)

Once the total MEM is known, emissions associated with the open detonation of a particular item can be calculated using the appropriate equation that is dependent on the pollutant. For PM_{10}, CO, NO_x, VOC, Benzene, and Toluene; emissions are calculated using the following equation:

$$E_{pol} = MEM_{total} * EF$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
MEM_{total} = Mass of energetic material open burned or open detonated during the year (lb/yr)
EF = Emission factor (lb/lb)

Finally, small amounts of lead can be found in the energetic material of some of the items that are open detonated at Hurlburt Field. Lead emissions can be calculated using a mass balance approach in which it is assumed that the total amount of lead in the energetic material is emitted. The following equation is used:

$$E_{Pb} = MEM_{total} * WP_{Pb}/100$$

Where,

E_{Pb} = Emissions of lead (lb/yr)
MEM_{total} = Mass of energetic material open detonated during the year (lb/yr)
WP_{Pb} = Weight percent lead in the energetic material (%)

12.3 Sample Calculations

The following is an example calculation for determining actual emissions from open detonation of the ML05 Mk-24 Explosive Cutter at Hurlburt Field during CY 2003:

Mass of energetic material per round:	7,686.94 grains/item (498.11 grams/item)
Number of rounds open detonated:	8 items

First calculate the total MEM detonated during the year:

MEM_{total} = MEM_{item} * NI * 0.002205
MEM_{total} = 498.11 grams/item * 8 items/yr * 0.002205 lb/grams = 8.79 lb/yr

Second, calculate emissions of CO, NO_x, PM_{10}, VOC, Benzene, and Toluene:

E_{pol} = MEM_{total} * EF
E_{CO} = 8.79 lb/yr * (0.0394 lb/lb) = **3.5×10^{-1} lb/yr**
E_{NOx} = 8.79 lb/yr * (0.0178 lb/lb) = **1.6×10^{-1} lb/yr**
E_{PM10} = 8.79 lb/yr * (0.30 lb/lb) = **2.6×10^{0} lb/yr**
E_{VOC} = 8.79 lb/yr * (8.6×10^{-4} lb/lb) = **7.6×10^{-3} lb/yr**
$E_{Benzene}$ = 8.79 lb/yr * (6.9 x 10-5 lb/lb) = **6.1×10^{-4} lb/yr**
$E_{Toluene}$ = 8.79 lb/yr * (2.6×10^{-5} lb/lb) = **2.3×10^{-4} lb/yr**

Finally, calculate the Pb emissions:

E_{Pb} = MEM_{total} * WP_{Pb}/100
E_{Pb} = 8.79 lb/yr * 0.0%/100 = **0 lb/yr**

12.4 Emissions Summary

2003 emissions from open detonation operations at Hurlburt Field are provided in Table 12-4 on page 12-5.

12.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 22), May 1999. AFIOH/RSEQ, Brooks AB TX.

2. U.S. Environmental Protection Agency, *Emission Factors for the Disposal of Energetic Materials by Open Burning and Open Detonation (OB/OD)*, Draft Version, 17 July 1998.

3. U.S. Army Defense Ammunition Center, *Munitions Items Disposition Action System (MIDAS)*, Central Library Version 74, 1 May 1998.

4. U.S. Army, *Ammunition Book Complete*, 21 July 1997.

5. U.S. Army Armament, Munitions and Chemical Command, *Development of Methodology and Technology for Identifying and Quantifying Emission Products from Open Burning and Open Detonation Thermal Treatment Methods*, Field Test Series A, B, and C, Volume 1 - Test Summary, January 1992.

Table 12-1 2003 Summary of Open Detonation Operations

Item Name	Stock Number	Number of Items Detonated in 2003	Mass of Energetic Material per Item (grains/item)	Lead Content (Wt %)[a]
Encapsulated Items				
A363 9mm Ball NATO	1305-01-172-9558	50	5.52	2.32
A555 .50 Cal Ball Linked	1305-00-555-4056	230	235.25	0.36
A555 .50 Cal Ball Linked	1305-00-028-6574	40	235.25	0.38
G900 M14 Thermite Grenade	1330-00-219-8557	38	10,858.86	1.54
G945 M18 Yellow Smoke Grenade	1330-00-289-6854	10	102.49	0.91
G950 M18 Red Smoke Grenade	1330-00-289-6852	10	102.49	0.91
L378 M80 Explosive	1370-00-028-5252	6	46.31	0.00
L495 M49A1 Trip Flare	3170-00-752-8060	4	5,262.78	0.00
M130 M6 Electric Cap	1375-01-192-9174	182	16.30	25.56
M131 M7 Non-Elec Cap	1375-01-057-6439	195	14.50	33.10
M174 .50 Cal Elec Imp	1385-00-605-0253	22	903.57	0.00
M627 M5 Firing Device	1375-00-028-5192	10	0.40	38.13
M766 M60 Time Fuze Igniter	1375-00-691-1671	230	0.40	15.25
ML03 M142 Firing Device	1375-01-040-1526	10	0.33	53.00
ML04 MK 23 Cutter	3175-01-037-5428	8	1,252.53	0.00
ML05 MK 24 Cutter	1375-01-037-5429	8	7,686.94	0.00
ML09 FLSC 20 Gr/Ft	1375-01-083-2820	1	79.80	0.00
ML10 FLSC 30 Gr/Ft	1375-01-082-9919	1	120.00	0.00
ML11 FLSC 40 Gr/Ft	1375-01-082-9920	1	160.00	0.00
ML13 FLSC 75 Gr/Ft	1375-01-082-9921	1	300.00	0.00
ML14 FLSC 125 Gr/Ft	1375-01-082-9922	1	500.00	0.00
ML16 FLSC 300 Gr/Ft	1375-01-082-9924	1	1,200.00	0.00
ML18 FLSC 500 Gr/Ft	1375-01-082-9925	1	2,000.00	0.00
ML19 FLSC 600 Gr/Ft	1375-01-083-2821	1	2,400.00	0.00
Bulk Items				
Det Cord 50 Gr/Ft	1375-00-167-3814	1000	200.00	0.00
M023 M112 Demo Chg, C-4	1375-01-389-3854	300	8,750.00	0.00
M023 M112 Demo Chg, C-4	1375-00-724-7040	3	8,750.00	0.00
M031 1/2 lb TNT	1375-00-926-9316	15	3,430.00	0.00
M118 2 lb PETN Charge	1375-00-728-5941	20	14,000.00	0.00
M183 Demo Chg Assy	1375-00-926-3985	4	8,812.56	0.00
M420 15 lb Comp B	1375-00-926-3939	4	70,740.76	0.00
M421 M3A2 40 lb Comp B	1375-00-088-6691	4	140,740.76	0.00
M456 Detonating Cord	1375-00-180-9356	4780	154.00	0.00
M591 M1 Military Dynamite	1375-00-724-9613	40	2,590.00	0.00
M670 M700 Time Fuze	1375-00-028-5246	2300	18.90	0.00
M980 Detasheet .83	1375-01-036-0443	1	140,000.00	0.00
MN33 Det Cord 200 Gr/Ft	1375-01-445-9546	55	800.00	0.00

Table 12-4 2003 Emissions from Open Detonation Operations

Item Name	Total MEM (lb/yr)	CO (lb/yr)	NO_X (lb/yr)	PM_{10} (lb/yr)	VOC[a] (lb/yr)	Benzene (lb/yr)	Toluene (lb/yr)	Lead (lb/yr)
Encapsulated Items								
A363 9mm Ball NATO	0.04	1.6E-03	7.0E-04	1.2E-02	3.4E-05	2.7E-06	1.0E-06	9.1E-04
A555 .50 Cal Ball Linked	7.73	3.0E-01	1.4E-01	2.3E+00	6.6E-03	5.3E-04	2.0E-04	2.8E-02
A555 .50 Cal Ball Linked	1.34	5.3E-02	2.4E-02	4.0E-01	1.2E-03	9.3E-05	3.5E-05	5.1E-03
G900 M14 Thermite Grenade	58.95	2.3E+00	1.0E+00	1.8E+01	5.1E-02	4.1E-03	1.5E-03	9.1E-01
G945 M18 Yellow Smoke Grenade	0.15	5.8E-03	2.6E-03	4.4E-02	1.3E-04	1.0E-05	3.8E-06	1.3E-03
G950 M18 Red Smoke Grenade	0.15	5.8E-03	2.6E-03	4.4E-02	1.3E-04	1.0E-05	3.8E-06	1.3E-03
L378 M80 Explosive	0.04	1.6E-03	7.1E-04	1.2E-02	3.4E-05	2.7E-06	1.0E-06	0.0E+00
L495 M49A1 Trip Flare	3.01	1.2E-01	5.4E-02	9.0E-01	2.6E-03	2.1E-04	7.8E-05	1.0E-04
M130 M6 Electric Cap	0.42	1.7E-02	7.5E-03	1.3E-01	3.6E-04	2.9E-05	1.1E-05	1.1E-01
M131 M7 Non-Elec Cap	0.40	1.6E-02	7.2E-03	1.2E-01	3.5E-04	2.8E-05	1.1E-05	1.3E-01
M174 .50 Cal Elec Imp	2.84	1.1E-01	5.1E-02	8.5E-01	2.4E-03	2.0E-04	7.4E-05	0.0E+00
M627 M5 Firing Device	0.00	2.3E-05	1.0E-05	1.7E-04	4.9E-07	3.9E-08	1.5E-08	2.2E-04
M766 M60 Time Fuze Igniter	0.01	5.2E-04	2.3E-04	3.9E-03	1.1E-05	9.1E-07	3.4E-07	2.0E-03
ML03 M142 Firing Device	0.00	1.9E-05	8.4E-06	1.4E-04	4.1E-07	3.3E-08	1.2E-08	2.5E-04
ML04 MK 23 Cutter	1.43	5.6E-02	2.5E-02	4.3E-01	1.2E-03	9.9E-05	3.7E-05	0.0E+00
ML05 MK 24 Cutter	8.79	3.5E-01	1.6E-01	2.6E+00	7.6E-03	6.1E-04	2.3E-04	0.0E+00
ML09 FLSC 20 Gr/Ft	0.01	4.5E-04	2.0E-04	3.4E-03	9.8E-06	7.9E-07	3.0E-07	0.0E+00
ML10 FLSC 30 Gr/Ft	0.02	6.8E-04	3.1E-04	5.1E-03	1.5E-05	1.2E-06	4.5E-07	0.0E+00
ML11 FLSC 40 Gr/Ft	0.02	9.0E-04	4.1E-04	6.9E-03	2.0E-05	1.6E-06	5.9E-07	0.0E+00
ML13 FLSC 75 Gr/Ft	0.04	1.7E-03	7.6E-04	1.3E-02	3.7E-05	3.0E-06	1.1E-06	0.0E+00
ML14 FLSC 125 Gr/Ft	0.07	2.8E-03	1.3E-03	2.1E-02	6.1E-05	4.9E-06	1.9E-06	0.0E+00
ML16 FLSC 300 Gr/Ft	0.17	6.8E-03	3.1E-03	5.1E-02	1.5E-04	1.2E-05	4.5E-06	0.0E+00
ML18 FLSC 500 Gr/Ft	0.29	1.1E-02	5.1E-03	8.6E-02	2.5E-04	2.0E-05	7.4E-06	0.0E+00
ML19 FLSC 600 Gr/Ft	0.34	1.4E-02	6.1E-03	1.0E-01	2.9E-04	2.4E-05	8.9E-06	0.0E+00
Encapsulated Total (lb/yr)		**3.40**	**1.54**	**25.88**	**0.07**	**5.95E-03**	**2.24E-03**	**1.19**
Bulk Items								
Det Cord 50 Gr/Ft	28.57	1.1E+00	5.1E-01	8.6E+00	2.5E-02	2.0E-03	7.4E-04	0.0E+00
M023 M112 Demo Chg, C-4	375.00	1.5E+01	6.7E+00	1.1E+02	3.2E-01	2.6E-02	9.8E-03	0.0E+00
M023 M112 Demo Chg, C-4	3.75	1.5E-01	6.7E-02	1.1E+00	3.2E-03	2.6E-04	9.8E-05	0.0E+00
M031 1/2 lb TNT	7.35	2.9E-01	1.3E-01	2.2E+00	6.3E-03	5.1E-04	1.9E-04	0.0E+00
M118 2 lb PETN Charge	40.00	1.6E+00	7.1E-01	1.2E+01	3.4E-02	2.8E-03	1.0E-03	0.0E+00
M183 Demo Chg Assy	5.04	2.0E-01	9.0E-02	1.5E+00	4.3E-03	3.5E-04	1.3E-04	0.0E+00
M420 15 lb Comp B	40.42	1.6E+00	7.2E-01	1.2E+01	3.5E-02	2.8E-03	1.1E-03	0.0E+00
M421 M3A2 40 lb Comp B	80.42	3.2E+00	1.4E+00	2.4E+01	6.9E-02	5.5E-03	2.1E-03	0.0E+00
M456 Detonating Cord	105.16	4.1E+00	1.9E+00	3.2E+01	9.0E-02	7.3E-03	2.7E-03	0.0E+00
M591 M1 Military Dynamite	14.80	5.8E-01	2.6E-01	4.4E+00	1.3E-02	1.0E-03	3.8E-04	0.0E+00
M670 M700 Time Fuze	6.21	2.4E-01	1.1E-01	1.9E+00	5.3E-03	4.3E-04	1.6E-04	0.0E+00
M980 Detasheet .83	20.00	7.9E-01	3.6E-01	6.0E+00	1.7E-02	1.4E-03	5.2E-04	0.0E+00
MN33 Det Cord 200 Gr/Ft	6.29	2.5E-01	1.1E-01	1.9E+00	5.4E-03	4.3E-04	1.6E-04	0.0E+00
Bulk Total (lb/yr)		**28.88**	**13.05**	**219.90**	**0.63**	**5.06E-02**	**1.91E-02**	**0.00**

[a]VOC is in the form of Total Hydrocarbons

SECTION 13
PESTICIDE APPLICATION

13.1 Background

Pesticides are applied throughout Hurlburt Field in the form of herbicides, insecticides, fungicides, and rodenticides. Emissions of concern from pesticide application include VOC and volatile organic HAP constituents. A review of CY 2003 pesticide application at Hurlburt Field was performed to identify those pesticides, which contain VOC and/or volatile organic HAP constituents. A summary of these pesticides is provided in Table 13-1. Only those pesticides, which were applied as liquids were considered. Emissions from pesticides applied as solids (e.g., powders/dusts, granules, pellets, baits, etc.) were considered negligible.

13.2 Emissions Calculation Method

A material balance approach is typically the most accurate method for determining actual pollutant emissions from pesticide application. Emissions of VOC and organic HAP pollutants are calculated by multiplying the total quantity (pounds/year) of pesticide applied times the weight fraction (weight percent divided by 100) of VOC and the weight fraction of each HAP in the pesticide. Since the total quantity of pesticide applied was not directly provided (the quantity of active ingredient applied was provided instead), it had to first be calculated based on the quantity of active ingredient applied and the weight fraction (weight percent divided by 100) of active ingredient in the pesticide. The following equations were used to determine VOC and organic HAP emissions:

$$Q_P = Q_{AI} * (WP_{AI}/100)$$
$$E_{pol} = Q_P * WP_{pol}/100$$

Where,

Q_P = Quantity of pesticide applied (lb/yr)
Q_{AI} = Quantity of active ingredient applied (lb/yr)
WP_{AI} = Weight percent of active ingredient in the pesticide (%)
E_{pol} = Emissions of a particular pollutant (lb/yr)
WP_{pol} = Weight percent of the pollutant in the pesticide (%)
100 = Factor for converting weight percent to weight fraction

It's important to note that many pesticides have organic active ingredients, which have very low vapor pressures, and therefore, only a portion of the ingredient is expected to evaporate within 30 days. According to Section 9.2.2 of AP-42, only that portion which evaporates within 30 days is considered for air emission purposes while the remaining portion is considered lost through other processes, such as degradation or surface runoff. Therefore, for emissions calculation purposes, the amount of a low vapor pressure active ingredient in a pesticide was reduced by either 42% (for active ingredients with a vapor pressure greater than 1×10^{-4} mm Hg) or 65% (for active ingredients with a vapor pressure ranging from 1×10^{-4} to 1×10^{-6} mm Hg). These reductions are based on emission factors listed in Table 9.2.2-4 of AP-42 for surface application of

pesticides. Active ingredients with a vapor pressure below 1 x 10^6 mm Hg were considered non-volatile.

13.3 Sample Calculations

The following is an example calculation for determining actual VOC emissions from the application of MANCOZEB (EPA Registration # 707-78) during CY 2003:

Quantity of active ingredient applied during 2003: 9.6079 lb/yr
Weight percent active ingredient in the pesticide: 80%
Weight percent VOC in the pesticide: 28%

$$Q_P = Q_{AI} * (WP_{AI}/100)$$
$$Q_P = 9.6079 \text{ lb/yr} * (80\%/100) = 7.69 \text{ lb/yr}$$

$$E_{pol} = Q_P * WP_{pol}/100$$
$$E_{VOC} = 7.69 \text{ lb/yr} * (28\ \%/100) = \mathbf{2.15\ lb/yr}$$

13.4 Emissions Summary

VOC and HAP emissions from pesticide application are provided in Table 13-2 on page 13-3.

13.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations (Revised December 2003),* (Section 25), May 1999. AFIERA/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 9.2.2, September 1995.

TABLE 13-1 2003 Summary of Volatile Pesticides Used

EPA Registration Number	Pesticide Name	Active Ingredient (%)	VOC (Wt %)[a]	Carbaryl (Wt%)[a]	Ethylene Glycol (Wt%)[a]	Glycol Ethers (Wt%)[a]	Methanol (Wt%)[a]	Methyl Chloroform (Wt%)[a]	Methylene Chloride (Wt%)[a]	Naphthalene (Wt%)[a]
239-2499-AA	2,4-D	0.4	0.1							
352-346	BROMACIL,LITHI.	21.9	47.5		32.5		5			
19713-49	CARBARYL	43.4	15.2	15.2						
239-2418	ACEPHATE	75	26.3							
3125-372	CYFLUTHRIN	24.3	39							4
464-571	Dursban L.O. Insecticide	41.5	73.0							
499-205	ALLETHRIN	4.5	51.7						43.5	
499-230	ACEPHATE	1	0.4					49.5		
62719-65	Dursban 2E Insecticide	24.1	50.5					35.5		
2217-543	2,4-D	42.5	13.9							
10404-44	2,4-D	19.9	6.1							
264-2	2,4-D	46.8	16.4							
4822-38	PYRETHRINS	1.3	30							
707-78	MANCOZEB	80	28							
11540-20	SULFLURAMID	19	84.5							
4-378-42737	FLAK 4-4	8	92							
499-285	PYRETHRUM	2.5	30.9					67		
499-221	PYRETHRINS	6.3	52.0					42.8		
10182-107	Demon TC Insecticide	25.3	7.4							
499-362	D-TRANS-ALLETHR	0.25	98.8							
9688-62	CHLORPYRIFOS	0.3	13.1			6				

[a] When determining pollutant content, if a low vapor pressure active ingredient is involved then the percentage of the active ingredient in the pesticide was adjusted to account for just that portion which is expected to evaporate within the first 30 days after application (reference Section 9.2.2 of AP-42). for example, although Drexel Carbaryl 4L actually contains 43.4% carbaryl, 15.2% is listed in the table since only about 35% of the carbaryl applied is expected to evaporate within 30 days.

Table 13-2 Actual 2003 Emissions from Pesticide Application

EPA Registration Number	Pesticide Name	AI[a] Applied	Pesticide Applied	VOC Emissions	Carbaryl (lbs/yr)	Ethylene Glycol (lbs/yr)	Glycol Ethers (lbs/yr)	Methanol (lbs/yr)	Methyl Chloroform (lbs/yr)	Methylene Chloride (lbs/yr)	Naphthalene (lbs/yr)
239-2499-AA	2,4-D	3.62	903.75	1.27							
352-346	BROMACIL,LITHI.	69.89	319.13	151.59		103.72		15.96			
19713-49	CARBARYL	0.28	0.63	0.10	0.10						
239-2418	ACEPHATE	9.38	12.50	3.28							
3125-372	CYFLUTHRIN	4.31	17.72	6.91							0.71
464-571	Dursban L.O. Insecticide	0.05	0.11	0.08							
499-205	ALLETHRIN	0.05	1.04	0.54						0.45	
499-230	ACEPHATE	0.01	1.40	0.00					0.69		
2217-543	2,4-D	22.78	53.55	7.46							
10404-44	2,4-D	1.13	5.66	0.34							
264-2	2,4-D	18.81	40.20	6.58							
4822-38	PYRETHRINS	0.61	46.67	14.00							
707-78	MANCOZEB	9.61	12.01	3.36							
11540-1	ULD BP300 Insecticide	0.01	0.06	0.05							
499-285	PYRETHRUM	0.03	2.50	0.77					1.68		
499-221	PYRETHRINS	0.26	4.10	2.13					1.76		
10182-107	Demon TC Insecticide	0.00	0.00	0.00							
499-362	D-TRANS-ALLETHR	0.43	174.54	172.46							
9688-62	CHLORPYRIFOS	0.10	32.50	4.26			1.95				
Total Emissions				**375.19**	**0.10**	**103.7**	**1.95**	**15.96**	**4.1**	**0.45**	**0.71**

[a] AI = Active Ingredient

SECTION 14
SITE RESTORATION

14.1 Background

Site Restoration at Hurlburt Field is comprised of two separate operations that treat groundwater contaminated with petroleum products. The first site, IRP SS-125, is in operation to pump and treat groundwater contaminated with PCE, TCE, and DCE utilizing an air stripper. The second operation, IRP SS-124, pumps JP-4 and JP-8 contaminated groundwater into a bowser tank. The units are included in the two-digit standard industrial classification code (SIC) 97 for National Security and International Affairs. The SCC that best describes this emission category is air stripping, 4-90-005-99.

14.2 Emissions Calculation Methods

Current emission data was not provided so it was assumed that 2003 emissions were equivalent to 1999 emissions data provided by Mr. Ben Coulter for each of these processes. At site SS-125 the remediation contractor provided the annual emissions. No HAP emissions data was available for the site. The emissions for site SS-124 were calculated using EPA's TANKS program (Version 4.07) and JP-4 HAP speciation data.

14.3 Emission Summary

Actual and potential emissions from site restoration are shown in Table 14-1.

Table 14-1 Emissions from Site Restoration

Pollutant	Emission Factor[1] (Weight % of VOC Emissions)	Pollutant Emissions (lb/yr)		Total Emissions (lb/yr)
		SS-124	SS-125	
VOC	See Section 14-2	114.95	2.32	117.27
Benzene	1.51	1.74	N/A	1.74
Ethyl Benzene	0.04	0.05	N/A	0.05
Hexane	1.96	2.25	N/A	2.25
Naphthalene	Negligible	Negligible	N/A	Negligible
Toluene	1.04	1.19	N/A	1.19
Xylenes	0.38	0.44	N/A	0.44

[1] Antoine's Equation and Raoult's Law were used to convert from liquid weight percent to vapor weight percent.

14.4 References

1. Conversation and documentation from Ben Coulter, 16 CES/CEV, 2002.

2. U.S. Environmental Protection Agency, *TANKS* Software Program, Version 4.07, 2000.

SECTION 15
SMALL ARMS FIRING

15.1 Background

Hurlburt Field has two firing ranges where authorized base personnel are allowed to fire small arms, such as the 9 mm pistol, 12 gauge shot gun, M16 rifle, and the M60 machine gun. Use of the firing range enables base personnel to train, certify, and maintain proficiency with the use of these weapons. Hurlburt has both an indoor range and an outdoor range. The indoor range has a Total Containment Trap particle control device to control lead emissions generated inside the range, while the outdoor range is uncontrolled.

The primary emissions from small arms firing include carbon monoxide (CO) and lead. CO is emitted as a combustion by-product from the detonation of the energetic material inside the ammunition. Lead emissions typically occur in two ways. First, the energetic material (typically the primer portion) in most small arms ammunition usually includes a small amount of a lead ingredient, such as lead styphnate or lead azide, which may be emitted into the atmosphere when the ammunition is fired. Second, the projectile (slug), which is fired at the target usually, contains lead (except in cases where "green ammo" is used). A small amount of lead may be released when the projectile impacts the bullet trap. Although some firing ranges are equipped with filters to control lead emissions, the firing range at Hurlburt Field is uncontrolled.

The amount of emissions generated from small arms firing is dependent on the type and quantity of ammunition rounds fired. Summary information on the small arms ammunition fired at Hurlburt Field's firing range during 2003 is provided in Table 15-1.

Table 15-1 2003 Summary of Ammunition Used at Small Arms Ranges

Ammunition Type	Rounds Fired Per Year	Control Device	Control Efficiency (%)
5.56 mm Ball (M193)	450,042	Cyclone	90
7.62mm Ball (M80)	26,924	Cyclone	90
9mm Ball (M882)	190,527	Cyclone	90
12 Gauge '00 Buckshot	1,025	Cyclone	90
40mm TP (M781)	4,500	None	0

15.2 Emissions Calculation Methods

CO emissions associated with a particular type of ammunition are calculated by multiplying the number of rounds of ammunition fired times the mass of energetic material (MEM) in each round of ammunition and then times the appropriate emission factor.

$$E_{CO} = NR * MEM * (1/7000) * (1/2000) * 77$$

Where,

E_{CO} = Emissions of carbon monoxide (lb/yr)
NR = Number of rounds of a particular type of ammunition fired during the year (rounds/yr)
MEM = Mass of energetic material in each round of ammunition (grains/round)
1/7000 = Unit conversion factor (1 lb/7000 grains)
1/2000 = Unit conversion factor (1 ton/2000 lb)
77 = CO emission factor (lb/ton) [Note - the emission factor is from AP-42 and is for the detonation of smokeless powder. The units are pounds of pollutant emitted per ton of explosive detonated.]

Typical MEM values for the types of ammunition used in Hurlburt Field's firing range during CY2003 are provided in Table 15-2 below.

As mentioned above, lead emissions from small arms firing come from the lead compounds (i.e., lead styphnate and/or lead azide) found in the ammunition's energetic material, and from the projectile. Unfortunately, there is currently no method available for estimating lead emissions contributed by the projectile. However, lead emissions contributed from the energetic material can be estimated by assuming all the lead is released when the ammunition is fired.

$$E_{Pb} = NR * Q_{Pb} * (1/7000) * [1-(CE/100)]$$

Where,

E_{Pb} = Emissions of lead (lb/yr)
NR = Number of rounds of a particular type of ammunition fired during the year (rounds/yr)
Q_{Pb} = Quantity of lead compounds contained in the ammunition (grains/round)
1/7000 = Unit conversion factor (1 lb/7000 grains)
CE = Control efficiency of filters, if applicable (%)

Typical lead content values (Q_{Pb}) for the ammunition used in Hurlburt firing range during CY2003 are listed in Table 15-2.

Table 15-2 Energetic Material and Lead Content for Ammunition

Ammunition Type	Mass of Energetic Material (grains/round)	Quantity of Lead Compounds (grains/round)
5.56 mm Ball (M193)	26.5	0.14
7.62mm Ball (M80)	46.6	0.22
9mm Ball (M882)	5.5	0.13
12 Gauge '00 Buckshot	26	0.36
40mm TP (M781)	5.8	0.17

15.3 Sample Calculation

The following is an example calculation for determining emissions associated with firing of 5.56 mm ammunition:

Ammunition Type: 5.56 mm
Number of Rounds Fired in 2003: 450,042
Mass of Energetic Material per Round: 26.5 grains
Quantity of Lead Compounds in Each Round: 0.14 grains
Type of Air Pollution Control Used: Cyclone

First calculate the carbon monoxide (CO) emissions as follows:

E_{CO} = NR * MEM * (1/7000) * (1/2000) * 77
E_{CO} = 450,042 rounds/yr * 26.5 grains/round * (1 lb/7000 grains) * (1 ton/2000 lb) * 77 lb/ton = **65.6 lb/yr**

Next, calculate the lead emissions as follows:

E_{Pb} = NR * Q_{Pb} * (1/7000) * [1-(CE/100)]
E_{Pb} = 450,042 rounds/yr * 0.14 grains/round * (1 lb/7000 grains) * [1-(90 %/100)] = **0.9 lb/yr**

15.4 Emissions Summary

2003 emissions from small arms firing at Hurlburt Field are provided in Table 15-3.

Table 15-3 2003 Emissions from Small Arms Firing

Ammunition Type	CO Emissions (lb/yr)	Lead Emissions (lb/yr)
5.56 mm Ball (M193)	65.6	0.90
7.62mm Ball (M80)	6.9	0.08
9mm Ball (M882)	5.76	0.35
12 Gauge '00 Buckshot	0.15	0.01
40mm TP (M781)	0.14	0.11
Total	**78.5**	**1.45**

15.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 27), May 1999. AFIOH/RSEQ, Brooks AFB TX.

2. U.S. Army Defense Ammunition Center, *Munitions Items Disposition Action System* (MIDAS), Central Library Version 81, 3 Dec 1998.

3. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 13.3, February 1980 (Reformatted January 1995).

SECTION 16
SOLVENT CLEANING TANKS

16.1 Background

Solvent cleaning tanks/machines are used by a variety of shops at Hurlburt Field to remove contaminants (e.g., dirt, grease, oils, lubricants, carbon deposits, paint etc.) from parts associated with aircraft, painting equipment, firearms, and other vehicles/equipment. Summary information on the solvent cleaning tanks used at Hurlburt Field in 2003 is provided in Table 16-1 on page 16-3.

Emissions from solvent cleaning tanks occur via direct evaporation from the equipment and/or from carry out (i.e., evaporation of the solvent which adheres to the part after the part is removed from the tank). VOC and any organic HAP constituents found in the solvent are the pollutants of concern from solvent cleaning tanks. Applicable Source Classification Codes include the following:

- SCC 4-01-002-51 Petroleum and Solvent Evaporation; Organic Solvent Evaporation; Degreasing; Stoddard (Petroleum solvent): General Degreasing Units
- SCC 4-01-002-95 Petroleum and Solvent Evaporation; Organic Solvent Evaporation; Degreasing; Other Not Classified: General Degreasing Units
- SCC 4-01-002-96 Petroleum and Solvent Evaporation; Organic Solvent Evaporation; Degreasing; Other Not Classified: General Degreasing Units
- SCC 4-01-002-51 Petroleum and Solvent Evaporation; Organic Solvent Evaporation; Cold Solvent Cleaning/Stripping; Other Not Classified

16.2 Emissions Calculation Method

Emissions from solvent tanks are typically calculated using a mass balance approach. In general, the quantity of solvent emitted is approximately equal to the total amount of fresh solvent added to the cleaning unit minus the amount of waste solvent that is removed from the unit for recycling/disposal. With the mass balance approach, the following equation is used to calculate emissions:

$$E_{pol} = [(VA - VR) * D] * [WP/100]$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
VA = Volume of fresh solvent added to the unit (gal/yr)
VR = Volume of waste solvent removed from the unit for recycling/disposal (gal/yr)
D = Density of the solvent (lb/gal)
WP = Weight percent of the pollutant in the solvent (%)

It's important to note that the mass balance approach could not be used for most of the solvent units at Hurlburt Field because either no records were maintained on the volume of solvent added/removed from the units during 2003, or the solvent in the machine was not replaced. For these tanks the operator provided estimates on usage. In these cases, the following equation was used:

$$E_{pol} = (VE * D) * (WP/100)$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
VE = Estimated volume of solvent evaporated from the unit during the year (gal/yr)
D = Density of the solvent (lb/gal)
WP = Weight percent of the pollutant in the solvent (%)

16.3 Sample Calculation

The following is an example calculation for determining pollutant emissions from the tank in Bldg 90102 using Safety Kleen's premium gold solvent:

Estimated volume of solvent, which evaporated from the tank during the year: 0.5 gal/yr
Density of the solvent: 6.41 lb/gal
Weight percent of pollutants in the solvent: VOC (100 %)

$$E_{pol} = (VE * D) * (WP/100)$$
$$E_{VOC} = (0.5 \text{ gal/yr} * 6.41 \text{ lb/gal}) * (100\%/100) = \mathbf{3.21\ lb/yr}$$

16.4 Emissions Summary

Emissions from solvent cleaning tanks are provided in Table 16-2 on page 16-4.

16.5 Reference

U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 28), May 1999. AFIOH/RSEQ, Brooks AFB TX.

Table 16-1 Summary of Solvent Cleaning Tanks

Bldg No.	Shop	Solvent Type	Solvent Usage (gal/yr)	Density (lb/gal)	VOC Content (Wt %)	MIBK (Wt %)	Ethyl Benzene (Wt %)	Methanol (Wt %)	Methyl Chloroform (Wt %)	Methylene Chloride (Wt %)	Xylene (Wt %)	Tetrachloro-ethylene (Wt %)	MEK (Wt %)	Toluene (Wt %)
90102	16 LRS/LGRVM	Premium Gold	0.5	6.41	100									
90102	16 LRS/LGRVM	Premium Gold	1	6.41	100									
90111	16 LRS/LGRVM	Safety Kleen 6782	0.25	6.91	100	14.75	5.2	1.45	0.5	0.5	5.20	0.50	24.55	36.15
90131	16 CRS/LGMPT	PD-680 Type II	1	6.43	100									
90353	16 TRANS/LGTM	Premium Gold	1	6.41	100									
90612	16 SVS/SVRA	Premium Gold	1	6.83	100									
90612	16 SVS/SVRA	Ultra Solv 221	0.125	6.91	100									
90626	16 CES/CEOHH	Safety Kleen 105	2	6.66	100		0.5		0.25		1	0.25		0.5
90700	16 CMS/MXMCP	Premium Gold	2	6.41	100									
90714	16 EMS/LGMFN	Met-L-Chek Penetrant	5	7.90	65									
90714	16 EMS/LGMFN	Met-L-Chek Emulsifier	5	6.84	100									
90731	16 EMS/Boeing	PD-680 Type II	1	6.43	100									
91031	23 STS/LGW	Breakthrough	1	6.41	100									
91137	823 RHS/LGTMA	Safety Kleen 6782	1	6.91	100	14.75	5.2	1.45	0.5	0.5	5.20	0.50	24.55	36.15
91266	DART / 53 ISO	Safety Kleen 6605	1	6.66	100									

Table 16-2 2003 Emissions from Solvent Cleaning Tanks

Bldg No.	Solvent Type	Solvent Usage (gal/yr)	VOC Emissions (lb/gal)	MIBK (lb/yr)	Ethyl Benzene (lb/yr)	Methanol (lb/yr)	Methyl Chloroform (lb/yr)	Methylene Chloride (lb/yr)	Xylene (lb/yr)	Tetrachloro-ethylene (lb/yr)	MEK (lb/yr)	Toluene (lb/yr)
90102	Premium Gold	0.5	3.21									
90102	Premium Gold	1	6.41									
90111	Safety Kleen 6782	0.25	1.73	2.5E-01	9.0E-02	2.5E-02	8.6E-03	8.6E-03	9.0E-02	8.6E-03	4.2E-01	6.2E-01
90131	PD-680 Type II	1	6.43									
90353	Premium Gold	1	6.41									
90612	Premium Gold	1	6.83									
90612	Ultra Solv 221	0.125	0.86									
90626	Safety Kleen 105	2	13.33		6.7E-02		3.3E-02		1.3E-01	3.3E-02		6.7E-02
90700	Premium Gold	2	12.83									
90714	Met-L-Chek Penetrant	5	25.67									
90714	Met-L-Chek Emulsifier	5	34.19									
90731	PD-680 Type II	1	6.43									
91031	Breakthrough	1	6.41									
91137	Safety Kleen 6782	1	6.91	1.0E+00	3.6E-01	1.0E-01	3.5E-02	3.5E-02	3.6E-01	3.5E-02	1.7E+00	2.5E+00
91266	Safety Kleen 6605	1	6.66									
Total Emissions (lb/yr)			**144.33**	**1.3E+00**	**5.2E-01**	**1.3E-01**	**7.7E-02**	**4.3E-02**	**5.8E-01**	**7.7E-02**	**2.1E+00**	**3.2E+00**

SECTION 17
STATIONARY INTERNAL COMBUSTION ENGINE EQUIPMENT

17.1 Background

Stationary internal combustion (IC) engine equipment at Hurlburt Field includes generators, deluge pumps, and water well pumps. According to data supplied by the Power Production Shop, Hurlburt Field used 57 generators in 2003. Most of these were back-up generators used to provide emergency electrical power at various locations throughout the base. In addition, Hurlburt Field had 16 deluge and water well pumps. There are several auxiliary power units located at the training exercise facility. All stationary internal combustion units were powered by reciprocating internal combustion engines. The generators, deluge pumps and water well pumps were fueled with diesel.

The back-up generators at Hurlburt Field are operated under two different modes. The primary/intended mode is to operate the generators "under load" during emergency power outages. The second mode is to run the generators "without load" a few hours each year as part of a preventive maintenance program.

Specific information on Hurlburt Field's stationary internal combustion engine equipment is provided in Table 17-3 on page 17-5.

17.2 Emissions Calculation Methods

Actual emissions from Hurlburt Field's generators were calculated using Environmental Protection Agency (EPA) emission factors based on generator peak output and the number of hours the generator operated during the year. The equation used is as follows:

$$E_{pol} = (PD*1.341*OT)/1000 * EF$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
PD = Peak Demand (kW)
1.341 = Factor for converting "kW" to "hp"
OT = Operating time (hr/yr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)

Deluge and water well pumps actual emissions were calculated using the same formula.

Emission factors used to calculate emissions from the stationary IC engine equipment at Hurlburt Field are provided in Tables 17-1 and 17-2 on the following pages. These emission factors are based on the following Source Classification Codes:

- SCC 2-02-001-01 (Internal Combustion Engines; Industrial; Diesel; Reciprocating)
- SCC 2-02-004-01 (Internal Combustion Engines; Industrial; Large Bore Engine; Diesel)
- SCC 2-03-001-01 (Internal Combustion Engines; Commercial/Institutional; Diesel; Reciprocating)

Table 17-1 Emission Factors for Small Diesel Internal Combustion Engines[a]

Pollutant	Emission Factor ($lb/10^3$ gal)[b]	Emission Factor ($lb/10^3$ hp-hr)[c]
Criteria Pollutants		
CO	130	6.68
NO_X	604	31
PM_{10}	42.5	2.2
SO_X	39.7	2.05
VOC[d]	49.3	2.5
Hazardous Air Pollutants		
Acetaldehyde	0.105	0.0054
Acrolein	0.013	6.48×10^{-4}
Benzene	0.128	0.0065
1,3-Butadiene	0.005	2.74×10^{-4}
Formaldehyde	0.162	0.0083
Naphthalene	0.012	5.94×10^{-4}
Polycyclic Aromatic Hydrocarbons (PAH)[e]	0.023	0.0012
Toluene	0.056	0.0029
Xylenes	0.039	0.0020

[a] Applies to stationary diesel reciprocating internal combustion engines with a rated power up to 600 horsepower (447 kilowatts).
[b] Pounds pollutant emitted per thousand gallons of fuel burned. These emission factors are from the EPA's FIRE program. The "$lb/10^3$ gal" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in FIRE times the typical heating value of diesel fuel (137 $MMBtu/10^3$ gal).
[c] Pounds pollutant emitted per thousand horsepower-hour (power output). These emission factors are from Section 3.3 of AP-42. The "$lb/10^3$ hp-hr" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in AP-42 times an average brake-specific fuel consumption (BSFC) value of 7 $MMBtu/10^3$ hp-hr.
[d] Based on the emission factor for Total Organic Compounds (TOC).
[e] For inventory purposes, assume PAH is the same as Polycyclic Organic Matter (POM).

Potential emissions from auxiliary power generators were based on agreed emissions limitations as set forth in Florida Department of Environmental Quality Air Operating Permit No. 0910064-007-AF. The emissions limitation is based on a 1,880,000 kW-hr per year auxiliary power generator operating limit.

The equations used is as follows:

<u>Generators</u>

$$E_{pol} = [1{,}880{,}000 * 1.341]/1000 * EF$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
1.341 = Factor for converting "kW" to "hp"

1,880,000 = Maximum allowable operating kW hours (kW-hr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)

Table 17-2 Emissions Factors for Large Diesel Internal Combustion Engines[a]

Pollutant	Emission Factor (lb/10^3 gal)[b]	Emission Factor (lb/10^3 hp-hr)[c]
Criteria Pollutants		
CO	111	5.5
NO_X	425	24
PM_{10}	7.85	0.40
SO_X[d]	138S[d]	8.09S[d]
VOC	13.7	0.64
Hazardous Air Pollutants		
Acetaldehyde	0.003	1.76×10^{-4}
Acrolein	0.001	5.52×10^{-5}
Benzene	0.106	0.0054
Formaldehyde	0.011	5.52×10^{-4}
Naphthalene	0.017	9.1×10^{-4}
Polycyclic Aromatic Hydrocarbons (PAH)[e]	0.029	0.0015
Toluene	0.038	0.0020
Xylenes	0.026	0.0014

[a] Applies to stationary diesel reciprocating internal combustion engines with a rated power greater than 600 horsepower (447 kilowatts).
[b] Pounds pollutant emitted per thousand gallons of fuel burned. These emission factors are from the EPA's FIRE program. The "lb/10^3 gal" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in FIRE times the typical heating value of diesel fuel (137 MMBtu/10^3 gal).
[c] Pounds pollutant emitted per thousand horsepower-hour (power output). These emission factors are from Section 3.3 of AP-42. The "lb/10^3 hp-hr" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in AP-42 times an average brake-specific fuel consumption (BSFC) value of 7 MMBtu/10^3 hp-hr.
[d] S = weight percent sulfur in the fuel. The SO_X emission factor is equal to the numerical value in the table times the weight percent sulfur. The maximum certified sulfur content for the diesel fuel used at Hurlburt Field is 0.05%, which yields a SO_X emission factors of 6.9 lb/10^3 gal and 0.40 lb/10^3 hp-hr.
[e] For inventory purposes, assume PAH is the same as Polycyclic Organic Matter (POM).

17.3 Sample Calculations

The following is an example calculation for determining actual carbon monoxide emissions from one of Hurlburt Field's generators:

Generator Location: Bldg 90747
Generator's Peak demand: 50 kW
Operating Time: 40 hr
Carbon Monoxide (CO) Emission Factor for Diesel Engines ≤ 447 kW: 6.68 lb/10^3 hp-hr

E_{pol} = (PD*1.341*OT)/1000 * EF
E_{CO} = (50 kW * 1.341 hp/kW*40 hr/yr)/1000 * 6.68 lb/10^3 hp-hr
E_{CO} = **17.92 lb/yr**

17.4 Emissions Summary

Actual and potential criteria and HAP pollutant emissions from generators and engine driven pumps are provided in Tables 17-4 to 17-7 on pages 17-5 to 17-12. Actual and potential

emissions from the auxiliary generators operating at the training grounds are provided in Tables 17-8 to 17-11 on pages 17-13 and 17-14. A summary of the total emissions associated with stationary IC engines is provided in Table 17-12 on page 17-15.

17.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 29), May 1999. AFIOH/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Chapter 3, October 1996.

3. U.S. Environmental Protection Agency. *Factor Information Retrieval System* (FIRE), Version 6.22, Oct 1999.

4. U.S. Environmental Protection Agency. Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, Report No. NR-005A, December 1997 (revised June 1998).

Table 17-3 Internal Combustion Engine Driven Equipment

Building #	Manufacturer	Model #	Serial #	Install Date	Max Power Rating Generators (Kw) Pumps (hp)	Operation Time (hr/yr)	Equipment Use
90365	Onan	3ODGAD-39322F	53128488	1991	30	38.6	Emergency Generator
90735	Kohler	60R0ZJ81	T04039I-342141	1991	60	22.7	Emergency Generator
90724	Onan	500DGFA	252.3408	1994	500	22.7	Emergency Generator
90226	Onan	150DGFA	44968707	1994	150	35.5	Emergency Generator
90001	Cummins	VTA28681	37114052	1987	350	18	Emergency Generator
90001	Onan	300DFGB	30330329	1992	300	17.8	Emergency Generator
90730A	Onan	60DGCBL-35468A	44390189	1989	60	28	Emergency Generator
90730B	Kohler	200R0ZD81	06A0472065	1995	200	23.2	Emergency Generator
90215	Onan	150DGFAL-35457A	30408547	1989	150	20.9	Emergency Generator
91307	Onan	30DLGL-33658E	51124242	1990	30	24.4	Emergency Generator
90880	Kohler	20R0Z281	44262870	1990	25	43.8	Emergency Generator
90053	Onan	100DGBL-30488A	44449710	1990	100	22.1	Emergency Generator
91546	Onan	150DGFA	46261698	2002	150	28.8	Emergency Generator
91545	Onan	900DFJC	33122479	1992	900	37.4	Emergency Generator
91117	Onan	350DFCC	30337390	1992	350	27.6	Emergency Generator
91020	Onan	LTA-10GA	34914867	1998	250	30.7	Emergency Generator
90760	Onan	150DGFA	46156414	2002	150	19.2	Emergency Generator
90056	Kohler	80R0ZU81	T06059T-342170	1989	80	27.8	Emergency Generator
90761	Onan	200DFAA	34673138	1992	200	25.3	Emergency Generator
90758	Onan	400DFEB-37343E	37131663	1991	400	18.1	Emergency Generator
90332	Onan	60DGCBL-30488A	44434613	1991	60	29.5	Emergency Generator
90332B	Onan	60GCBL	44390189	2002	60	29.8	Emergency Generator
90603	Onan	30R0ZJ81	704039D-332722	1989	30	46.8	Emergency Generator
90048	Onan	60DGCBL-30488A	44425754	1987	60	23.4	Emergency Generator
90113	Onan	100DGDBL-30488A	45951432	2000	150	28.5	Emergency Generator
90802	Kohler	100R0Z271	44188041	1987	100	19.2	Emergency Generator
90710	Kohler	60R0ZJ81	T04039T-342153	1989	60	24.4	Emergency Generator
90005	Onan	500DFYG-29098E	25162840	1989	500	19.1	Emergency Generator
90005	Onan	500DFYG-29098E	25163314	1989	500	20.5	Emergency Generator
90326	Cummins	440FDR7-136JJ-W	30127725	1986	125	29.9	Emergency Generator
90747	Catepillar	3304B-D1	83Z06966	1993	110	40	Emergency Generator
90412	Kohler	60R0ZJ81	T04039T-448752	1995	60	44.8	Emergency Generator
90601	Kohler	150R0ZJ81	RG6076A-200843	1993	150	63.8	Emergency Generator

Table 17-3 Internal Combustion Engine Driven Equipment (continued)

Building #	Manufacturer	Model #	Serial #	Install Date	Max Power Rating Generators (Kw) Pumps (hp)	Operation Time (hr/yr)	Equipment Use
91118	Onan	15RDJCL	430913	1991	15	32.8	Emergency Generator
90355	Cummins	NT855GS2	11315862	1986	215	53.5	Emergency Generator
90043	Onan	15RDJCL	1304891	1988	15	16.9	Emergency Generator
91601	Onan	150DGFA	44968707	2002	150	111.2	Emergency Generator
92420	Onan	100DGBL-30488A	44397561	1990	100	16.2	Emergency Generator
92424	Onan	15RDJCL	130487	1988	15	16.1	Emergency Generator
90752	Onan	40DLGTL-33658B	53122638	1998	40	17.3	Emergency Generator
91102	Onan	30DLGL	53122570	1990	30	22.6	Emergency Generator
93343	Onan	30DGAD	53135337	1991	30	14.1	Emergency Generator
91026	Onan	30DGAD	53128075	1991	30	22.7	Emergency Generator
91014	Onan	15RDJCL	409601	1991	15	17	Emergency Generator
90909	Onan	15RDJCL	270030	1991	15	18.2	Emergency Generator
91023	Onan	100R0ZJ81	CD6059T-217448	1989	100	17.2	Emergency Generator
90102	Kohler	250R0ZD81	06VF212574	1995	200	18.3	Emergency Generator
90117	Kohler	15RDJCL	130408	1995	15	19	Emergency Generator
90614	Onan	15RDJCL	955132	1987	15	32.8	Emergency Generator
91267	Onan	4B3.9-G2	45948066	2000	40	20	Emergency Generator
91136	Onan	125DGEAL-3180	30408008	1990	125	55.6	Emergency Generator
90017	Onan	30DGAD-39322F	53128483	1990	30	17.6	Emergency Generator
90232	Kohler	100R0ZJ81	T06059T-314907	1991	100	9.3	Emergency Generator
90053	Kohler	50R0ZJ81	T04039T-437928	1994	55	112.9	Emergency Generator
90032	Kohler	150R0ZJ81	RG6076A-200848	1998	100	26.4	Emergency Generator
90577	Onan	125DGEAL-3185A	45947760	2000	40	17.4	Emergency Generator
91350	Onan	100DGBL-30488	44397560	1991	100	36.1	Emergency Generator

Table 17-4 2003 Criteria Pollutant Emissions from Generators

Bldg. No.	Peak Rating (kW)	Peak Demand (kW)	Fuel Type[1]	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	CO (lb/yr)	NOx (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
Diesel Generators > 447kW for which Fuel Usage is Uknown										
90724	500	350	Diesel	NR	22.7	58.60	255.70	4.26	4.26	6.82
91545	900	275	Diesel	NR	37.4	75.86	331.01	5.52	5.52	8.83
90005	500	250	Diesel	NR	19.1	35.22	153.68	2.56	2.56	4.10
90005	500	250	Diesel	NR	20.5	37.80	164.94	2.75	2.75	4.40
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown										
90365	30	25	Diesel	NR	38.6	8.64	40.12	2.85	2.65	3.24
90735	60	45	Diesel	NR	22.7	9.15	42.46	3.01	2.81	3.42
90226	150	125	Diesel	NR	35.5	39.75	184.47	13.09	12.20	14.88
90001	350	200	Diesel	NR	18	32.25	149.66	10.62	9.90	12.07
90001	300	100	Diesel	NR	17.8	15.95	74.00	5.25	4.89	5.97
90730A	60	65	Diesel	NR	28	16.30	75.66	5.37	5.00	6.10
90730B	200	100	Diesel	NR	23.2	20.78	96.44	6.84	6.38	7.78
90215	150	125	Diesel	NR	20.9	23.40	108.60	7.71	7.18	8.76
91307	30	10	Diesel	NR	24.4	2.19	10.14	0.72	0.67	0.82
90880	25	10	Diesel	NR	43.8	3.92	18.21	1.29	1.20	1.47
90053	100	80	Diesel	NR	22.1	15.84	73.50	5.22	4.86	5.93
91117	350	220	Diesel	NR	27.6	54.39	252.42	17.91	16.69	20.36
91020	250	150	Diesel	NR	30.7	41.25	191.43	13.59	12.66	15.44
90056	80	50	Diesel	NR	27.8	12.45	57.78	4.10	3.82	4.66
90761	200	45	Diesel	NR	25.3	10.20	47.33	3.36	3.13	3.82
90758	400	195	Diesel	NR	18.1	31.62	146.72	10.41	9.70	11.83
90332	60	45	Diesel	NR	29.5	11.89	55.19	3.92	3.65	4.45
90332B	60	50	Diesel	NR	29.8	13.35	61.94	4.40	4.10	5.00
90603	30	20	Diesel	NR	46.8	8.38	38.91	2.76	2.57	3.14
90048	60	15	Diesel	NR	23.4	3.14	14.59	1.04	0.96	1.18
90113	150	100	Diesel	NR	28.5	25.53	118.48	8.41	7.83	9.55
90802	100	75	Diesel	NR	19.2	12.90	59.86	4.25	3.96	4.83
90710	60	25	Diesel	NR	24.4	5.46	25.36	1.80	1.68	2.05
90326	125	72	Diesel	NR	29.9	19.28	89.49	6.35	5.92	7.22
90747	110	50	Diesel	NR	40	17.92	83.14	5.90	5.50	6.71
90412	60	50	Diesel	NR	44.8	20.07	93.12	6.61	6.16	7.51

Table 17-4 2003 Criteria Pollutant Emissions from Generators (continued)

Bldg. No.	Peak Rating (kW)	Peak Demand (kW)	Fuel Type[1]	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	CO (lb/yr)	NOx (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
90601	150	125	Diesel	NR	63.8	71.44	331.53	23.53	21.92	26.74
91118	15	10	Diesel	NR	32.8	2.94	13.64	0.97	0.90	1.10
90355	215	150	Diesel	NR	53.5	71.89	333.61	23.68	22.06	26.90
90043	15	12	Diesel	NR	16.9	1.82	8.43	0.60	0.56	0.68
91601	150	125	Diesel	NR	111.2	124.51	577.84	41.01	38.21	46.60
92420	100	40	Diesel	NR	16.2	5.80	26.94	1.91	1.78	2.17
92424	15	5	Diesel	NR	16.1	0.72	3.35	0.24	0.22	0.27
90752	40	20	Diesel	NR	17.3	3.10	14.38	1.02	0.95	1.16
90760	150	125	Diesel	NR	19.2	21.50	99.77	7.08	6.60	8.05
91102	30	25	Diesel	NR	22.6	5.06	23.49	1.67	1.55	1.89
93343	30	20	Diesel	NR	14.1	2.53	11.72	0.83	0.78	0.95
91546	150	125	Diesel	NR	28.8	32.25	149.66	10.62	9.90	12.07
91026	30	15	Diesel	NR	22.7	3.05	14.15	1.00	0.94	1.14
91014	15	5	Diesel	NR	17	0.76	3.53	0.25	0.23	0.28
90909	15	8	Diesel	NR	18.2	1.30	6.05	0.43	0.40	0.49
91023	100	50	Diesel	NR	17.2	7.70	35.75	2.54	2.36	2.88
90102	200	75	Diesel	NR	18.3	12.29	57.06	4.05	3.77	4.60
90117	15	7	Diesel	NR	19	1.19	5.53	0.39	0.37	0.45
90614	15	7	Diesel	NR	32.8	2.06	9.54	0.68	0.63	0.77
91267	40	15	Diesel	NR	20	2.69	12.47	0.89	0.82	1.01
91136	125	75	Diesel	NR	55.6	37.35	173.35	12.30	11.46	13.98
90017	30	10	Diesel	NR	17.6	1.58	7.32	0.52	0.48	0.59
90232	100	35	Diesel	NR	9.3	2.92	13.53	0.96	0.89	1.09
90053	55	30	Diesel	NR	112.9	30.34	140.80	9.99	9.31	11.35
90032	100	45	Diesel	NR	26.4	10.64	49.39	3.50	3.27	3.98
90577	40	15	Diesel	NR	17.4	2.34	10.85	0.77	0.72	0.88
91350	100	45	Diesel	NR	36.1	14.55	67.53	4.79	4.47	5.45
					Total (lb/yr)	**1,157.81**	**5,315.57**	**328.07**	**306.73**	**379.81**

Table 17-5 2003 Criteria Pollutant Emissions from Engine Driven Pumps

Bldg. No.	Rated Power Output (hp)	Loading Factor (% of Max. Power)	Fuel Type[1]	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	CO (lb/yr)	NOx (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
Diesel IC Engines ≤ 600 hp for which Fuel Usage is Unkown										
90717	146	74	Diesel	NR	112.8	81.41	377.79	26.81	24.98	30.47
90717	146	74	Diesel	NR	42.2	30.46	141.34	10.03	9.35	11.40
90717	146	74	Diesel	NR	31.2	22.52	104.50	7.42	6.91	8.43
90711	125	74	Diesel	NR	30.5	18.85	87.46	6.21	5.78	7.05
90711	125	74	Diesel	NR	32.8	20.27	94.05	6.67	6.22	7.59
90036	340	74	Diesel	NR	25	42.02	194.99	13.84	12.89	15.73
91136	111	74	Diesel	NR	55.6	30.51	141.58	10.05	9.36	11.42
90601	120	74	Diesel	NR	63.8	37.85	175.63	12.46	11.61	14.16
90705	231	74	Diesel	NR	24.7	28.20	130.89	9.29	8.66	10.56
90705	231	74	Diesel	NR	13	14.84	68.89	4.89	4.56	5.56
90705	231	74	Diesel	NR	21.2	24.21	112.34	7.97	7.43	9.06
90705	231	74	Diesel	NR	22	25.12	116.58	8.27	7.71	9.40
90810	224	74	Diesel	NR	20.8	23.03	106.88	7.59	7.07	8.62
90810	224	74	Diesel	NR	17.8	19.71	91.47	6.49	6.05	7.38
90810	224	74	Diesel	NR	19.3	21.37	99.17	7.04	6.56	8.00
90308	121	74	Diesel	NR	0	0.00	0.00	0.00	0.00	0.00
					Total (lb/yr)	**440.35**	**2,043.56**	**145.03**	**135.14**	**164.80**

[1] = Sulfur content in diesel fuel is 0.05% by weight

NR = Not Reported

Table 17-6 2003 HAP Emissions from Generators

Bldg. No.	Peak Rating (kW)	Peak Demand (kW)	Fuel Type	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	Acetaldehyde (lb/yr)	Acrolein (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Formaldehyde (lb/yr)	Naphthalene (lb/yr)	POM (lb/yr)	Toluene (lb/yr)	Xylenes (lb/yr)
Diesel Generators > 447kW for which Fuel Usage is Uknown														
90724	500	350	Diesel	NR	22.7	1.9E-03	5.9E-04	5.8E-02	0.0E+00	5.9E-03	9.7E-03	1.6E-02	2.1E-02	1.5E-02
91545	900	200	Diesel	NR	37.4	1.8E-03	5.5E-04	5.4E-02	0.0E+00	5.5E-03	9.1E-03	1.5E-02	2.0E-02	1.4E-02
90005	500	250	Diesel	NR	19.1	1.1E-03	3.5E-04	3.5E-02	0.0E+00	3.5E-03	5.8E-03	9.6E-03	1.3E-02	9.0E-03
90005	500	250	Diesel	NR	20.5	1.2E-03	3.8E-04	3.7E-02	0.0E+00	3.8E-03	6.3E-03	1.0E-02	1.4E-02	9.6E-03
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown														
90365	30	25	Diesel	NR	38.6	7.0E-03	8.4E-04	8.4E-03	3.5E-04	1.1E-02	7.7E-04	1.6E-03	3.8E-03	2.6E-03
90735	60	45	Diesel	NR	22.7	7.4E-03	8.9E-04	8.9E-03	3.8E-04	1.1E-02	8.1E-04	1.6E-03	4.0E-03	2.7E-03
90226	150	100	Diesel	NR	35.5	2.6E-02	3.1E-03	3.1E-02	1.3E-03	4.0E-02	2.8E-03	5.7E-03	1.4E-02	9.5E-03
90001	350	200	Diesel	NR	18	2.6E-02	3.1E-03	3.1E-02	1.3E-03	4.0E-02	2.9E-03	5.8E-03	1.4E-02	9.7E-03
90001	300	100	Diesel	NR	17.8	1.3E-02	1.5E-03	1.6E-02	6.5E-04	2.0E-02	1.4E-03	2.9E-03	6.9E-03	4.8E-03
90730A	60	40	Diesel	NR	28	8.1E-03	9.7E-04	9.8E-03	4.1E-04	1.2E-02	8.9E-04	1.8E-03	4.4E-03	3.0E-03
90730B	200	104	Diesel	NR	23.2	1.7E-02	2.1E-03	2.1E-02	8.9E-04	2.7E-02	1.9E-03	3.9E-03	9.4E-03	6.5E-03
90215	150	100	Diesel	NR	20.9	1.5E-02	1.8E-03	1.8E-02	7.7E-04	2.3E-02	1.7E-03	3.4E-03	8.1E-03	5.6E-03
91307	30	10	Diesel	NR	24.4	1.8E-03	2.1E-04	2.1E-03	9.0E-05	2.7E-03	1.9E-04	3.9E-04	9.5E-04	6.5E-04
91546	150	74	Diesel	NR	28.8	1.5E-02	1.9E-03	1.9E-02	7.8E-04	2.4E-02	1.7E-03	3.4E-03	8.3E-03	5.7E-03
90880	25	10	Diesel	NR	43.8	3.2E-03	3.8E-04	3.8E-03	1.6E-04	4.9E-03	3.5E-04	7.0E-04	1.7E-03	1.2E-03
90053	100	70	Diesel	NR	22.1	1.1E-02	1.3E-03	1.3E-02	5.7E-04	1.7E-02	1.2E-03	2.5E-03	6.0E-03	4.1E-03
91117	350	220	Diesel	NR	27.6	4.4E-02	5.3E-03	5.3E-02	2.2E-03	6.8E-02	4.8E-03	9.8E-03	2.4E-02	1.6E-02
91020	250	150	Diesel	NR	30.7	3.3E-02	4.0E-03	4.0E-02	1.7E-03	5.1E-02	3.7E-03	7.4E-03	1.8E-02	1.2E-02
90056	80	50	Diesel	NR	27.8	1.0E-02	1.2E-03	1.2E-02	5.1E-04	1.5E-02	1.1E-03	2.2E-03	5.4E-03	3.7E-03
90761	200	45	Diesel	NR	25.3	8.2E-03	9.9E-04	9.9E-03	4.2E-04	1.3E-02	9.1E-04	1.8E-03	4.4E-03	3.1E-03
90758	400	195	Diesel	NR	18.1	2.6E-02	3.1E-03	3.1E-02	1.3E-03	3.9E-02	2.8E-03	5.7E-03	1.4E-02	9.5E-03
90332	60	15	Diesel	NR	29.5	3.2E-03	3.8E-04	3.9E-03	1.6E-04	4.9E-03	3.5E-04	7.1E-04	1.7E-03	1.2E-03
90603	30	20	Diesel	NR	46.8	6.8E-03	8.1E-04	8.2E-03	3.4E-04	1.0E-02	7.5E-04	1.5E-03	3.6E-03	2.5E-03
90048	60	15	Diesel	NR	23.4	2.5E-03	3.1E-04	3.1E-03	1.3E-04	3.9E-03	2.8E-04	5.6E-04	1.4E-03	9.4E-04
90113	150	100	Diesel	NR	28.5	2.1E-02	2.5E-03	2.5E-02	1.0E-03	3.2E-02	2.3E-03	4.6E-03	1.1E-02	7.6E-03
90800	100	75	Diesel	NR	9.2	5.0E-03	6.0E-04	6.0E-03	2.5E-04	7.7E-03	5.5E-04	1.1E-03	2.7E-03	1.9E-03
90710	60	24	Diesel	NR	24.4	4.2E-03	5.1E-04	5.1E-03	2.2E-04	6.5E-03	4.7E-04	9.4E-04	2.3E-03	1.6E-03
90326	125	72	Diesel	NR	29.9	1.6E-02	1.9E-03	1.9E-02	7.9E-04	2.4E-02	1.7E-03	3.5E-03	8.4E-03	5.8E-03
90747	110	50	Diesel	NR	40	1.4E-02	1.7E-03	1.7E-02	7.3E-04	2.2E-02	1.6E-03	3.2E-03	7.8E-03	5.4E-03

Table 17-6 2003 HAP Emissions from Generators (continued)

Bldg. No.	Peak Rating (kW)	Peak Demand (kW)	Fuel Type	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	Acetaldehyde (lb/yr)	Acrolein (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Formaldehyde (lb/yr)	Naphthalene (lb/yr)	POM (lb/yr)	Toluene (lb/yr)	Xylenes (lb/yr)
90412	60	50	Diesel	NR	44.8	1.6E-02	1.9E-03	2.0E-02	8.2E-04	2.5E-02	1.8E-03	3.6E-03	8.7E-03	6.0E-03
90601	150	125	Diesel	NR	63.8	5.8E-02	6.9E-03	7.0E-02	2.9E-03	8.9E-02	6.4E-03	1.3E-02	3.1E-02	2.1E-02
91118	215	100	Diesel	NR	32.8	2.4E-02	2.9E-03	2.9E-02	1.2E-03	3.7E-02	2.6E-03	5.3E-03	1.3E-02	8.8E-03
90043	15	12	Diesel	NR	16.9	1.5E-03	1.8E-04	1.8E-03	7.5E-05	2.3E-03	1.6E-04	3.3E-04	7.9E-04	5.4E-04
91013	25	15	Diesel	NR	0	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
92420	100	40	Diesel	NR	16.2	4.7E-03	5.6E-04	5.6E-03	2.4E-04	7.2E-03	5.2E-04	1.0E-03	2.5E-03	1.7E-03
92424	15	5	Diesel	NR	16.1	5.8E-04	7.0E-05	7.0E-04	3.0E-05	9.0E-04	6.4E-05	1.3E-04	3.1E-04	2.2E-04
90752	40	20	Diesel	NR	17.3	2.5E-03	3.0E-04	3.0E-03	1.3E-04	3.9E-03	2.8E-04	5.6E-04	1.3E-03	9.3E-04
91102	30	25	Diesel	NR	22.6	4.1E-03	4.9E-04	4.9E-03	2.1E-04	6.3E-03	4.5E-04	9.1E-04	2.2E-03	1.5E-03
90760	150	74	Diesel	NR	19.2	1.0E-02	1.2E-03	1.2E-02	5.2E-04	1.6E-02	1.1E-03	2.3E-03	5.5E-03	3.8E-03
93343	30	20	Diesel	NR	14.1	2.0E-03	2.5E-04	2.5E-03	1.0E-04	3.1E-03	2.2E-04	4.5E-04	1.1E-03	7.6E-04
91026	30	15	Diesel	NR	22.7	2.5E-03	3.0E-04	3.0E-03	1.3E-04	3.8E-03	2.7E-04	5.5E-04	1.3E-03	9.1E-04
91014	15	5	Diesel	NR	17	6.2E-04	7.4E-05	7.4E-04	3.1E-05	9.5E-04	6.8E-05	1.4E-04	3.3E-04	2.3E-04
90909	15	8	Diesel	NR	18.2	1.1E-03	1.3E-04	1.3E-03	5.3E-05	1.6E-03	1.2E-04	2.3E-04	5.7E-04	3.9E-04
90102	200	75	Diesel	NR	18.3	9.9E-03	1.2E-03	1.2E-02	5.0E-04	1.5E-02	1.1E-03	2.2E-03	5.3E-03	3.7E-03
91023	100	50	Diesel	NR	17.2	6.2E-03	7.5E-04	7.5E-03	3.2E-04	9.6E-03	6.9E-04	1.4E-03	3.3E-03	2.3E-03
90117	15	7	Diesel	NR	19	9.6E-04	1.2E-04	1.2E-03	4.9E-05	1.5E-03	1.1E-04	2.1E-04	5.2E-04	3.6E-04
90614	15	7	Diesel	NR	32.8	1.7E-03	2.0E-04	2.0E-03	8.4E-05	2.6E-03	1.8E-04	3.7E-04	8.9E-04	6.2E-04
91136	125	75	Diesel	NR	55.6	3.0E-02	3.6E-03	3.6E-02	1.5E-03	4.6E-02	3.3E-03	6.7E-03	1.6E-02	1.1E-02
91267	40	15	Diesel	NR	20	2.2E-03	2.6E-04	2.6E-03	1.1E-04	3.3E-03	2.4E-04	4.8E-04	1.2E-03	8.0E-04
90017	30	10	Diesel	NR	17.6	1.3E-03	1.5E-04	1.5E-03	6.5E-05	2.0E-03	1.4E-04	2.8E-04	6.8E-04	4.7E-04
90232	100	35	Diesel	NR	9.3	2.4E-03	2.8E-04	2.8E-03	1.2E-04	3.6E-03	2.6E-04	5.2E-04	1.3E-03	8.7E-04
90053	55	30	Diesel	NR	112.9	2.5E-02	2.9E-03	3.0E-02	1.2E-03	3.8E-02	2.7E-03	5.5E-03	1.3E-02	9.1E-03
90032	100	45	Diesel	NR	26.4	8.6E-03	1.0E-03	1.0E-02	4.4E-04	1.3E-02	9.5E-04	1.9E-03	4.6E-03	3.2E-03
90577	40	18	Diesel	NR	17.4	2.3E-03	2.7E-04	2.7E-03	1.2E-04	3.5E-03	2.5E-04	5.0E-04	1.2E-03	8.4E-04
91601	150	74	Diesel	NR	111.2	6.0E-02	7.2E-03	7.2E-02	3.0E-03	9.2E-02	6.6E-03	1.3E-02	3.2E-02	2.2E-02
91350	100	45	Diesel	NR	36.1	1.2E-02	1.4E-03	1.4E-02	6.0E-04	1.8E-02	1.3E-03	2.6E-03	6.3E-03	4.4E-03
					Total (lb/yr)	**6.4E-01**	**7.8E-02**	**9.5E-01**	**3.2E-02**	**9.9E-01**	**1.0E-01**	**1.9E-01**	**4.1E-01**	**2.8E-01**

NR = Not Reported

Table 17-7 2003 HAP Emissions from Engine Driven Pumps

Bldg. No.	Rated Power Output (hp)	Loading Factor (% of Max. Power)	Fuel Type	Fuel Usage (10^3 gal/yr)	Operating Time (hr/yr)	Acetaldehyde (lb/yr)	Acrolein (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Formaldehyde (lb/yr)	Naphthalene (lb/yr)	POM (lb/yr)	Toluene (lb/yr)	Xylenes (lb/yr)
Diesel IC Engines ≤ 600 hp for which Fuel Usage is Uknown														
90717	146	74	Diesel	NR	112.8	6.58E-02	7.90E-03	7.92E-02	3.34E-03	1.01E-01	7.24E-03	1.46E-02	3.53E-02	2.44E-02
90717	146	74	Diesel	NR	42.2	2.46E-02	2.95E-03	2.96E-02	1.25E-03	3.78E-02	2.71E-03	5.47E-03	1.32E-02	9.12E-03
90717	146	74	Diesel	NR	31.2	1.82E-02	2.18E-03	2.19E-02	9.24E-04	2.80E-02	2.00E-03	4.05E-03	9.78E-03	6.74E-03
90711	125	74	Diesel	NR	30.5	1.52E-02	1.83E-03	1.83E-02	7.73E-04	2.34E-02	1.68E-03	3.39E-03	8.18E-03	5.64E-03
90711	125	74	Diesel	NR	32.8	1.64E-02	1.97E-03	1.97E-02	8.31E-04	2.52E-02	1.80E-03	3.64E-03	8.80E-03	6.07E-03
90036	340	74	Diesel	NR	25	3.40E-02	4.08E-03	4.09E-02	1.72E-03	5.22E-02	3.74E-03	7.55E-03	1.82E-02	1.26E-02
91136	111	74	Diesel	NR	55.6	2.47E-02	2.96E-03	2.97E-02	1.25E-03	3.79E-02	2.71E-03	5.48E-03	1.32E-02	9.13E-03
90601	120	74	Diesel	NR	63.8	3.06E-02	3.67E-03	3.68E-02	1.55E-03	4.70E-02	3.37E-03	6.80E-03	1.64E-02	1.13E-02
90705	231	74	Diesel	NR	24.7	2.28E-02	2.74E-03	2.74E-02	1.16E-03	3.50E-02	2.51E-03	5.07E-03	1.22E-02	8.44E-03
90705	231	74	Diesel	NR	13	1.20E-02	1.44E-03	1.44E-02	6.09E-04	1.84E-02	1.32E-03	2.67E-03	6.44E-03	4.44E-03
90705	231	74	Diesel	NR	21.2	1.96E-02	2.35E-03	2.36E-02	9.93E-04	3.01E-02	2.15E-03	4.35E-03	1.05E-02	7.25E-03
90705	231	74	Diesel	NR	22	2.03E-02	2.44E-03	2.44E-02	1.03E-03	3.12E-02	2.23E-03	4.51E-03	1.09E-02	7.52E-03
90810	224	74	Diesel	NR	20.8	1.86E-02	2.23E-03	2.24E-02	9.45E-04	2.86E-02	2.05E-03	4.14E-03	1.00E-02	6.90E-03
90810	224	74	Diesel	NR	17.8	1.59E-02	1.91E-03	1.92E-02	8.08E-04	2.45E-02	1.75E-03	3.54E-03	8.56E-03	5.90E-03
90810	224	74	Diesel	NR	19.3	1.73E-02	2.07E-03	2.08E-02	8.77E-04	2.66E-02	1.90E-03	3.84E-03	9.28E-03	6.40E-03
90308	121	74	Diesel	NR	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
					Total (lb/yr)	**1.3E-01**	**4.3E-02**	**4.3E-01**	**1.8E-02**	**5.5E-01**	**3.9E-02**	**7.9E-02**	**1.9E-01**	**1.3E-01**

NR = Not Reported

Table 17-8 2003 Actual Criteria Pollutant Emissions from Generators at the Training Grounds

Allowable Emergency Generator KW-hr/yr	CO (lb/yr)	NOx (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown					
2280 kW-hr	20.41	94.71	6.72	6.26	7.64

Table 17-9 2003 Potential Criteria Pollutant Emissions from Generators at the Training Grounds

Maximum Allowable Emergency Generator KW-hr/yr	CO (lb/yr)	NOx (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown					
1,880,000 kW-hr	16,828.26	78,095.20	5,542.24	5,164.36	6,298.00

Table 17-10 2003 Actual HAP Emissions from Generators at the Training Grounds

Allowable Emergency Generator KW-hr/yr	Acetaldehyde (lb/yr)	Acrolein (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Formaldehyde (lb/yr)	Naphthalene (lb/yr)	POM (lb/yr)	Toluene (lb/yr)	Xylenes (lb/yr)
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown									
2280 KW-hp/yr	**1.6E-02**	**2.0E-03**	**2.0E-02**	**8.4E-04**	**2.5E-02**	**1.8E-03**	**3.7E-03**	**8.9E-03**	**6.1E-03**

Table 17-11 2003 Potential HAP Emissions from Generators at the Training Grounds

Maximum Allowable Emergency Generator KW-hr/yr	Acetaldehyde (lb/yr)	Acrolein (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Formaldehyde (lb/yr)	Naphthalene (lb/yr)	POM (lb/yr)	Toluene (lb/yr)	Xylenes (lb/yr)
Diesel Generators ≤ 447kW for which Fuel Usage is Uknown									
1,880,000 KW-hp/yr	**1.4E+01**	**1.6E+00**	**1.6E+01**	**6.9E-01**	**2.1E+01**	**1.5E+00**	**3.0E+00**	**7.3E+00**	**5.0E+00**

Table 17-12 2003 Summary of Internal Combustion Engine Emissions

Actual Criteria Pollutant Emissions from Internal Engine Combustion					
Emission Source	**CO (lb/yr)**	**NOx (lb/yr)**	**PM_{10} (lb/yr)**	**SO_X (lb/yr)**	**VOC (lb/yr)**
Generators	1,157.81	5,315.57	328.07	306.73	379.81
Engine Driven Pumps	440.35	2,043.56	145.03	135.14	164.80
Training Grounds	20.41	94.71	6.72	6.26	7.64
Total lb/yr	**1,618.57**	**7,453.84**	**479.82**	**448.14**	**552.25**
Total tons/yr	**0.81**	**3.73**	**0.24**	**0.22**	**0.28**

Actual HAP Emissions from Internal Engine Combustion									
Emission Source	**Acetaldehyde (lb/yr)**	**Acrolein (lb/yr)**	**Benzene (lb/yr)**	**1,3-Butadiene (lb/yr)**	**Formaldehyde (lb/yr)**	**Naphthalene (lb/yr)**	**POM (lb/yr)**	**Toluene (lb/yr)**	**Xylenes (lb/yr)**
Generators	6.40E-01	7.80E-02	9.47E-01	3.22E-02	9.93E-01	1.01E-01	1.92E-01	4.08E-01	2.82E-01
Engine Driven Pumps	1.27E-01	4.27E-02	4.28E-01	1.81E-02	5.47E-01	3.92E-02	7.91E-02	1.91E-01	1.32E-01
Training Grounds	1.65E-02	1.98E-03	1.99E-02	8.37E-04	2.54E-02	1.81E-03	3.67E-03	8.86E-03	6.11E-03
Total lbs/yr	**7.83E-01**	**1.23E-01**	**1.39E+00**	**5.11E-02**	**1.57E+00**	**1.42E-01**	**2.75E-01**	**6.08E-01**	**4.20E-01**
Total tons/yr	**3.92E-04**	**6.13E-05**	**6.97E-04**	**2.55E-05**	**7.83E-04**	**7.08E-05**	**1.37E-04**	**3.04E-04**	**2.10E-04**

Potential Criteria Pollutant Emissions from Internal Combustion Engines at the Training Grounds					
Emission Source	**CO (lb/yr)**	**NOx (lb/yr)**	**PM_{10} (lb/yr)**	**SO_X (lb/yr)**	**VOC (lb/yr)**
Training Grounds	16,828.26	78,095.20	5,542.24	5,164.36	6,298.00
Total lb/yr	**16,828.26**	**78,095.20**	**5,542.24**	**5,164.36**	**6,298.00**
Total tons/yr	**8.41**	**39.05**	**2.77**	**2.58**	**3.15**

Potential HAP Emissions from Internal Combustion Engines at the Training Grounds									
Emissions Source	**Acetaldehyde (lb/yr)**	**Acrolein (lb/yr)**	**Benzene (lb/yr)**	**1,3-Butadiene (lb/yr)**	**Formaldehyde (lb/yr)**	**Naphthalene (lb/yr)**	**POM (lb/yr)**	**Toluene (lb/yr)**	**Xylenes (lb/yr)**
Training Grounds	1.36E+01	1.63E+00	1.64E+01	6.90E-01	2.09E+01	1.50E+00	3.02E+00	7.31E+00	5.04E+00
Total lbs/yr	**1.36E+01**	**1.63E+00**	**1.64E+01**	**6.90E-01**	**2.09E+01**	**1.50E+00**	**3.02E+00**	**7.31E+00**	**5.04E+00**
Total tons/yr	**6.80E-03**	**8.16E-04**	**8.19E-03**	**3.45E-04**	**1.05E-02**	**7.48E-04**	**1.51E-03**	**3.65E-03**	**2.52E-03**

SECTION 18
ARCHITECTUAL COATINGS

18.1 Background

In 2003, architectural coating usage at Hurlburt Field was performed by contractors working for 16 CES/CEH, 16CES/CEOE, and by residents of base housing. Paint usage for this section can be grouped into several different functional areas of the base, including: structural maintenance, housing maintenance, and miscellaneous small users. The paints allocated to the housing maintenance section are only applied at the base housing areas. The paints allocated to the structural maintenance section are applied to industrial and office buildings throughout the base. The paints allocated to the miscellaneous small users are applied in small quantities at various locations for minor wall repairs, etc. Usage information for housing was obtained from the painting contractor. For structural maintenance and residents of base housing, usage information was obtained from the Self Help Office. Information on shop, manufacturer, and usage is provided in Table 18-1 on page 18-3.

18.2 Emissions Calculation Method

The emissions of concern from painting include VOC and organic HAPs. Since transfer efficiency for structural painting is assumed to be 100 percent, there are no particulate emissions. Actual emissions were calculated from the VOC and HAP content, product usage, and the specific gravity of the paints. It was assumed that the entire VOC and HAP content of the products evaporated during mixing and application.

Specific information on each chemical product (e.g., specific gravity or density, VOC content, organic HAP content, etc.) was obtained either directly from Material Safety Data Sheets (MSDSs) or derived from information in the MSDSs. AFIOH/RSEQ obtained most MSDSs from either the DoD Hazardous Material Information System (HMIS), the University of Vermont's MSDS Internet site, or from the manufacturer. The emissions from this source category are conservative in that where a weight percent range was given for an ingredient; the average weight percent was used in the calculations.

18.3 Sample Calculation Method

The following calculation was used to determine VOC emissions from the use of Sherwin Williams A-100 Satin Latex paint:

2003 Product Usage: 754 gal/yr
VOC Content: 0.93 lb/gal

$$E_{voc} = 754 \text{ gal/yr} * 0.93 \text{ lbs/gal} = \mathbf{701.22 \text{ lbs/yr}}$$

The following calculation was used to determine Ethyl Benzene (HAP) emissions from Sherwin Williams A-100 Satin Latex paint:

CY2003 Product Usage:	754 gal/yr
Product Density:	9.65 lbs/gal
Ethyl Benzene:	3% (wt %)

E_{voc} = 754 gal/yr ∗ 9.65 lbs/gal * 3%/100 = **218.3 lbs/yr**

18.4 Emissions Summary

Table 18-2, page 18-4, presents VOC and HAP emissions.

18.5 Reference

U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 30). AFIOH/RSEQ, May 1999.

Table 18-1 2003 Summary of Architectural Coatings

Chemical NSN	Chemical Name	Manufacturer	Shop	Usage (gal/yr)	Density (lb/gal)	VOC Content (lb/gal)	Organic HAP Content (Wt%)				
							Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Toluene	Xylenes
8010-00-F04-1315	Rustoleum Paint	Rust-Oleum Corp	16 CES/CEH	26.5	7.61	5.33	4			25	25
8010-00-N08-8439	Diversified Gloss	Sherwin Williams	16 CES/CEH	54	6.5	3.57	4				22
8010-00-F05-1615	Minwax Helsman Clear Gloss	Minwa Co.	16 CES/CEH	8	7.26	56					
8030-00-555-2878	Thompsons Water Seal	Thompson and Formby	16 CES/CEH	94	6.66	5.16					
8010-00-F05-1615	Minwax Polyurethane	Minwax Co.	16 CES/CEH	6	7.26	4.05					
8010-00-N08-2175	Latex Semi-Gloss	Sherwin Williams	16 CES/CEH	119.5	9.83	3.00		1	2		
8010-P3527-85	A-100 Latex Satin White	Sherwin Williams	16 CES/CEH	754	9.65	0.93		3			
8010-PN-B30-W40	Promar 200 Latex Semi-Gloss	Sherwin Williams	16 CES/CEH	534	10.35	0.45		2	3.5		
8010-00-N02-6974	Kilz Aerosol	Master Chem Ind.	16 CES/CEH	16	8.18	3.61					
8010-00-939-6165	Reducer	Sherwin Williams	16 CES/CEH	12	6.91	100				25	25
8010-P0-0N0-09228	Latex Gloss	Sherwin Williams	16 CES/CEH	30	10.00	3		1			
8010-PN-B30-W40	Promar 400 Latex Flat	Sherwin Williams	Self Help	223	11.46	0.87		4			
80109-AB186X	Latex Semi Gloss,Paint	Bennette Paint	Self Help	72	9.99	20		5			
8010-00-165-8628	9600 All Weather Stain	Devoe	Self Help	280	7.25	4.86					
8010-00-N04-3644	66 Super Kote Acrylic Traffic Paint	Coronado	Self Help	13	11.50	0.761		1.7			
8010-00-N01-7860	Paint,Enamel Semi-Gloss	Coronado	Self Help	10	10.70	1.6		2			
8030-00-555-2878	Thompsons Water Seal Waterproofing	Thompson and Formby	Self Help	28	6.66	3.33					
6810-00-N02-5546	Kilz II 51652-20001	Caldwell Paint	Self Help	45	10.58	3.7		2			

Table 18-2 2003 Emissions from Architectural Coatings

Chemical NSN	Chemical Name	Shop	VOC Emissions (lb/yr)	HAP Emissions (lb/yr)				
				Ethyl Benzene	Ethylene Glycol	Glycol Ethers	Toluene	Xylenes
8010-00-F04-1315	Rustoleum Paint	16 CES/CEH	141.25	8.1E+00			5.0E+01	5.0E+01
8010-00-N08-8439	Diversified Gloss	16 CES/CEH	192.78	1.4E+01				7.7E+01
8010-00-F05-1615	Minwax Helsman Clear Gloss	16 CES/CEH	448.00					
8030-00-555-2878	Thompsons Water Seal	16 CES/CEH	485.04					
8010-00-F05-1615	Minwax Polyurethane	16 CES/CEH	24.30					
8010-00-N08-2175	Latex Semi-Gloss	16 CES/CEH	358.50		1.2E+01	2.3E+01		
8010-P3527-85	A-100 Latex Satin White	16 CES/CEH	701.22		2.2E+02			
8010-PN-B30-W40	Promar 200 Latex Semi-Gloss	16 CES/CEH	240.30		1.1E+02	1.9E+02		
8010-00-N02-6974	Kilz Aerosol	16 CES/CEH	57.76					
8010-00-939-6165	Reducer	16 CES/CEH	1,200.00				2.1E+01	2.1E+01
8010-P0-0N0-09228	Latex Gloss	16 CES/CEH	90.00		3.0E+00			
8010-PN-B30-W40	Promar 400 Latex Flat	Self Help	194.01		1.0E+02			
80109-AB186X	Latex Semi Gloss,Paint	Self Help	1,440.00		3.6E+01			
8010-00-165-8628	9600 All Weather Stain	Self Help	1,360.80					
8010-00-N04-3644	66 Super Kote Acrylic Traffic Paint	Self Help	9.89		2.5E+00			
8010-00-N01-7860	Paint,Enamel Semi-Gloss	Self Help	16.00		2.1E+00			
8030-00-555-2878	Thompsons Water Seal Waterproofing	Self Help	93.24					
681000N025546	Kilz II 51652-20001	Self Help	166.50		9.5E+00			
		Total	**5,928**	**2.2E+01**	**5.0E+02**	**2.2E+02**	**2.1E+01**	**1.5E+02**

SECTION 19
WELDING OPERATIONS

19.1 Background

There are four welding shops at Hurlburt Field. These are located in the 16th Civil Engineer's Squadron 16th CES/CEOFA, 16th CES/ CEOHV, 16th Logistics Readiness Squadron, 16th LRS/TRANS and the 16th Equipment Maintenance Squadron (16th EMS/LGMFM). These welding shops have mechanical ventilated areas making them stationary sources. During CY2003, there were two different types of electric arc welding performed. These two types included Shielded Metal Arc Welding (SMAW) and Gas Metal Arc Welding (GMAW). Summary information on the electric arc welding operations performed at these welding shops in CY2003 is provided in Table 19-1.

Table 19-1 2003 Summary of Welding Operations

Shop	Bldg No.	Process Type	Rod Type	SCC	Consumption (lb/yr)
16 CES/CEOFA	90053	SMAW	E6010	3-09-051-44	40
16 CES/CEOFA	90053	SMAW	E6011	3-09-051-32	10
16 CES/CEOFA	90053	SMAW	E6013	3-09-051-40	10
16 CES/CEOFA	90053	SMAW	E7018	3-09-051-44	40
16 EMS/MXMFA	90070	SMAW	E6010	3-09-051-44	5
16 EMS/MXMFA	90070	SMAW	E6011	3-09-051-32	5
16 EMS/MXMFA	90070	SMAW	E7018	3-09-051-44	3
16 EMS/MXMFA	90070	GMAW	ER70S	3-09-052-54	50
16 EMS/MXMFA	90070	GMAW	ER4043	3-09-052-54	5
16EMS/MXMFA	90070	GMAW	ER5356	3-09-052-54	5
16CES/CEOHV	90053	SMAW	E6010	3-09-051-44	25
16CES/CEOHV	90053	SMAW	E7018	3-09-051-44	25
16CES/CEOHV	90053	GMAW	ER70S	3-09-052-54	5
16TRANS/LGTC	90109	SMAW	E6010	3-09-051-44	10
16TRANS/LGTC	90109	GMAW	ER70S	3-09-052-54	20

The emissions of concern from electric arc welding include particulate matter and inorganic HAPs. Common inorganic HAPs associated with arc welding include chromium (Cr), cobalt (Co), manganese (Mn), nickel (Ni), and lead (Pb).

19.2 Emissions Calculation Methods

Actual pollutant emissions from electric arc welding are calculated by multiplying the quantity of rods consumed times an appropriate EPA emission factor. The following equation is used:

$$E_{pol} = (EC / 1000) * EF$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr)
EC = Mass of Rod Consumed (lb/yr)
1000 = Factor for converting "lb" to "10^3 lb"

EF = Emission Factor (lb/10^3 lb)

Available emission factors and Source Classification Codes (SCCs) for the welding rods used at Hurlburt Field are provided in Table 19-2. Unfortunately, there were no EPA emission factors or SCCs for most of the welding rods used at 16 EMS/LGMFM welding shop. Therefore, to calculate particular matter emissions from these welding rods an average emission factor for known welding rods was used instead.

Table 19-2 Emission Factors used for Welding Operations

Process Type	Welding Rod Type	PM/PM_{10}[a] (lb/10^3 lb)	HAPs (lb/10^3 lb)				
			Cr[b]	Co[c]	Mn[d]	Ni[e]	Pb[f]
SMAW	E6010	25.6	0.003	ND	0.991	0.004	ND
SMAW	E6011	38.4	0.005	0.001	0.998	0.005	ND
SMAW	E6013	19.7	0.004	<0.001	0.945	0.002	ND
SMAW	E7018	18.4	0.006	0.001	1.03	0.002	ND
GMAW	ER70S	5.2	0.001	<0.001	0.318	0.001	ND
GMAW	ER4043[g]	23.8	0.046	0.001	0.9494	0.0052	ND

[a] All welding fumes are considered to be PM_{10}.
[b] Chromium
[c] Cobalt
[d] Manganese
[e] Nickel
[f] Lead
[g] Fumes and HAP Emission Factors were obtained by using the average of known electrodes E6010, E6011, E6013, E7018, E9018.
ND = No Data

19.3 Sample Calculation

The following is an example calculation for determining actual emissions associated with the SMAW E6010 rod used by the Welding-Sheet Metal Unit:

$$E_{pol} = (EC / 1000) * EF$$

$$E_{PM10} = (40 \text{ lb/yr} / 1000) * 25.60 \text{ lb}/10^3 \text{ lb} = \mathbf{1.02 \text{ lb/yr}}$$

$$E_{Cr} = (40 \text{ lb/yr} / 1000) * 0.003 \text{ lb}/10^3 \text{ lb} = \mathbf{1.20 \times 10^{-4} \text{ lb/yr}}$$

$$E_{Mn} = (40 \text{ lb/yr} / 1000) * 0.991 \text{ lb}/10^3 \text{ lb} = \mathbf{3.96 \times 10^{-2} \text{ lb/yr}}$$

$$E_{Ni} = (40 \text{ lb/yr} / 1000) * 0.004 \text{ lb}/10^3 \text{ lb} = \mathbf{1.60 \times 10^{-4} \text{ lb/yr}}$$

19.4 Emissions Summary

Emissions from welding operations are provided in Table 19-3 on page 19-3.

19.5 References

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Section 33), May 1999. AFIOH/RSEQ, Brooks AFB TX.

2. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources* (AP-42), Section 12.19, January 1995.

Table 19-3 2003 Emissions from Welding Operations

Shop	Process Type	Electrode Type	Amount Used (lb/yr)	PM_{10} (lb/yr)	HAP Emissions (lb/yr)			
					Cr[a]	Co[b]	Mn[c]	Ni[d]
16 CES/CEOFA	SMAW	E6010	40	1.02	1.20E-04	N/A	3.96E-02	1.60E-04
16 CES/CEOFA	SMAW	E6011	10	0.38	5.00E-05	1.00E-05	9.98E-03	5.00E-05
16 CES/CEOFA	SMAW	E6013	10	0.20	4.00E-05	1.00E-05	9.45E-03	2.00E-05
16 CES/CEOFA	SMAW	E7018	40	0.74	2.40E-04	4.00E-05	4.12E-02	8.00E-05
16 EMS/MXMFM	SMAW	E6010	5	0.12	2.30E-04	5.00E-06	4.75E-03	2.60E-05
16 EMS/MXMFM	GMAW	E6011	5	0.12	2.30E-04	5.00E-06	4.75E-03	2.60E-05
16 EMS/MXMFM	SMAW	E7018	3	0.07	1.38E-04	3.00E-06	2.85E-03	1.56E-05
16 EMS/MXMFM	GMAW	ER4043[e]	5	0.12	2.30E-04	5.00E-06	4.75E-03	2.60E-05
16 EMS/MXMFM	GMAW	ER5356[e]	5	0.12	2.30E-04	5.00E-06	4.75E-03	2.60E-05
16 EMS/MXMFM	GMAW	ER70-S	50	0.26	2.60E-01	5.00E-05	1.59E-02	5.00E-05
16 EMS/CEOHV	SMAW	E6011	25	0.96	1.25E-04	2.50E-05	2.50E-02	1.25E-04
16 EMS/CEOHV	SMAW	E7018	25	0.64	7.50E-05	N/A	2.48E-02	1.00E-04
16 EMS/CEOHV	GMAW	MIL-705-2	5	0.12	2.30E-04	5.00E-06	4.75E-03	2.60E-05
16TRANS/LGTC	SMAW	E6010	10	0.05	1.00E-05	1.00E-05	3.18E-03	1.00E-05
16TRANS/LGTC	GMAW	ER70-S	20	0.10	1.04E-01	2.00E-05	6.36E-03	2.00E-05
Total Emissions (lb/yr)				**5.02**	**3.66E-01**	**1.33E-04**	**2.02E-01**	**7.61E-04**

N/A = Not Applicable (i.e., no emission factor available)

[a] Cr = Chromium

[b] Co = Cobalt

[c] Mn = Manganese

[d] Ni = Nickel

[e] Fumes and HAP Emission Factors were obtained by using the average of known electrodes E6010, E6011,E7018.

SECTION 20
MISCELLANEOUS SOURCES

20.1 Background

Woodworking, sanding, and disintegrator operations involve the use of mechanical equipment (e.g., electric saws, sanders, paper disintegrators, control equipment etc.) that generates particulate emissions. There are currently five carpentry shops, one fiberglass-sanding booth, one vehicle sanding preparation booth, and one paper and microfilm disintegrator at Hurlburt Field. Summary information on these operations is provided in Table 20-1 below.

Table 20-1 2003 Summary of Woodworking / Sanding / Disintegrator Operations

Shop	Type of Control Device	Est. Control Device Efficiency (%)	Volume Collected	Particle Density (lb/ft^3)[a]
16 SVS/SVRD	Medium size high efficiency cyclone	90	2242 ft^3/yr	11.5
16 TRANS/LGRRT	Cyclone, fabric filter	99.5	1056 ft^3/yr	11.5
16 TRANS/LGRDC	Small diameter high efficiency cyclone	90	2200 ft^3/yr	11.5
16 EMS/MXMFE	Fabric filter	99	1153 ft^3/yr	11.5
16 CES/CEOFA	Large diameter cyclone	85	960 ft^3/yr	11.5
16 EMS/LGMFE	Particulate filter cartridges	99.5	200 lb/yr	N/A
16 RHS/LGTMA	Particle filters which vent inside shop	N/A	N/A	N/A
53 ISO/DART	Particle filters which vent inside shop	N/A	N/A	N/A
16 CRS/SCDPR	Cyclone followed by fabric filter	99	300 lb/yr	1.33 to 1.67

[a] Particulate density at each location was unknown. Therefore, an average density of 11.5 lb/ft^3 (listed in Perry's Chemical Engineer's Handbook) was used.

There are two other sources of miscellaneous emissions. The first source is from spills of JP-8 / Diesel / Mogas. Table 20-2 shows the volume lost of each type of hydrocarbon. The other source of miscellaneous emissions is from Fire Fighter training where 1000 gallons of propane were burned during CY2003.

Table 20-2 Losses from Accidental Releases

Substance Spilled	Volume Not Recovered
JP-8	90.5 Gallons
Diesel	4 Gallons
MOGAS	4 Gallons

20.2 Emissions Calculation Methods

Particulate Emissions

Actual emissions of total particulate matter (PM) emissions from woodworking are calculated using a mass balance approach which is based on the estimated efficiency of the control device and the amount of particulate matter collected during the year. The following equation is used:

$$E_{PM} = [(MSD_{col}) / (eff/100)] - MSD_{col}$$

Where,

E_{PM} = Emissions of particulate matter (lb/yr)
MSD_{col} = Mass of particulate collected [i.e., captured by the control device] (lb/yr)
eff = Efficiency of control device (%)

Since the mass of particulate collected during the year is not directly known, it must be calculated based on the volume collected and the density of the particulate. The following equation is used to calculate the mass of particulate:

$$MSD_{col} = VSD_{col} * D$$

Where,

MSD_{col} = Mass of particulate collected (lb/yr)
VSD_{col} = Volume of particulate collected (ft^3/yr)
D = Density of the particulate (lb/ft^3)

It's important to note that since the size of the particulate matter emitted into the atmosphere is unknown, it is conservatively assumed that PM_{10} emissions are equal to total PM emissions.

<u>Fuel Spill Emissions</u>

Actual VOC emissions from fuel spills are calculated using a simple material balance approach. The difference between the total quantities of fuel spilled minus the quantity of fuel recovered is assumed to equal the VOC emissions. The following equation is used:

$$E_{VOC} = [QS – QR] * D$$

Where,

E_{VOC} = Emissions of VOC (lb/yr)
QS = Quantity of fuel spilled (gal/yr)
QR = Quantity of fuel recovered (gal/yr)
D = Density of the fuel (lb/gal) [note – typical densities are: 6.8 for JP-8, 7.1 for diesel, and 6.0 for gasoline]

HAP emissions associated with fuel spills are calculated based on the liquid-phase speciation of the fuel. This is accomplished by multiplying the total VOC emissions by the weight fraction (weight percent divided by 100) of each HAP in the liquid fuel. The following equation is used:

$$E_{HAP} = E_{VOC} * (LWP_{HAP} / 100)$$

Where,

E_{HAP} = Emissions of a specific HAP (lb/yr)
E_{VOC} = VOC emissions (lb/yr)
LWP_{HAP} = Weight percent of the HAP in the liquid fuel (%)
100 = Factor for converting weight percent into weight fraction

Liquid-phase speciations of the different fuels can be found in Appendix A of this report.

Fire Fighter Training

Actual emissions from fire fighter training are calculated by simply multiplying the quantity of fuel combusted times appropriate emission factors. The following equation is used:

$$E_{pol} = QF * EF$$

E_{pol} = Emissions of a particular pollutant (lb/yr)
QF = Quantity of fuel burned (gal/yr)
EF = Emission Factor (lb/gal)

Emission factors from live propane fires are provided in Table 20-3. These emission factors were derived from testing performed at the Air Force's fire fighter training school located at Goodfellow AFB TX.

Table 20-3 Emission Factors for Fire Fighter Training using Liquid Propane Fuel[a]

Pollutant	Emission Factor (lb/gal)[b]
Criteria Pollutants	
CO	0.0154
NO_X	0.0557
PM	0.0095
PM_{10}[c]	0.0095
VOC[d]	0.0240
Hazardous Air Pollutants[e]	
Formaldehyde	0.0007

[a] Emission factors are based on sampling performed at Goodfellow AFB.
[b] Emission factors are in units of pounds pollutant per gallon of fuel burned.
[c] Sampling for PM_{10} was not performed. PM_{10} assumed to equal PM.
[d] Based on sampling results for Total Hydrocarbons (THC), as methane.
[e] The only HAP sampled for was formaldehyde.

20.3 Sample Calculation

The following is a sample calculation for determining particulate matter emissions from the woodworking operations performed at Hurlburt Field.

Estimated quantity of particulate collected: 2200 ft^3/yr
Estimated density of the particulate: 11.5 lb/ft^3
Type of control device: Medium size high efficiency cyclone
Estimated efficiency of control device: 90%

First, calculate the mass of particulate captured by the control device system during the year:

$$MSD_{col} = VSD_{col} * D$$
$$MSD_{col} = 2200\ ft^3/yr * 11.5\ lb/ft^3 = 25{,}300\ lb/yr$$

Next, calculate the particulate emissions:

$$E_{PM} = [(MSD_{col}) / (eff/100)] - MSD_{col}$$
$$E_{PM} = [25{,}300\ lb/yr / (90\%/100)] – 25{,}300\ lb/yr = 2{,}811.1\ lb/yr$$

20.4 Emissions Summary

Emissions from particulate collection devices are presented in Table 20-4 on page 20-5, emissions from fuel spills are presented in Table 20-5 on page 20-6, while emissions from fire fighter training are given in Table 20-6, also on page 20-6.

20.5 REFERENCES

1. U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Sections 10, 12, 35), May 1999. IERA/RSEQ, Brooks AFB TX.

2. Environmental Quality Management, *Emissions Testing of Fire Fighter Training Facility - Goodfellow AFB TX*, January 1998.

Table 20-4 2003 Emissions from Particle Collectors

Shop	Particulate Collected	Units	Particulate Density (lb/ft^3)	Control Efficiency (%)	PM_{10}
16 SVS/SVRD	2242	ft^3/yr	11.5	90	2,864.78
16 TRANS/LGRRT	1056	ft^3/yr	11.5	99.5	61.03
TRANS/LGRDC	2200	ft^3/yr	11.5	90	2,811.11
16 EMS/MXMFE	1153	ft^3/yr	11.5	99	133.93
16 CES/CEOFA	960	ft^3/yr	11.5	85	1,948.24
16 EMS/LGMFE	200	lb/yr	N/A	99.5	1.01
16 RHS/LGTMA	[1]N/A	N/A	N/A	N/A	N/A
53 ISO/DART	[1]N/A	N/A	N/A	N/A	N/A
16 CRS/SCDPR	300	lb/yr	N/A	99	3.03
				Lb/Yr	**7,823.12**
				Tons/Yr	**3.91**

1 Vehicle sanding preparation booth vents into the booth.

N/A Not Applicable

Table 20-5 2003 Emissions from Fuel Spills

Substance Spillled	Volume Lost (gal)	VOC (lb/gal)	VOC (lb/yr)	Benzene (lb/yr)	Cumene (lb/yr)	Ethyl Benzene (lb/yr)	Hexane (lb/yr)	Methyl Tert-Butyl Ether (lb/yr)	Naphthalene (lb/yr)	Toluene (lb/yr)	2,2,4 Trimethyl pentane (lb/yr)	Xylenes (lb/yr)
JP-8	90.5	6.8	615.4	1.23	1.78	5.29	N/A	N/A	5.23	10.15	0.12	29.17
Diesel	4	6.75	27	1.94	0.11	0.19	0.62	N/A	N/A	1.11	N/A	0.68
Mogas	4	6.58	26.32	0.16	0.01	0.01	0.13	1.21	N/A	0.18	0.18	0.05
Total Emissions			**668.72**	**3.33**	**1.90**	**5.49**	**0.75**	**3.33**	**0.01**	**11.45**	**0.53**	**29.90**

N/A not applicable

Table 20-6 2003 Emissions from Fire Fighter Training

Location	Fuel Type	Fuel Burned	Fuel Units	CO (lb/yr)	NO_X (lb/yr)	PM_{10} (lb/yr)	SO_X (lb/yr)	VOC (lb/yr)	Formaldehyde (lb/yr)
Fire Training	LPG	1,000.00	gal/yr	15.4	55.7	9.5	16.0	24.0	0.7
			Total (lb/yr)	**15.4**	**55.7**	**9.5**	**16.0**	**24.0**	**0.7**

SECTION 21
PAINT SPRAY BOOTHS

21.1 Background

During 2003, Hurlburt Field operated three paint spray booths and several designated paint areas where surface coatings (paints, primers, etc.) were applied using High Volume Low Pressure (HVLP) spray guns and aerosol spray cans. In addition to paints, various other chemicals were also used in the paint spray booths such as chemical paint strippers and organic solvent cleaners.

The Hurlburt Field paint spray booths are equipped with a cross-draft ventilation system to remove pollutants from the work area. Paint is also applied in open uncontrolled areas and hangers. The primary pollutants of concern include VOC and organic HAPs that are generated from the evaporation of the solvent portion of the chemicals used in the booths. In addition, particulate matter and possibly some inorganic HAPs are also generated due to paint over spray. All booths are equipped with a single stage filter for the control of particulate matter and inorganic HAP emissions.

Summary information on the different chemicals used in Hurlburt Field's paint spray booths and paint areas are provided in Table 21-1, beginning on page 21-5. This information includes the applicable shop office symbol, the chemical name, chemical stock number, a representative manufacturer, method of application (spray-on coatings only), booth #, estimated quantity used in 2003, density, estimated transfer efficiency (spray-on coatings only), estimated control efficiency (spray-on coatings only), VOC content, and HAPs content (if applicable).

Chemical usage information at Hurlburt Field was obtained from the individual shops and Environmental Management Information System (EMIS) chemical authorization listings for each applicable shop and from local purchase receipts that were provided by shop operators.

Specific information on each chemical product (e.g., specific gravity or density, VOC content, HAP content, solids content, etc.) was either obtained directly from Material Safety Data Sheets (MSDSs) or derived from information provided in the MSDSs. AFIOH/RSEQ obtained most MSDSs from either the DoD Hazardous Material Information System (HMIS), the University of Vermont's MSDS internet site, or from the manufacturer. In some cases the VOC content of the chemical product was not listed on the MSDS and was not available from the manufacturer. Therefore, the VOC content for these products was estimated by identifying all ingredients that meet the definition of VOC (found in 40 CFR 51.100) and then summing up their weight percents. Likewise, in some cases the solids content (applicable only to those products which are sprayed on) was not listed on the MSDS and was not available from the manufacturer. Therefore, the percent solids content for these products was estimated by subtracting out the solvent portion (VOC and exempt solvents) and assuming the remainder of the product was solids.

Hurlburt Field has established a federally enforceable limit on the volume of paint that can be used in the paint booths not to exceed 4600 gallons per year.

There are several Source Classification Codes applicable to the paint spray booths at Hurlburt Field, including the following:

- SCCs 4-02-001-10, 4-02-002-10, 4-02-003-10, 4-02-004-10, 4-02-005-10, 4-02-006-10, and 4-02-007-10 Petroleum and Solvent Evaporation; Surface Coating Operations; Surface Coating Application – General
- SCC 4-02-009-98 Petroleum and Solvent Evaporation; Surface Coating Operations; Thinning Solvents – General; General: Specify in Comments

21.2 Emissions Calculation Methods

Two separate methodologies are used to calculate actual emissions from paint spray booths. One method is for VOC and organic HAP emissions and the other method is for particulate matter and inorganic HAP emissions.

VOC and organic HAP emissions are calculated using a mass balance approach in which it is assumed the entire solvent portion of a chemical evaporates. The following equation is used:

$$E_{pol} = VC * D * (WP/100)$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr) [note: pollutant must be VOC or an organic HAP]
VC = Volume of chemical used (gal/yr)
D = Density of the chemical (lb/gal)
WP = Weight percent of the pollutant in the chemical (%)
100 = Factor for converting "percent" into a fraction

Particulate matter and inorganic HAPs emissions are only applicable to coatings that are sprayed on. Emissions are based on the volume of coating used, the weight percent of pollutant in the coating, the transfer efficiency of the paint spraying operation, and the efficiency of the particulate control system. The following equation is used:

$$E_{pol} = VC * D * (WP/100) * [1 - (TE/100)] * [1- (CE_{PM}/100)]$$

Where,

E_{pol} = Emissions of a particular pollutant (lb/yr) [note: pollutant must be PM or an inorganic HAP]
VC = Volume of coating applied (gal/yr)
D = Density of the coating (lb/gal)
WP = Weight percent of the pollutant in the coating (%) [note: for PM the weight percent solids content is used]
100 = Factor for converting "percent" into a fraction

TE = Estimated Transfer Efficiency of the spray coating operation (%)
CE_{PM} = Efficiency of the PM/inorganic HAP control system (%) [note: CE equals zero if no PM/inorganic HAP control device is used]

Potential emissions from paint spray booths and paint areas are calculated based on the volume of paint used during 2003 compared to Hurlburt Field's permit limit of 4600 gallons per year. In general, the 2003 actual emissions are multiplied times the ratio of maximum annual allowable paint usage to actual annual paint usage. The ratio used was

4600 gals/ * 804.01 gals = 5.72

21.3 Sample Calculations

The following is an example calculation for determining actual emissions from the spraying of Deft Epoxy Primer Kit by the 16 EMS/LGMFE:

Quantity of coating used in 2003: 50 gal
Coating Density: 8.96 lb/gal
VOC and organic HAP weight percents: VOC (55.2%) and Toluene (5.99)
Solids and inorganic HAP weight percents: Solids Content (44.81%), No inorganic HAPs listed
Type of application method: HVLP Spray Gun
Estimated Transfer Efficiency: 65%
Type(s) of emissions control: Single stage particulate filters for the collection of particulate matter and inorganic HAPs only
Estimated efficiency of emissions control system: 95% (note – applicable only to particulate matter and inorganic HAPs)

First calculate the VOC and organic HAP emissions:

E_{pol} = VC * D * (WP/100)
E_{VOC} = 50 gal/yr * 8.96 lb/gal * (55.2%/100) = **247.4 lb/yr**
$E_{toluene}$ = 50 gal/yr * 8.96 lb/gal * (5.99%/100) = **26.8 lb/yr**

Next, calculate the particulate matter and inorganic HAP emissions:

E_{pol} = VC * D * (WP/100) * [1 - (TE/100)] * [1- (CE/100)]
E_{PM10} = 50 gal/yr * 8.96 lb/gal * (44.81%/100) * [1 - (65%/100)] * [1- (95%/100)]
= **3.5 lb/yr**

No inorganic HAPs to calculate

21.4 Emissions Summary

Actual and potential emissions from paint spray booths and areas are provided in Table 21-2, beginning on page 21-9.

21.5 Reference

U.S. Air Force. *IERA-RS-BR-SR-1999-0001 Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations* (Revised December 2003) (Section 30), May 1999. AFIOH/RSEQ, Brooks AFB TX.

Table 21-1 2003 Summary of Surface Coatings used in Paint Spray Booths

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	Coating Application Method	Usage (gal/yr)	Density (lb/gal)	Coating Transfer Efficiency (%)	Particulate Control Efficiency (%)	Coating Solids Content (Wt%)	VOC Content (Wt%)	Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
6810002812785	Methyl Ethyl Ketone	Chemtree Corp	16 EMS / LGMFE	N/A	15.12	6.75	N/A	0	0	100.0						100			
6810008556160	Isopropyl Alcohol	Arco Chemical Co	16 EMS / LGMFE	N/A	35.00	6.50	N/A	0	0	100.0									
8010000822450	Epoxy Primer Coating Kit	DEFT, Inc	16 EMS / LGMFE	HVLP	50.00	8.96	65	95	44.81	55.2								5.99	
8010001605787	Thinner	CSD Inc	16 EMS / LGMFE	N/A	57	6.86	N/A	0	0	100.0						12	30.5	10.5	7
8010013316109	Eco Sure Red	DEFT, Inc	16 EMS / LGMFE	N/A	3.00	8.85	65	95	35	65.0							2.93		21.82
8010013363980	Eco Sure Green	DEFT, Inc	16 EMS / LGMFE	N/A	.250	8.31	65	95	33	67.0									20.27
8010013483060	Eco Sure Gray	DEFT, Inc	16 EMS / LGMFE	N/A	3	9.92	65	95	33	67.0								15.06	3.26
8010013316105	Eco Sure White	DEFT, Inc	16 EMS / LGMFE	N/A	0.05	7.52	65	95	35	65.0								34.68	
8010013323738	Eco-Sure Blue	DEFT, Inc	16 EMS / LGMFE	N/A	.250	7.41	65	95	35	65.0							2.85		24.22
8010013316108	Eco-Sure Black	DEFT, Inc	16 EMS / LGMFE	N/A	6.25	9.90	65	95	40	60.0							3.24	15.24	3.24
8010006641914	So-Sure Lacquer Light Gray	LHB Industries	16 EMS / LGMFE	HVLP	33	8.51	65	95	15	85.0		1.72						11.99	1.72
8010013055555	Polyurethane Green	LHB Industries	16 CRS	HVLP	1.13	8.92	65	95	54	46.0		0.1				5	20	5	1
6810LPUS7590	Enamel Thinner Gl	Sherwin Williams	16 RS / LGTM	N/A	1	10.00	N/A	0	0	100.0						20	1		
8010LP53725	Ultra 7000 Basecoat ABS-Bf	Sherwin Williams	16 RS / LGTM	HVLP	1.125	8.16	65	95	35	95.0		4							23
8010LPUS3GL	US3 Ultra System Reducer	Sherwin Williams	16 RS / LGTM	HVLP	0.811	56.23	65	95	30	70.0							30		
8030005468621	Undercoat UI	Aerosol Systems	16 RS / LGTM	HVLP	4	7.50	65	95	43	57.0	20							2	5
8010004591756	Polyurethane Coating	CAAP Company	16 EMS / LGMFE	HVLP	3	8.00	65	95	51	49.0				0.5					49.4
8010013505259	So-Sure Primer Yellow	LHB Industries	16 EMS/LGMMS	N/A	.250	7.50	65	95	15	85.0								15	3
8010008489272	So-Sure Orange	LHB Industries	16 EMS/LGMWM	N/A	2	7.50	65	95	52	48.0									
8010007219745	So-Sure Gloss Yellow	LHB Industries	16 EMS / LGMFE	N/A	.125	7.50	65	95	52	48.0									
8010013316112	So-Sure Olive Drab	LHB Industries	16 EMS/LGMWMI	N/A	4.5	7.50	65	95	52	48.0									
8010013483060	Paint Enamel Gray	LHB Industries	16 EMS/LGMH	HVLP	2	8.33	65	95	52	48.0							2.92	14.66	19.84
8010006169143	Enamel SP/Paint Black	LHB Industries	16 EMS/LGMH	N/A	2.00	7.50	65	95	52	48.0								14.66	

Table 21-1 2003 Summary of Surface Coatings used in Paint Spray Booths (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	Coating Application Method	Usage (gal/yr)	Density (lb/gal)	Coating Transfer Efficiency (%)	Particulate Control Efficiency (%)	Coating Solids Content (Wt%)	VOC Content (Wt%)	Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
8010009356609	So-Sure White	LHB Industries	16 EMS / LGMFE	N/A	32.00	7.50	65	95	52	48.0		2.14						28.58	4.29
8010LP-Sand Dune	Enamel Sand Dune	LHB Industries	16CRS	HVLP	0.41	8.33	65	95	30	70.0		5						10	10
8010LP24831	Enamel,Red	LHB Industries	16CRS	HVLP	0.50	59.09	65	95	35	65.0		5	5					15	20
8010013504755	Enamel,Black	LHB Industries	16CRS	HVLP	2.00	7.50	65	95	45	55.0								10	10
8010LP24805	Enamel,White	LHB Industries	16CRS	HVLP	1.75	26.03	65	95	51	49.0		3							
8010LP24833	Enamel, Blue	LHB Industries	16CRS	HVLP	1.00	7.50	65	95	30	70.0									
8010LP75933	Enamel, Yellow	LHB Industries	16CRS	HVLP	2.00	8.33	65	95	30	70.0									
801001331611	Olive Drab Ename/	LHB Industries	16CRS	HVLP	6.19	8.33	65	95	60	35.6							2.91	11.99	20.62
8010LP75948	Primer Gray	LHB Industries	16CRS	HVLP	0.34	9.16	65	95	40	60.0									
8010LPP6H49	primer acrylic urethane	Sherwin Williams	16 LRS/LGTM	HVLP	128.00	14.99	65	95	69	31.0		2					3	26	
8010LPE6H59	Sealer	Sherwin Williams	16CRS	HVLP	128.00	14.99	65	95	60	3.6									
8010LPUS7590	Reducer	Sherwin Williams	16CRS	HVLP	2.00	7.33	65	95	60	7.1						15		10	10
8010LPUSS51819G	Ultra 1 Desert Tan	Sherwin Williams	16CRS	HVLP	0.28	14.99	65	95	72	28.0									
8010009881458	So-Sure Blue	LHB Industries	16CRS	HVLP	0.13	8.33	65	95	45	55.0		5						15	1
8010012659143	Polyurethane Coating White Part 1	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	12.91	65	95	68.56	18.0		0.1						5	0.01
8010012659143	Polyurethane Coating White Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	7.91	65	95	41.96	58.0		0.03					25		
8010013296304	Polyurethane Coating Blue	DEFT, Inc	16 EMS / LGMFE	HVLP	3.00	12.91	65	95	68.56	18.0		0.1						5	1
8010012659139	Polyurethane Coating	DEFT, Inc	16 EMS / LGMFE	HVLP		9.48	65	95	79	21.0								1	1
8010012659153	Polyurethane Coating Orange-Yellow Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	20.00	9.83	65	75.61	24.0	55.0	0.1							5	1
8010012659153	Polyurethane Coating Orange-Yellow Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	20.00	8.08	65	95	43.85	56.0							45	15	
	Polyurethane Coating Black Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	2.00	13.33	65	95	40	60.3		0.02						0.2	0.05
	Polyurethane Coating Black Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	20.00	7.90	65	95	70	30.0									
8010013055550	Polyurethane Coating Gray Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	10.11	65	95	64	36.0		0.25				2.39	23.74	0.58	0.21

Table 21-1 2003 Summary of Surface Coatings used in Paint Spray Booths (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	Coating Application Method	Usage (gal/yr)	Density (lb/gal)	Coating Transfer Efficiency (%)	Particulate Control Efficiency (%)	Coating Solids Content (Wt%)	VOC Content (Wt%)	Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
8010013055550	Polyurethane Coating Gray Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	7.93	65	95	70	30.0									
8010013055551	Polyurethane Coating Gray Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	2.00	10.11	65	95	64	36.0		0.25				2.39	23.74	0.58	0.21
8010013055551	Polyurethane Coating Gray Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	2.00	7.93	65	95	70	30.0									
8010013363033	Polyurethane Coating Gray Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	1.00	11.63	65	65	80	20.0	0.03								0.08
8010013363033	Polyurethane Coating Gray Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	1.00	8.07	65	95	43	57.0							25		
8010013363036	Polyurethane Coating Green Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	2.00	11.50	65	95	66.4	56.7		0.23				2.17	19.39	0.53	0.19
8010013363036	Polyurethane Coating Green Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	20.00	7.93	65	95	70.4	29.6									
8010013623876	Polyurethane Coating Green	DEFT, Inc	16 CRS	HVLP		10.40	65	95	79	21.0									
8010013504755	Eco Sure Gray	LHB Industries	16 CRS	HVLP	1.00	10.25	65	95	9	91.0									
8010013565171	Clear Gloss Part 1	DEFT, Inc	16 EMS / LGMFE	HVLP	2.50	8.71	65	95	65	35.0		0.04						2.3	0.09
8010013565171	Clear Gloss Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	2.50	7.86	65	95	50	50.0							37.12	13.03	
8010013623876	Polyurethane Coating Green 14053	DEFT, Inc	16 RH/LGTM	HVLP	6.00	8.37	65	95	51	49.0				1.6		18.08			
8010013803249	Polyurethane Coating Gray Part1	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	10.30	65	95	64	36.0		1				5	20	1	1
8010013803249	Polyurethane Coating Gray Part 2	DEFT, Inc	16 EMS / LGMFE	HVLP	5.00	9.01	65	95	74	26.0							5		
8030005468621	Rubberized Undercoat	Ralrube	16 RHS/LGTM	HVLP	5.00	169.33	65	95	75	75.0	5								
	Ultra 7000 Stabilizers, Reducers CC-645HS	Sherwin Williams	16 TRANS/LGTM	HVLP	6.00	7.24	65	95	2	97.5		9							49
	Clearcoat Urethane BCS-605	Sherwin Williams	16 TRANS/LGTM	HVLP	5.00	8.16	65	95	46	64.0						7			
	Ultra 7000 Basecoat/ Clearcoat Urethane CCH690	Sherwin Williams	16 TRANS/LGTM	HVLP	2.50	8.66	65	95	67	33.0		2					1		22
	Etching, Filters, and Primers E2G980	Sherwin Williams	16 TRANS/LGTM	HVLP	1.00	8.83	65	95	39	61.0									
	Color Seal Acrylic Urethane E6H59	Sherwin Williams	16 TRANS/LGTM	HVLP	2.00	11.25	65	95	68	32.0		1						6	8
	G.B.P. Etching Filler Reducer R7K981	Sherwin Williams	16 TRANS/LGTM	HVLP	2.50	6.76	65	95	4	96.0							41		4
	Ultra 7000 Basecoat U7000	Sherwin Williams	16 TRANS/LGTM	HVLP	2.00	7.78	65	95	11	79.0		5							28
	Ultra 7000 Basecoat U7001 to U7300	Sherwin Williams	16 TRANS/LGTM	HVLP	1.31	7.78	65	95	11	79.0		5							28

Table 21-1 2003 Summary of Surface Coatings used in Paint Spray Booths (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	Coating Application Method	Usage (gal/yr)	Density (lb/gal)	Coating Transfer Efficiency (%)	Particulate Control Efficiency (%)	Coating Solids Content (Wt%)	VOC Content (Wt%)	Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
	Ultra 7000 Basecoat/ Clearcoat	Sherwin Williams	16 TRANS/LGTM	HVLP	3.22	8.91	65	95	39	61.0		2.5						2.5	19.5
	Ultra 7000 Clearcoat Urethane CC-650	Sherwin Williams	16 TRANS/LGTM	HVLP	17.94	8.00	65	95	44	56.0		4							22
	Ultra 7000 Basecoat U7080	Sherwin Williams	16 TRANS/LGTM	HVLP	2.75	66.81	65	95	42	58.0		5						5	30
	Ultra 7000 Basecoat U7081	Sherwin Williams	16 TRANS/LGTM	HVLP	1.75	7.9135	65	95	45	55		6							35
	Ultra System Base Colorants U7070-7138	Sherwin Williams	16 TRANS/LGTM	HVLP	8.18	8.1634	65	95	35	65		4							23
	Ultra System Reducer US-1	Sherwin Williams	16 RHS/ LGTM	HVLP	6.50	6.75	65	95	30	70.0						30			
	Ultra 7000 Basecoat/ Clearcoat System U7 Series	Sherwin Williams	16 TRANS/LGTM	HVLP	5.00	8.50	65	95	40	60		4						3	20
	Ultra Stage	Sherwin Williams	16 RHS/LGTM	HVLP	17.25	9.00	65	95	53	47		5						5	27
	Ultra Stage	Sherwin Williams	16 TRANS/LGTM	HVLP	5.71	8.50	65	95	46	54		2						6	31
	Acrlyd Acrylic Enamel System ACR-LF	Sherwin Williams	16 TRANS/LGTM	HVLP	2.13	8.58	65	95	45	55		6						5	33
	V2V269,V6V175,V6V301E namel System ACR-LF	Sherwin Williams	16 TRANS/LGTM	HVLP	1.00	7.59	65	95	31	69			38						
	UltraSolv Reducer US-7590	Sherwin Williams	16 RHS/ LGTM	HVLP	20.00	7.58	65	95	0	100								19	
	Red Enamel 24831	Seymour of Sycamore	16 RHS/ LGTM	HVLP	0.75	59.09	65	95	35	65		5	5					15	20
	White Enamel 24805	Seymour of Sycamore	16 RHS/ LGTM	HVLP	2.75	26.03	65	95	51	49		3						9	11
	Blue Enamel 24833	Seymour of Sycamore	16 RHS/ LGTM	HVLP	0.63	0.78	65	95	30	70		5	5					15	15
	Caterpillar Yellow	Seymour of Sycamore	16 RHS/ LGTM	HVLP	2.00	9.11	65	95	30	70		5	10				5		5
	Black Spray Enamel	Seymour of Sycamore	16 RHS/ LGTM	HVLP	3.00	7.08	65	95	20	80	20	1						9	3
8010013316111	Olive Drab Ename/	Seymour of Sycamore	16 RHS/ LGTM	HVLP	24.33	7.22	65	95	15	85	1				30			11	9
	Sandable Gray Primer	Seymour of Sycamore	16 RHS/ LGTM	HVLP	10.19	6.54	65	95	40	60			5					20	5
8010001429273	Crest Paint Stripper #7	Crest Industrial Chemicals	16 HGS/DART	N/A	2.50	9.41	N/A	0	64	36					36				
8010001818080	Aircraft Thinner	CSD Inc	16 HGS/DART	N/A	12.00	7.42	N/A	0	0	100		2				11		11	7
8010011462649	Epoxy Paint	DEFT, Inc	16 HGS/DART	HVLP	5.00	11.54	65	95	59	32			25				5		
8010012659143	Polyurethane Coating WhitePart 1	DEFT, Inc	16 HGS/DART	HVLP	2.00	12.91	65	95	69	18		0						5	0

Table 21-1 2003 Summary of Surface Coatings used in Paint Spray Booths (continued)

Chemical NSN (without dashes)	Chemical Name	Manufacturer	Shop	Coating Application Method	Usage (gal/yr)	Density (lb/gal)	Coating Transfer Efficiency (%)	Particulate Control Efficiency (%)	Coating Solids Content (Wt%)	VOC Content (Wt%)	Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene-1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
8010012659143	Polyurethane Coating WhitePart 2	DEFT, Inc	16 HGS/DART	HVLP	2.00	7.91	65	95	42	58		0					25		
8010013055551	Polyurethane Coating Gray Part 1	DEFT, Inc	16 HGS/DART	HVLP	3.00	10.11	65	95	64	36		0				2	24	1	0
8010013055551	Polyurethane Coating Gray Part 2	DEFT, Inc	16 HGS/DART	HVLP	3.00	7.93	65	95	70	30									
8010013565171	Clear Gloss Part1	DEFT, Inc	16 HGS/DART	HVLP	1.00	8.71	65	95	65	35		0						2	0
8010013565171	Clear Gloss Part 2	DEFT, Inc	16 HGS/DART	HVLP	1.00	7.86	65	95	50	50								37	13
8010014166557	Epoxy Primer Coating Part A	DEFT, Inc	16 HGS/DART	HVLP	20.00	11.25	65	95	63	37		1							1
8010014166557	Epoxy Primer Coating Part B	DEFT, Inc	16 HGS/DART	HVLP	20.00	7.66	65	95	60	40									
8010014166556	Epoxy Primer Coating Part A	DEFT, Inc	16 HGS/DART	HVLP	9.00	11.25	65	95	54	36									
8010014166556	Epoxy Primer Coating Part B	DEFT, Inc	16 HGS/DART	HVLP	9.00	8	65	95	71	29		5							

Thinners are recycled, for the purpose of this inventory it was assumed that 25% of the thinners used evaporated

Table 21-2 2003 Emissions from Paint Spray Booths

Shop	Chemical Name	Chemical NSN	VOC Emissions (lb/yr)	PM_{10} Emissions (lb/yr)	HAP Emissions (lb/yr)								
					Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene 1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
16 EMS / LGMFE	Methyl Ethyl Ketone	6810002812785	102.00	N/A						25.50			
16 EMS / LGMFE	Isopropyl Alcohol	6810008556160	227.41	N/A									
16 EMS / LGMFE	Epoxy Primer Coating Kit	8010000822450	247.38	3.51								26.84	
16 EMS / LGMFE	Thinner	8010001605787	391.24	N/A						11.74	119.33	41.08	27.39
16 EMS / LGMFE	Eco Sure Red	8010013316109	17.26	N/A							0.78		5.79
16 EMS / LGMFE	Eco Sure Green	8010013363980	1.39	N/A									0.42
16 EMS / LGMFE	Eco Sure Gray	8010013483060	19.94	N/A								4.48	0.97
16 EMS / LGMFE	Eco Sure White	8010013316105	0.23	N/A								0.12	
16 EMS / LGMFE	Eco-Sure Blue	8010013323738	1.20	N/A							0.05		0.45
16 EMS / LGMFE	Eco-Sure Black	8010013316108	37.13	N/A							2.00	9.43	2.00
16 EMS / LGMFE	So-Sure Lacquer Light Gray	8010006641914	238.80	0.74		4.83						33.68	4.83
16 CRS	Polyurethane Green	8010013055555	4.62	0.09		0.01				0.13	2.01	0.50	0.10
16 RS / LGTM	Enamel Thinner Gl	6810LPUS7590	10.00	N/A						0.50	0.10		
16 RS / LGTM	Ultra 7000 Basecoat ABS-Bf	8010LP53725	8.72	0.06		0.37							2.11
16 RS / LGTM	US3 Ultra System Reducer	8010LPUS3GL	31.92	0.24							13.68		
16 RS / LGTM	Undercoat UI	8030005468621	17.09	0.23	6.00							0.60	1.50
16 EMS / LGMFE	Polyurethane Coating	8010004591756	11.76	0.21				0.12					11.85
16 EMS/LGMMS	So-Sure Primer Yellow	8010013505259	1.59	N/A								0.28	0.06
16 EMS/LGMWM	So-Sure Orange	8010008489272	7.20	N/A									
16 EMS / LGMFE	So-Sure Gloss Yellow	8010007219745	0.45	N/A									
16 EMS/LGMWMI	So-Sure Olive Drab	8010013316112	16.19	N/A									
16 EMS/LGMH	Paint Enamel Gray	8010013483060	8.00	0.15							0.49	2.44	3.31

Table 21-2 2003 Emissions from Paint Spray Booths (continued)

Shop	Chemical Name	Chemical NSN	VOC Emissions (lb/yr)	PM_{10} Emissions (lb/yr)	HAP Emissions (lb/yr)								
					Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene 1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
16 EMS/LGMH	Enamel SP/Paint Black	8010006169143	7.20	N/A								2.20	
16 EMS / LGMFE	So-Sure White	8010009356609	115.15	N/A		5.13						68.56	10.29
16CRS	Enamel Sand Dune	8010LP-Sand Dune	2.41	0.02		0.17						0.34	0.34
16CRS	Enamel,Red	8010LP24831	19.20	0.18		1.48	1.48					4.43	5.91
16CRS	Enamel,Black	8010013504755	8.25	0.12								1.50	1.50
16CRS	Enamel,White	8010LP24805	22.32	0.41		1.37							
16CRS	Enamel, Blue	8010LP24833	5.25	0.04									
16CRS	Enamel, Yellow	8010LP75933	11.66	0.09									
16CRS	Olive Drab Ename/	801001331611	18.36	0.54							1.50	6.18	10.63
16CRS	Primer Gray	8010LP75948	1.85	0.02									
16 LRS/LGTM	primer acrylic urethane	8010LPP6H49	594.96	23.17		38.38					57.58	499.00	
16CRS	Sealer	8010LPE6H59	69.09	20.15									
16CRS	Reducer	8010LPUS7590	1.04	0.15						0.55		1.47	1.47
16CRS	Ultra 1 Desert Tan	8010LPUSS51819G	1.18	0.05									
16CRS	So-Sure Blue	8010009881458.00	0.57	0.01		0.05						0.16	0.01
16 EMS / LGMFE	Polyurethane Coating White Part 1	8010012659143.00	11.62	0.77		0.06						3.23	0.01
16 EMS / LGMFE	Polyurethane Coating White Part 2	8010012659143.00	22.95	0.29		0.01					9.89		
16 EMS / LGMFE	Polyurethane Coating Blue	8010013296304.00	6.97	0.46		0.04						1.94	0.39
16 EMS / LGMFE	Polyurethane Coating	8010012659139.00	0.00	0.00								0.00	0.00
16 EMS / LGMFE	Polyurethane Coating Orange-Yellow Part1	8010012659153.00	108.12	4.03	0.20							9.83	1.97
16 EMS / LGMFE	Polyurethane Coating Orange-Yellow Part 2	8010012659153.00	90.50	1.24							72.72	24.24	
16 EMS / LGMFE	Polyurethane Coating Black Part1		16.07	0.19		0.01						0.05	0.01

Table 21-2 2003 Emissions from Paint Spray Booths (continued)

Shop	Chemical Name	Chemical NSN	VOC Emissions (lb/yr)	PM_{10} Emissions (lb/yr)	HAP Emissions (lb/yr)								
					Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene 1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
16 EMS / LGMFE	Polyurethane Coating Black Part 2		47.40	1.94									
16 EMS / LGMFE	Polyurethane Coating Gray Part1	8010013055550.00	18.20	0.57		0.13				0.30	12.00	0.29	0.11
16 EMS / LGMFE	Polyurethane Coating Gray Part 2	8010013055550.00	11.90	0.49									
16 EMS / LGMFE	Polyurethane Coating Gray Part1	8010013055551.00	7.28	0.23		0.05				0.12	4.80	0.12	0.04
16 EMS / LGMFE	Polyurethane Coating Gray Part 2	8010013055551.00	4.76	0.19									
16 EMS / LGMFE	Polyurethane Coating Gray Part1	8010013363033.00	2.33	1.14	0.00								0.01
16 EMS / LGMFE	Polyurethane Coating Gray Part 2	8010013363033.00	4.60	0.06							2.02		
16 EMS / LGMFE	Polyurethane Coating Green Part1	8010013363036.00	13.04	0.27		0.05				0.12	4.46	0.12	0.04
16 EMS / LGMFE	Polyurethane Coating Green Part 2	8010013363036.00	46.95	1.95									
16 CRS	Polyurethane Coating Green	8010013623876.00	0.00	0.00									
16 CRS	Eco Sure Gray	8010013504755.00	9.33	0.02									
16 EMS / LGMFE	Clear Gloss Part 1	8010013565171.00	7.62	0.25		0.01						0.50	0.02
16 EMS / LGMFE	Clear Gloss Part 2	8010013565171.00	9.83	0.17							7.29	2.56	
16 RH/LGTM	Polyurethane Coating Green 14053	8010013623876.00	24.61	0.45				0.80		2.27			
16 EMS / LGMFE	Polyurethane Coating Gray Part1	8010013803249.00	18.53	0.58		0.51				0.64	10.30	0.51	0.51
16 EMS / LGMFE	Polyurethane Coating Gray Part 2	8010013803249.00	11.71	0.58							2.25		
16 RHS/LGTM	Rubberized Undercoat	8030005468621.00	635.00	11.11	42.33								
16 TRANS/LGTM	Ultra 7000 Stabilizers, Reducers CC-645HS	0.00	42.35	0.02		3.91							21.28
16 TRANS/LGTM	Clearcoat Urethane BCS-605	0.00	26.12	0.33						0.71			
16 TRANS/LGTM	Clearcoat Urethane CCH690	0.00	7.15	0.25		0.43					0.22		4.76
16 TRANS/LGTM	Etching, Filters, and Primers E2G980	0.00	5.39	0.06									
16 TRANS/LGTM	Color Seal Acrylic Urethane E6H59	0.00	7.20	0.27		0.22						1.35	1.80

Table 21-2 2003 Emissions from Paint Spray Booths (continued)

Shop	Chemical Name	Chemical NSN	VOC Emissions (lb/yr)	PM_{10} Emissions (lb/yr)	HAP Emissions (lb/yr)								
					Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene 1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
16 TRANS/LGTM	G.B.P. Etching Filler Reducer R7K981	0.00	16.21	0.01							6.92		0.68
16 TRANS/LGTM	Ultra 7000 Basecoat U7000	0.00	12.29	0.03		0.78							4.36
16 TRANS/LGTM	Ultra 7000 Basecoat U7001 to U7300	0.00	8.05	0.02		0.51							2.85
16 TRANS/LGTM	Ultra 7000 Basecoat/ Clearcoat	0.00	17.51	0.20		0.72						0.72	5.60
16 TRANS/LGTM	Ultra 7000 Clearcoat Urethane CC-650	0.00	80.34	1.10		5.74							31.56
16 TRANS/LGTM	Ultra 7000 Basecoat U7080	0.00	106.56	1.35		9.19						9.19	55.12
16 TRANS/LGTM	Ultra 7000 Basecoat U7081	0.00	7.62	0.11		0.83							4.85
16 TRANS/LGTM	Ultra System Base Colorants U7070-7138	0.00	43.40	0.41		2.67							15.36
16 RHS/ LGTM	Ultra System Reducer US-1	0.00	30.70	0.23						3.29			
16 TRANS/LGTM	Clearcoat System U7 Series	0.00	25.49	0.30		1.70						1.27	8.50
16 RHS/LGTM	Ultra Stage	0.00	72.97	1.44		7.76						7.76	41.92
16 TRANS/LGTM	Ultra Stage	0.00	26.21	0.39		0.73						2.91	15.05
16 TRANS/LGTM	Acrlyd Acrylic Enamel System ACR-LF	0.00	10.05	0.14		1.01						0.82	5.94
16 TRANS/LGTM	V2V269,V6V175,V6V301 Enamel System ACR-LF	0.00	5.24	0.04			2.88						
16 RHS/ LGTM	UltraSolv Reducer US-7590	0.00	151.60	0.00								28.80	
16 RHS/ LGTM	Red Enamel 24831	0.00	28.81	0.27		2.22	2.22					6.65	8.86
16 RHS/ LGTM	White Enamel 24805	0.00	35.08	0.64		2.05						6.52	8.20
16 RHS/ LGTM	Blue Enamel 24833	0.00	0.34	0.00		0.02	0.02					0.07	0.07
16 RHS/ LGTM	Caterpillar Yellow	0.00	12.75	0.10		0.91	1.82				0.91		0.91
16 RHS/ LGTM	Black Spray Enamel	0.00	16.99	0.07	4.25	0.21						1.92	0.68
16 RHS/ LGTM	Olive Drab Ename/	8010013316111.00	149.30	0.46	1.76				52.69			19.32	15.81
16 RHS/ LGTM	Sandable Gray Primer	0.00	39.97	0.47			3.33					13.32	3.33

Table 21-2 2003 Emissions from Paint Spray Booths (continued)

Shop	Chemical Name	Chemical NSN	VOC Emissions (lb/yr)	PM_{10} Emissions (lb/yr)	HAP Emissions (lb/yr)								
					Hexane	Ethyl Benzene	Glycol Ethers	Hexamethylene 1,6-Diisocyanate	Methylene Chloride	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Toluene	Xylenes
16 HGS/DART	Crest Paint Stripper #7	8010001429273.00	8.47	N/A					8.47				
16 HGS/DART	Aircraft Thinner	8010001818080.00	89.04	N/A		1.78				2.34		9.35	6.23
16 HGS/DART	Epoxy Paint	8010011462649.00	18.18	0.59			14.43				2.89		
16 HGS/DART	Polyurethane Coating WhitePart 1	8010012659143.00	4.65	0.31		0.03						1.29	0.03
16 HGS/DART	Polyurethane Coating WhitePart 2	8010012659143.00	9.18	0.12		0.00					3.96		
16 HGS/DART	Polyurethane Coating Gray Part 1	8010013055551.00	10.92	0.34		0.08				0.18	7.20	0.18	0.06
16 HGS/DART	Polyurethane Coating Gray Part 2	8010013055551.00	7.14	0.29									
16 HGS/DART	Clear Gloss Part1	8010013565171.00	3.05	0.10		0.00						0.20	0.01
16 HGS/DART	Clear Gloss Part 2	8010013565171.00	3.93	0.07								2.92	1.02
16 HGS/DART	Epoxy Primer Coating Part A	8010014166557.00	83.22	2.48		2.25							2.25
16 HGS/DART	Epoxy Primer Coating Part B	8010014166557.00	61.31	1.61									
16 HGS/DART	Epoxy Primer Coating Part A	8010014166556.00	36.45	0.96									
16 HGS/DART	Epoxy Primer Coating Part B	8010014166556.00	20.10	0.86		3.47							
Total Actual Emissions (lb/yr)			**4750.62**	**93.59**	**54.54**	**101.88**	**26.18**	**0.92**	**61.16**	**48.40**	**345.34**	**861.27**	**361.12**
Total Potential Emissions (lb/yr)			**27179.71**	**535.46**	**312.01**	**582.88**	**149.78**	**5.28**	**349.93**	**276.89**	**1975.79**	**4927.60**	**2066.08**

APPENDIX A

FUEL SPECIATION DATA

Table A-1 Liquid Phase and Vapor Phase Speciation of JP-8

HAP Component	Weight Percent in Liquid-Phase[a]	Weight Percent in Vapor-Phase[b]
Benzene	0.033	0.20
Cumene	0.179	0.29
Ethylbenzene	0.157	0.86
Hexane		0.84
Naphthalene	0.264	0.38
Toluene	0.216	1.65
2,2,4-Trimethylpentane	0.001	0.02
Xylenes (mixed isomers)	1.173	4.74

[a] The liquid-phase speciation is based on average values listed in the Air Force AL/EQ report entitled "JP-8 Composition and Variability." A typical JP-8 density of 0.81 Kg/L (6.8 lb/gal) was used to convert the average "mg/L" values found in the AL/EQ report into units of mg/Kg (ppm).

[b] The vapor-phase speciation was calculated using the liquid-phase speciation values and the procedures found in Southwest Research Institute. *JP-8 Volatility Study*, Project No. 03-3148, March 2001.

Table A-2 Liquid Phase and Vapor Phase Speciation of Diesel Fuel

HAP Component	Weight Percent in Liquid-Phase[a]	Weight Percent in Vapor-Phase[b]
Benzene	0.2	7.2
Cumene	0.1	0.4
Ethylbenzene	0.2	0.7
Hexane (*n*-hexane)	0.04	2.3
Naphthalene	0.2	Negligible
Toluene	0.4	4.1
Xylenes (mixed isomers)	0.8	2.5

[a] With the exception of naphthalene, the liquid-phase speciation is based on "typical" values obtained from Table 3 of API's Manual of Petroleum Measurement Standards, Chapter 19.4. The naphthalene liquid-phase percentage was obtained by averaging the sample results found in the draft version of EPA's report entitled "Technical Support Document for Development of a Comparable Fuel Exemption"

[b] The vapor-phase speciation was calculated using the liquid-phase speciation values and the procedures found in Section 7.1.4 of AP-42.

Table A-3 Liquid Phase and Vapor Phase Speciation of Gasoline

HAP Component	Weight Percent in Liquid-Phase[a]	Weight Percent in Vapor-Phase[b]
Benzene	1.8	0.6
Cumene	0.5	0.02
Ethylbenzene	1.4	0.04
Hexane (*n*-hexane)	1	0.5
Methyl tert-butyl ether	4.5	4.6
Naphthalene	0.3	Negligible
Toluene	7	0.7
2,2,4-Trimethylpentane	4	0.7
Xylenes (mixed isomers)	7	0.2

[a] With the exception of naphthalene, the liquid-phase speciation is based on "typical" values obtained from Table 3 of API's Manual of Petroleum Measurement Standards, Chapter 19.4. The naphthalene liquid-phase percentage was obtained by averaging the sample results found in the draft version of EPA's report entitled "Technical Support Document for Development of a Comparable Fuel Exemption."

[b] The vapor-phase speciation was calculated using the liquid-phase speciation values and the procedures found in Section 7.1.4 of AP-42.