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PROPOSED FINAL

POLLUTION PREVENTION STRATEGIC PLAN

DOBBINS AIR RESERVE BASE, GEORGIA
GENERAL MITCHELL IAP-ARS, WISCONSIN
GRISSOM AIR RESERVE BASE, INDIANA
HOMESTEAD AIR RESERVE STATION, FLORIDA
MARCH AIR RESERVE BASE, CALIFORNIA
MINNEAPOLIS-ST. PAUL IAP-ARS, MINNESOTA
NIAGARA FALLS AIR RESERVE STATION, NEW YORK
PITTSBURGH IAP-ARS, PENNSYLVANIA
WESTOVER AIR RESERVE BASE, MASSACHUSETTS
WILLOW GROVE AIR RESERVE STATION, PENNSYLVANIA
YOUNGSTOWN AIR RESERVE STATION, OHIO

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ACRONYMS AND ABBREVIATIONS

AC/R	Air Conditioning/Refrigeration
AFRC	Air Force Reserve Command
AFI	Air Force Instruction
AFV	Alternative-Fueled Vehicle
ANG	Air National Guard
AP	Affirmative Procurement
ARB	Air Reserve Base
ARS	Air Reserve Station
ARW	Air Refueling Wing
AW	Airlift Wing
BCA	Base Closure Agency
BEE	Bioenvironmental Engineer
BTU	British Thermal Unit
CBCS	Combat Communications Squadron
CE	Civil Engineer
CEV	Civil Engineering - Environmental
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CNG	Compressed Natural Gas
CPG	Comprehensive Procurement Guideline
CY	Calendar Year
DERA	Defense Environmental Restoration Account
DLA	Defense Logistics Agency
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
ECAMP	Environmental Compliance Assessment and Management Program
EMIS	Environmental Management Information System
EPA	U.S. Environmental Protection Agency
EPA-17	Seventeen Chemicals Listed Under ITP
EPC	Environmental Protection Committee
EPCRA	Emergency Planning and Community Right-to-Know Act
FANG	Florida Air National Guard
FFCA	Federal Facilities Compliance Act
FOTW	Federally Operated Treatment Works
FR	Federal Register
FW	Fighter Wing
FY	Fiscal Year
GA ANG	Georgia Air National Guard
GSA	U.S. General Services Administration
HAZMAT	Hazardous Materials
HMP	Halon Management Plan
HMP2	Hazardous Material Pollution Prevention Module
HQ	Headquarters
HVLP	High Volume Low Pressure
HW	Hazardous Waste
IAP	International Airport
IMMS	Inventory Material Management Software
IMPAC	International Merchant Purchase Authorization Card
IPM	Integrated Pest Management
IRP	Installation Restoration Program
ITP	Industrial Toxics Program
IW	Industrial Waste
LB	Pound
LG	Logistics Group
MAJCOM	Major Command
MEK	Methyl Ethyl Ketone
MIBK	Methyl Isobutyl Ketone
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
NAS	Naval Air Station
ODS	Ozone Depleting Substance
OPR	Office of Primary Responsibility
OWS	Oil/Water Separator
PMP	Pest Management Plan
POC	Point of Contact
POL	Petroleum, Oil, and Lubricants
POTW	Publicly Operated Treatment Works
PP	Pollution Prevention
PPA	Pollution Prevention Act
PPMAP	Pollution Prevention Management Action Plan
PPO	Pollution Prevention Opportunity
PPOA	Pollution Prevention Opportunity Assessment
PPSP	Pollution Prevention Strategic Plan
QA	Quality Assurance
QAE	Quality Assurance Engineer
QRP	Qualified Recycle Program
RCRA	Resource Conservation and Recovery Act
RMP	Refrigerant Management Plan
RRRP	Resource Recovery and Recycling Program
SEA	Science and Engineering Associates
SGPB	Bioenvironmental Engineer (BEE)
SOW	Statement of Work
SPTG	Support Group
sq. ft.	Square Feet
TCLP	Toxicity Characteristic Leeching Procedure
TO	Technical Order
TRI	Toxics Release Inventory
USAF	U.S. Air Force
UST	Underground Storage Tank
UTA	Unit Training Assembly
VOC	Volatile Organic Compound
WIMS	Work Information Management System

BASE ABBREVIATIONS

DOB	Dobbins Air Reserve Base
GMT	General Mitchell IAP-ARS
GRI	Grissom Air Reserve Base
HOM	Homestead Air Reserve Station
MAR	March Air Reserve Base
MSP	Minneapolis-St. Paul IAP-ARS
NFS	Niagara Falls Air Reserve Station
PIT	Pittsburgh IAP-ARS
WST	Westover Air Reserve Base
WIL	Willow Grove Air Reserve Station
YNG	Youngstown Air Reserve Station

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EXECUTIVE SUMMARY

The pollution prevention program at the AFRC bases is directed by a number of legislative actions, Executive Orders, policies, and regulatory requirements. The "Air Force Pollution Prevention Strategy" established program area baselines and reduction goals for each base to achieve. The program areas are listed below:

- Environmental Protection Agency (EPA) Industrial Toxic Pollutants (ITP), commonly referred to as EPA-17 Chemicals
- Ozone Depleting Substances (ODSs)
- Hazardous Waste (HW)
- Municipal Solid Waste (MSW)
- Affirmative Procurement (AP)
- Pesticides
- Toxic Release Inventory (TRI) Chemical Releases
- Volatile Air Emissions (also referred to as VOCs).

This Pollution Prevention Strategic Plan (PPSP) describes the successful implementation of pollution prevention programs at the AFRC bases. It provides an overview of applicable pollution prevention laws, policies, and regulations; the current status of the 11 AFRC bases in achieving U.S. Air Force (USAF) pollution prevention goals; and provides detailed information on Pollution Prevention Opportunities (PPOs) existing, planned, or recommended for the bases.

An integral part of this PPSP is the Pollution Prevention Database, which is provided on disk in Appendix C of this document. The database contains numerous PPOs that have or could be implemented at AFRC bases. The intended users of the database are Civil Engineering Environmental Division (CEV) personnel at individual bases and at AFRC headquarters who can query the database for extensive information about PPOs, including implementation strategies, vendors, and costs. Other potential users of the database are Hazmart, Bioenvironmental Engineering, and Environmental Protection Committee/Pollution Prevention (EPC/P2) Subcommittee personnel.

Based on pollution prevention metric data reported by the bases, the 11 AFRC bases have done a tremendous job of meeting and exceeding most of the USAF goals (this includes any goals whose deadlines are on or before December 31, 1997). Table ES-1 provides a summary by program area of each of the AFRC bases' compliance status with the most recent USAF pollution prevention goals.

As shown in Table ES-1, approximately 77 percent of the current goals were met across the Command. (Note: TRI chemical and pesticide status was not included in this percentage because the goals for these two program areas are for 1999 and 2000, respectively.) Not shown in

the table, but highlighted in Section 3.2, is the fact that many bases have significantly exceeded the USAF goals. This cumulative effect of exceeding the goals across the Command translates to significant pollution reductions for AFRC.

The project which resulted in the preparation of this Strategic Plan was extremely successful. The exchange of information and PPOs between bases during the base site visits and follow-up telephone contacts, proved to be the most important product of the project. The bases have many knowledgeable people in the shops, CEV and other organizations who have researched and implemented PPOs. Where these PPOs were successful, SEA recommended these PPOs for other bases during later site visits and in this document. These PPOs were also put in the database. Because many of the goals have been met by the bases, these recommended PPOs can benefit bases by helping to meet future goals, reducing pollution at the source, and reducing compliance costs.

Table ES-1. Compliance Status With Pollution Prevention Goals for AFRC Bases[1]

PROGRAM AREA	BASES										
	DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Municipal Solid Waste Disposal[2]	-	-	+	+	+	-	-	+	-	8	-
Hazardous Waste Disposal[3]	-	+	+	+	+	+	+	+	+	-	+
EPA-17 Chemical Purchases[4]	+	+	+	+	+	+	+	+	+	+	+
ODS Purchases[5]	+	+	+	+	+	+	-	-	+	+	+
TRI Chemicals[6]	0	0	0	0	0	+	0	+	0	0	+
Pesticides Applied[7]	0	0	0	0	0	0	0	0	+	0	0

NOTES:
1. *A (+) indicates the goal was met and a (-) indicates the goal was not met.*
2. *The program goal calls for a 50 percent reduction in municipal solid waste disposal by December 31, 1997 (Baseline Year 1992.*
3. *The program goal calls for a 25 percent reduction in hazardous waste disposal by December 31, 1996 (Baseline Year 1992).*
4. *The program goal calls for a 50 percent reduction in the amount of EPA-17 chemicals purchased by 1996 (Baseline Year 1992).*
5. *The program goal calls for minimizing or eliminating purchases of ODSs (Baseline Year 1992. Bases achieving reductions greater than 90 percent were designated as having met the goal.*
6. *The program goal calls for a 50 percent reduction in total releases and off-site transfers by December 31, 1999 (Baseline Year 1994.*
7. *The program goal calls for a 50 percent reduction in active ingredient applied by the end of FY 2000 (Baseline Year 1993).*
8. *Municipal solid waste is collected by the Naval Air Station (NAS) at Willow Grove; therefore, solid waste metrics are generated by the NAS and not by Willow Grove ARS.*
9. *"0" indicates that future goals have not been met.*

Based on this command-wide survey, the major area of the AFRC pollution prevention program needing improvement is metrics data tracking. Review of the metric data, discussions with HQ AFRC/CEV and AFRC base personnel, and comparison of metric data with observations during the site visits indicated that some of the data is inconsistent and inaccurate and needs to be verified.

There are several reasons for these data problems. First, the baseline figures reported for many of the bases are inaccurate. The baselines can either be generously overstated, making it easy to meet reduction goals, or are unfairly understated, making it very difficult to meet goals.

Second, it can be time consuming to track and report all of the metrics required, and some base CEV personnel do not have the time to accurately perform these efforts. Therefore, some of the metrics reported by the bases are "guestimates", which makes it difficult to make comparisons with prior reporting periods or with data reported by other bases. Third, the systems at the bases to track the data are not consistent, accurate, or complete making it difficult to report data in the proper format. Fourth, the data requirements may not necessarily represent the best parameters for tracking pollution prevention progress.

To solve these problems, AFRC should consider the following changes to the tracking and reporting requirements:

1. Acknowledge the inaccuracies of the baseline figures and concentrate more on the continuing progress of pollution prevention by the bases for each of the program areas.
2. Reduce the data that needs to be reported to HQ AFRC/CEV to that minimally required by the USAF.
3. At a minimum, prepare detailed procedures on how to track and report data at the bases to provide consistency (including providing any needed software and training). Preferably HQ AFRC/CEV should develop a command-wide metric software tracking program that requires base personnel to enter data into a computer program that will eliminate misinterpretations of data requirements. This type of software tool is currently being developed by HQ AFRC, and should ease the reporting burden for the bases. This software is expected to generate reports via EMIS for hazardous waste, ODS, and potentially solid waste. This project should also include user training for base personnel.
4. Utilize an overall environmental compliance cost metric (e.g. the total cost for waste disposal, analytical costs, penalties, fees, etc.) as an additional measure of pollution prevention progress.

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1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVES

The U.S. Air Force (USAF), Air Force Reserve Command (AFRC), and AFRC bases are committed to environmental leadership and preventing pollution by reducing usage of hazardous materials and releases of pollutants into the environment to as near zero as feasible. The pollution prevention concept is designed to prevent pollution by reducing or eliminating harmful discharges to the air, land, and water at the source.

To accomplish these pollution prevention goals, AFRC bases have developed and implemented pollution prevention programs. In the past, documentation of each base's pollution prevention program was accomplished through the preparation of a Pollution Prevention Management Action Plan (PPMAP). The PPMAP measures each base's progress in meeting the USAF pollution prevention goals. Where goals are not being met, the Pollution Prevention Opportunity Assessment (PPOA), which is an appendix of the PPMAP, prescribes pollution prevention opportunities (PPOs) that will help each base meet its goals.

The USAF requires the implementation, periodic review, and updating of PPMAPs. To fulfill this requirement for all bases, AFRC is preparing a Command-wide PPMAP and PPOA, together referred to as the AFRC Pollution Prevention Strategic Plan (PPSP). The Command-wide PPSP is used to manage the actions needed to develop and execute pollution prevention programs for all AFRC bases.

This PPSP includes a Command-wide streamlined PPMAP and PPOA. These streamlined component plans identify, for each AFRC base, all existing and proposed PPOs and their implementation status, as well as new PPOs. The PPSP includes an analysis and comparison of existing Command-wide data that resolves and/or explains various anomalies as well as an assessment of the status of several installation-specific plans. Finally, an Affirmative Procurement Plan is developed as part of the PPSP to assist the bases in initiating and implementing an affirmative procurement program.

The objectives for development of the PPSP are as follows:

1) To meet DoD, USAF, AFRC, and other requirements for the development and implementation of PPMAPS and PPOAs at AFRC bases;

2) To lessen the impact of activities at AFRC bases on the environment in terms of reducing pollution and emissions while still maintaining the base's mission;

3) To produce a PPSP that will be easy to follow, use, and implement; and

4) To reduce costs associated with waste disposal or environmental compliance activities.

This PPSP has been developed for the 11 AFRC installations shown below:

- Dobbins Air Reserve Base, Georgia
- General Mitchell International Airport-Air Reserve Station, Wisconsin
- Grissom Air Reserve Base, Indiana
- Homestead Air Reserve Base, Florida
- March Air Reserve Base, California
- Minneapolis-St. Paul International Airport-Air Reserve Station, Minnesota
- Niagara Falls Air Reserve Station, New York
- Pittsburgh International Airport-Air Reserve Station, Pennsylvania
- Westover Air Reserve Base, Massachusetts
- Willow Grove Air Reserve Station, Pennsylvania
- Youngstown Air Reserve Station, Ohio.

1.2 TECHNICAL APPROACH

To meet the basic objectives for the development of the PPSP, a format was developed that would present important and useful information and required actions in a concise and "user-friendly" manner. Furthermore, because the PPSP is a command-wide document, it does not fit into the USAF format for pollution prevention plans. Therefore, this document follows a different format from that suggested by USAF guidance, but still provides the information required by the guidance.

The technical approach consisted of the following efforts:

1. Data collection activities, including obtaining and reviewing key base documents and plans, visiting the base shops, and interviewing base personnel at all 11 AFRC bases.

2. Review and analysis of the existing AFRC metrics data that was provided by HQ AFRC/CEV for municipal solid waste, hazardous waste, industrial waste, EPA-17 chemicals, and ozone depleting substances in order to accomplish a Command-wide comparison.

3. Review of existing PPMAPs and PPOAs for each base to establish a universe of all PPOs recommended at each base and to prepare a database of existing, proposed, and new PPOs.

4. Conduct an overview of base Refrigerant Management Plans, Halon Management Plans, and Pesticide Management Plans to determine their adequacy.

5. Provide TRI and pesticide data for the baseline year and 1996 for each base to generate Command metrics and determine if anomalies in this data exist across the Command.

6. Assemble baseline and recent data (from AFRC/CEV) for each pollution prevention program component to document which goals have been met and which have not.

7. Preparation of the AFRC PPSP to include the Command-wide streamlined PPMAP and PPOA based on the above efforts.

8. Preparation of a Command-wide PPOA, including screening and evaluating PPOs to identify those that are feasible and appropriate for the bases, and those that are needed to meet or exceed pollution prevention goals and save money or resources.

9. Preparation of an Affirmative Procurement Plan to assist the bases in developing programs to purchase recycled products.

10. Preparation of a pollution prevention checklist to be used by the ECAMP evaluators to determine the status for implementing the pollution prevention program at each base.

11. Development of a database of descriptions and key information on PPOs applicable to AFRC bases.

1.3 CONTENT OF PLAN

This PPSP contains seven sections plus an executive summary (at the beginning of the plan):

- Section 1.0 serves as the Introduction.

- Section 2.0, Background, provides an overview of pollution prevention requirements, the history of pollution prevention at AFRC bases, and the current status of pollution prevention at each base.

- Section 3.0, Pollution Prevention Metrics, describes what the pollution prevention metrics are and summarizes the metrics data. The section then analyzes the metrics data across the Command for each program area.

- Section 4.0, Pollution Prevention Opportunities, contains descriptions of the numerous PPOs available for use at AFRC bases. It presents brief discussions and tables that summarize PPOs that were proposed in prior PPMAPs but not implemented, PPOs that currently exist, and new PPOs that are recommended. This section also describes the contents and potential uses of the AFRC pollution prevention database.

- Section 5.0, Base-Specific Discussions, is divided into eleven subsections (one for each AFRC base). These discussions provide key information on each base including whether goals have been met, explanations for significant anomalies, successful and recommended PPOs, and other related information.

- Section 6.0, Current Status of AFRC Affirmative Procurement Programs, is similar to Section 5.0 in that it is broken into eleven subsections (one for each AFRC base). These subsections provide an overview of the current status of each base's compliance with meeting affirmative procurement requirements in each of the eight Comprehensive Procurement Guideline (CPG) categories.

- Section 7.0 lists the references used to prepare the PPSP.

There are numerous appendices to the PPSP. These appendices are listed below.

- Appendix A–Pollution Prevention Opportunity Assessment
- Appendix B–Affirmative Procurement Plan
- Appendix C–Pollution Prevention Database
- Appendix D–Pesticide Data Collection Form
- Appendix E–USAF Pollution Prevention Strategy
- Appendix F–Executive Orders Applicable to Pollution Prevention

2.0 BACKGROUND

2.1 OVERVIEW OF POLLUTION PREVENTION REQUIREMENTS

This section presents an overview of the Federal laws, Executive Orders, and policies that established the USAF Pollution Prevention Program. The state laws related to pollution prevention are not described because very few states have pollution prevention laws that significantly affect AFRC bases.

2.1.1 Federal Laws

There are two Federal laws that directly relate to the USAF Pollution Prevention Program: The Pollution Prevention Act (PPA) of 1990 and the Federal Facilities Compliance Act (FFCA). These two Acts are discussed in this section.

Two other statutes that indirectly relate to the USAF Pollution Prevention Program are the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Resource Conservation and Recovery Act (RCRA), which are also discussed in the following sections.

2.1.1.1 Pollution Prevention Act of 1990

The PPA established pollution prevention as a national policy for the United States. The PPA contains numerous provisions, primarily directed towards the U.S. Environmental Protection Agency (EPA) to promote pollution prevention through grants, educational programs, data gathering, and the inclusion of pollution prevention related activities in other EPA programs.

The PPA also established a hierarchy for the selection of pollution control options including source reduction, recycling, and treatment. The first choice in the hierarchy is *source reduction*, which is defined as any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or release into the environment (including fugitive emissions) prior to recycling, treatment, or disposal. Further, source reduction reduces hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. The term, source reduction, includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

Where source reduction is not feasible, wastes should be *recycled.* Recycling is the process by which materials otherwise destined for treatment or disposal are collected, reprocessed or remanufactured, and reused.

Wastes that cannot be prevented or recycled, should be *treated* in an environmentally-safe manner whenever feasible. Disposal or other release into the environment should be employed only as a last resort and should only be conducted in an environmentally-safe manner.

In accordance with the PPA, EPA issued a national pollution prevention strategy in January 1991. Among the objectives of the strategy is the encouragement of Federal facilities to take voluntary action to identify and implement pollution prevention as opposed to using regulatory requirements to mandate actions.

2.1.1.2 Federal Facility Compliance Act

The FFCA was passed in 1992. The FFCA's primary directive was waiving sovereign immunity for Federal facilities regarding compliance with any Federal, state, local, or interstate solid and hazardous waste requirements. The Act also makes Federal employees subject to administrative orders, penalties, and fines, but does exempt them from personal liability.

With regard to pollution prevention, the FFCA made all Federal facilities subject to Federal, state, and local pollution prevention laws and regulations related to solid and hazardous waste. This was important for ensuring compliance with state pollution prevention laws that have been passed in some states.

2.1.1.3 SARA Title III - Emergency Planning and Community Right-to-Know Act

EPCRA originally exempted Federal facilities from its requirements; however, Executive Order 12856 (discussed in detail in Section 2.1.2.1 below) required Federal facilities to comply with key provisions of the Act. The component of EPCRA that relates to the USAF Pollution Prevention Program requires reporting of releases of certain hazardous materials that exceed threshold limits for processing or otherwise using these compounds at Federal facilities. The reporting of releases is done on an EPA-developed form (Form R) which is used to create a national database known as the Toxic Release Inventory (TRI). Form R also requires facilities to report on their pollution prevention efforts for the hazardous materials regulated by the Act.

2.1.1.4 Resource Conservation and Recovery Act

RCRA has a provision that relates to the USAF Pollution Prevention Program. Section 6002(e) of RCRA specifies procedures and guidelines for government agencies to follow for their procurement programs to encourage the purchase of recycled products. The purchase of recycled products is referred to as *affirmative procurement*. Executive Order 12873 (discussed further in Section 2.1.2.2 below) expands on this section of RCRA and provides comprehensive procurement guidelines (CPG) for Federal facilities on affirmative procurement. (Additional information about affirmative procurement regulations and other information is given in Appendix B.)

2.1.2 Executive Orders

There are several key Executive Orders issued by the President related to the USAF Pollution Prevention Program. These Executive Orders are described in the following sections.

2.1.2.1 Executive Order 12856 - Pollution Prevention

Executive Order 12856 was signed on August 3, 1993 and reaffirms the Federal government's commitment to fully implement the provisions of the Pollution Prevention Act of 1990. The Executive Order requires Federal agencies to develop pollution prevention programs. It also requires Federal facilities to develop and implement written pollution prevention plans.

In addition, the Executive Order requires Federal facilities to comply with EPCRA (discussed above in Section 2.1.1.3). EPCRA Section 313 requires reporting of releases of certain hazardous materials above set threshold limits. Written pollution prevention plans required by the Executive Order must be designed to meet the Executive Order goal of 50 percent reduction in total releases and off-site transfers of TRI hazardous materials by December 31, 1999 from the 1994 baseline.

2.1.2.2 Executive Order 12873 - Affirmative Procurement

Executive Order 12873 requires Federal agencies to develop affirmative procurement programs that promote cost effective waste reduction and recycling. Affirmative procurement means buying products made from recycled materials including recycled paper, retread tires, re-refined oil, etc. The Executive Order requires the government to buy recycled products to help develop a market for these products.

Executive Order 12873 uses Section 6002 of RCRA (discussed above in Section 2.1.1.4) as a guideline for determining what types of recycled products should be included in the program. It expands the government's affirmative procurement efforts and the types of products to be included in the program.

2.1.2.3 Executive Orders 12759, 12845, and 12902 - Energy Efficiency

Executive Order 12759 reaffirms the energy goals of the National Energy Conservation Policy Act. The Executive Order sets goals of reducing overall energy use in Federal buildings by 10 percent by 1995 and by 20 percent by 2000 based on 1985 energy use levels.

Executive Orders 12845 and 12902 require government agencies to purchase energy efficient computers and other energy efficient equipment and appliances.

2.1.2.4 Executive Order 12843 - Ozone Depleting Chemicals

Executive Order 12843 requires Federal agencies to minimize, where economically practicable, the procurement of products containing or manufactured with Class I Ozone Depleting Substances (ODSs). ODSs are substances that deplete the earth's stratospheric ozone layer and contribute significantly to greenhouse warming. Some examples include chlorofluorocarbons (CFCs), which are used in air conditioning and refrigeration systems, and halons which are used in fire suppression systems.

This Executive Order also requires Federal government contracts to be consistent with the phase-out schedules for these chemicals. Additionally, the Executive Order requires Federal government agencies to set policies and practices to reduce emissions and recycle ODSs.

2.1.2.5 Executive Orders 12844 and 13031 – Alternative-Fueled Vehicles

Executive Order 12844, which was signed on April 23, 1993, requires that Federal government agencies purchase alternative-fueled vehicles (AFV) for their fleets to a level in excess of 50 percent of the requirements of the Energy Policy Act of 1992. This Executive Order was superseded by Executive Order 13031, which further outlines the requirements of agency purchases of AFVs. It requires that an agency submit annually a report to the Office of Management and Budget describing how the agency is complying currently with the Executive Order and how it plans to maintain its compliance as the agency strives to meet the requirement that 75 percent of all new vehicle acquisitions be AFVs by 1999 and thereafter. The Executive Order also describes credits that may be received for agencies using "zero emission vehicles" or AFVs for medium and heavy-duty vehicles. Both Executive Orders provide exceptions for National Defense Vehicles, which cover USAF vehicles.

2.1.3 USAF Policies

The USAF outlined its pollution prevention policies in the "USAF Pollution Prevention Strategy," released by the USAF Chief of Staff and the Secretary of the USAF on July 25, 1995 (see Appendix E). The Strategy provides the vision, objectives, and goals for execution of the USAF's Pollution Prevention Program. The Vision Statement reads:

> "Effectively promote pollution prevention by minimizing or eliminating the use of hazardous materials and the release of pollution into the environment. Meet or exceed regulatory requirements through the use of education, training, and awareness programs, health-based risk assessments, acquisition practices, contract management, facilities management, energy conservation, and innovative pollution prevention technologies."

The Strategy further specifies:

> "Incorporation of pollution prevention in all aspects of installation operations."

The USAF has set both qualitative goals and quantitative goals for pollution prevention policy. The qualitative goals include the following:

- Prevent at the source, to the greatest extent possible, environmentally harmful discharges to the air, land, surface water, and groundwater. Wastes that cannot be prevented at the source will be recycled.
- Use alternatives to hazardous substances and processes, when possible.
- Reduce municipal solid waste through source reduction and recycling.

- Use products containing recycled materials, when available. Exceptions will be granted only if the product does not meet the minimum quality standard for its intended use.

The USAF has set specific quantitative goals for several pollution prevention program components. Each program component addresses a category of materials or chemicals and has numeric reduction goals associated with these categories. These reduction goals are shown in Table 2-1. All but the Energy Conservation goal will be addressed by this PPSP.

Table 2-1. USAF Pollution Prevention Program Goals

PROGRAM COMPONENT	BASELINE YEAR	GOAL
EPA-17 Chemicals	*1992*	*50% reduction of purchases by 31 December 96*
Hazardous Waste	*1992*	*25% reduction in disposal by 31 December 96* *50% reduction in disposal by 31 December 99*
Municipal Solid Waste	*1992*	*10% reduction in disposal by 31 December 93* *30% reduction in disposal by 31 December 96* *50% reduction in disposal by 31 December 97*
Affirmative Procurement	*None*	*100% of all products purchased each year in each of EPA's categories shall contain recycled materials meeting EPA's Guideline Criteria*
Energy Conservation	*1985*	*10% reduction in BTU/sq. ft by 1995* *20% reduction in BTU/sq. ft by 2000* *30% reduction in BTU/sq. ft by 2005*
TRI Chemical Releases	*1994*	*50% reduction of total releases and off-site transfers by 1999*
Ozone Depleting Substances	*1992*	*Minimize or eliminate the purchase of ozone depleting substances by 31 December 96*
Volatile Air Emissions	*1993*	*Reduce emissions wherever possible*
Pesticide Management	*1993*	*50% reduction in pounds of active ingredient by 30 September 2000*

2.2 HISTORY OF POLLUTION PREVENTION AT AFRC BASES

Pollution prevention has been an ongoing process at AFRC bases since 1992. Each base has developed a pollution prevention program to facilitate the implementation of pollution prevention activities and to actively monitor the progress of these activities. In 1993, a first round of pollution prevention plans was completed for all AFRC bases. Baselines and goals for most program areas were established for each base. The program goals sought to reduce quantities of waste disposal or chemical usage by a specified amount for each program area. Large reductions in waste generation and hazardous chemical usage were achieved after the first round of plans was completed. These big reductions were realized primarily because, for the first time, pollution prevention was a major focus at AFRC bases. Many of the large waste streams and excess uses of hazardous materials were easy to identify and reduce.

A second round of pollution prevention plans was completed in 1996 and further reductions were achieved. In fact, this second round of plans was very successful in helping the bases to meet and exceed many of their program area goals. In order to continue to meet and exceed program area goals in 1998 and beyond, AFRC has undertaken a Command-wide pollution prevention initiative, and this PPSP is a vital component of this initiative.

The history presented above holds for most of the AFRC bases with three exceptions: Homestead ARS, March ARB, and Grissom ARB. These three bases have had significant changes in their missions and operations since the pollution prevention program began.

Homestead AFB was hit by Hurricane Andrew on August 24, 1992. Since the time of Hurricane Andrew, the base has operated with a reduced personnel contingent. Approximately 45 percent of the base facilities were a total loss due to hurricane damage, 33 percent sustained severe damage, and 22 percent sustained moderate damage. Many of the facilities have been demolished since the hurricane and numerous new facilities have been constructed. Homestead AFB has been designated for reuse by Dade County as a civilian/military industrial complex which now includes Homestead ARS. Because the base did not exist in its current form and size until 1995, the pollution prevention baselines and metrics have been difficult to quantify.

March ARB was an active duty base up until April 1996. The baselines set for the base were originally formulated from March ARB's status as an active duty base. The baselines have since been modified to reflect the base's status as a Reserve installation. The latest plan, which was prepared in August 1997, is the first plan that addresses the base since it has been a Reserve base.

Grissom ARB was also an active duty base up until October 1994. Again, the baselines originally established for the base when they were an active duty installation were modified to reflect Grissom ARB's current status as a Reserve installation. This PPSP is the second pollution prevention plan prepared for the base since it has been transferred to the AFRC.

2.3 CURRENT STATUS OF POLLUTION PREVENTION AT AFRC BASES

This section identifies the current status of pollution prevention programs at AFRC bases. It identifies which pollution prevention program goals have been met and those still needing to be met. The baselines and goals for each pollution prevention program area are listed, as well as the status of each base's progress towards meeting these goals.

2.3.1 Hazardous Waste Program Area

The established baseline and goals for the hazardous waste (HW) program area are listed in Table 2-2. The table shows that all of the bases have achieved the required reductions to meet their 1996 goals. However, the 1997 metrics data shows that Dobbins ARB and Willow Grove ARS reported increases in hazardous waste disposal, causing both of these bases to fall short of their 1996 goals. The table also shows that six of the bases have reduced HW disposal to levels that are already below the 1999 goal.

2.3.2 Municipal Solid Waste Program Area

The established baseline and goals for the municipal solid waste (MSW) program area are listed in Table 2-3. As indicated in the table, all but 2 of the bases, Pittsburgh IAP-ARS and Westover ARB, met their interim goals for solid waste disposal in 1993. Again in 1996, all but 2 of the bases met their interim goals: Dobbins ARB and Minneapolis-St. Paul IAP-ARS. Unfortunately, only 4 of the 11 bases were able to meet their 1997 municipal solid waste reduction goals. The bases that met their 1997 goals include Grissom ARB, Homestead ARS, March ARB, and Pittsburgh IAP-ARS. Municipal solid waste metrics were not available for Willow Grove ARS because the municipal solid waste contract is managed by the Naval Air Station (NAS) Willow Grove, who does not provide disposal data.

Table 2-2. AFRC Hazardous Waste Disposal Goals and Metrics[1]

BASE	1992 BASELINE (lbs)	1996		1997 ACTUAL (lbs)[3]	1999 GOAL (lbs)[2]
		GOAL (lbs)[2]	ACTUAL (lbs)		
DOB	7,813	5,860	5,546	5,903*	3,907
GMT	4,834	3,626	1,268	3,215	2,417
GRI	21,155	15,866	12,149	7,343	10,578
HOM	5,205	3,904	3,285	2,342	2,603
MAR	342,945	257,209	111,311	30,930	171,473
MSP	12,937	9,703	6,156	5,673	6,469
NFS	52,730	39,548	20,087	11,310	26,365
PIT	7,202	5,402	2,817	1,810	3,601
WST	73,354	55,016	38,525	36,068	36,677
WIL	8,096	6,072	5,806	8,367*	4,048
YNG	11,790	8,843	3,735	5,575	5,895

NOTES:
1. Metrics are measured in pounds of hazardous waste disposed.
2. The program goals call for a 25 percent reduction in hazardous waste disposal by December 31, 1996 and a 50 percent reduction by December 31, 1999.
3. An (*) symbol indicates that 1997 disposal data did not meet the 1996 reduction goal.

Table 2-3. AFRC Municipal Solid Waste Disposal Goals and Metrics[1]

BASE	1992 BASELINE (tons)	1993		1996		1997	
		GOAL (tons)[3]	ACTUAL (tons)[4]	GOAL (tons)[3]	ACTUAL (tons)[4]	GOAL (tons)[3]	ACTUAL (tons)[4]
DOB	1,114	1,002	965	780	853*	557	843*
GMT	334	301	179	234	99	167	184*
GRI	1,549	1,394	1,274	1,084	460	774	246
HOM	540	486	440	378	122	270	93
MAR	3,135	2,822	2,435	2,195	1,604	1,568	1,267

MSP	*358*	*322*	*240*	*251*	*332**	*179*	*294**
NFS	*984*	*886*	*598*	*689*	*614*	*492*	*507**
PIT	*380*	*342*	*347**	*266*	*145*	*190*	*116*
WST	*1,164*	*1,047*	*1,164**	*815*	*765*	*582*	*893**
WIL[2]	--	--	--	--	--	--	--
YNG	*283*	*255*	*137*	*198*	*169*	*142*	*147**

NOTES:
1. *Metrics are measured in tons of municipal solid waste disposed.*
2. *Municipal solid waste is collected by the Naval Air Station (NAS) at Willow Grove; therefore, solid waste metrics are generated by the NAS and not by Willow Grove ARS .*
3. *The municipal solid waste program goals call for a 10 percent reduction in disposal by December 31, 1993, a 30 percent* reduction by December 31, 1996, and a 50 percent reduction by *December 1997*
4. *An (*) symbol indicates that the disposal goal was not met.*

2.3.3 EPA-17 Chemicals Goals and Metrics

The established baseline and goals for the EPA-17 chemical program area are listed in Table 2-4. As shown in the table, all of the bases successfully met their program goals for 1996; however, two bases, General Mitchell IAP-ARS and Niagara Falls ARS, had sharp increases in EPA-17 chemical purchases in 1997.

Table 2-4. AFRC EPA-17 Chemical Purchase Goals and Metrics[1]

BASE	*1992 BASELINE (lbs)*	*1996*		*1997 ACTUAL (lbs)*
		GOAL (lbs) [2]	*ACTUAL (lbs)*	
DOB	*7,078*	*3,539*	*746*	*250*
GMT	*5,332*	*2,666*	*615*	*2,191*
GRI	*6,221*	*3,111*	*1,396*	*1,395*
HOM	*1,877*	*939*	*892*	*926*
MAR	*3,991*	*1,996*	*1,767*	*279*
MSP	*4,534*	*2,267*	*310*	*203*
NFS	*3,228*	*1,614*	*461*	*1,463*
PIT	*3,072*	*1,536*	*834*	*732*
WST	*8,396*	*4,198*	*2,397*	*1,223*
WIL	*7,867*	*3,934*	*2,252*	*1,518*
YNG	*2,900*	*1,450*	*369*	*406*

NOTES:
1. *Metrics are measured in pounds of EPA-17 chemicals issued.*
2. *The program goal calls for a 50 percent reduction in the amount of EPA-17 chemicals purchased by December 31, 1996.*

2.3.4 Ozone Depleting Substances Program Area

The established baseline and goals for the ozone depleting substances (ODSs) program area are listed in Table 2-5. As indicated in the table, none of the bases have been able to completely

eliminate the purchase of ODSs; although every base, except Niagara Falls ARS, Pittsburgh IAP-ARS, and Westover ARB, showed significant reductions by purchasing less than 25 pounds of ODS in 1997. By contrast, Niagara Falls ARS and Pittsburgh IAP-ARS both showed increases in ODS issued in 1997.

2.3.5 TRI Chemical Releases Program Area

The established baseline and goals for the TRI chemical program area are listed in Table 2-6. All bases, except Willow Grove ARS and Grissom ARB, have shown decreases in TRI chemical releases from 1994 to 1996. Three bases, Pittsburgh IAP-ARS , Minneapolis-St. Paul IAP-ARS, and Youngstown ARS, have met the 1999 50 percent reduction goals. This is the first time that the TRI chemical reduction goals and metrics have been quantified.

Table 2-5. AFRC ODS Purchase Goals and Metrics[1]

BASE	1992 BASELINE 1 (lbs)	1996		1997 ACTUAL (lbs)
		GOAL (lbs) [2]	ACTUAL (lbs)	
DOB	6,072	0	149	20
GMT	1,817	0	4	5
GRI	1,879	0	10	3
HOM	365	0	72	23
MAR	4,887	0	108	21
MSP	804	0	21	10
NFS	1,313	0	7	161
PIT	1,470	0	101	183
WST	3,486	0	195	95
WIL	2,185	0	20	6
YNG	2,397	0	65	17

NOTES:
1. Metrics are measured in pounds of ODSs issued.
2. The USAF program area goal for ODSs is to minimize or eliminate the purchase of Class I ODSs by the end of CY 1996.

Table 2-6. AFRC TRI Chemicals Goals and Metrics[1]

BASE	1994 BASELINE (lbs)	1996 ACTUAL (lbs)	1999 GOAL [2] (lbs)
DOB	1,464	1,074	732
GMT	1,159	743	580
GRI	1,627	1,687	814
HOM	2,082	1,156	1,041
MAR	4,480	2,361	2,240
MSP	3,607	397	1,804
NFS	940	560	470
PIT	3,103	1,122	1,552
WST	3,690	3,110	1,845
WIL	2,077	2,726	1,039
YNG	1,687	521	844

NOTES:
1. Metrics are measured in pounds of TRI chemicals purchased.
2. Program goals call for a 50 percent reduction in total releases and off-site transfers by December 31, 1999.

2.3.6 Pesticide Management Program Area

The established baseline and goals for the pesticide management program area are listed in Table 2-7. This is the first time the pesticide program area goals and metrics have been quantified. The amount of pesticide applied varies considerably from base to base, and there are no clear reduction trends in the data. Significant reductions, however, are expected going forward as bases try to meet the FY 2000 goal.

Table 2-7. AFRC Pesticides Goals and Metrics[1]

BASE	1993 BASELINE (lbs)	1996 ACTUAL (lbs)	2000 GOAL2 (lbs)
DOB	436.95	506.74	218.48
GMT	57.33	131.12	28.67
GRI	467.00	198.38	233.5
HOM	3,820.00	2,696.54	1910.00
MAR	144.78	144.78	72.39
MSP	256.40	245.68	128.20
NFS	0.49	7.00	0.25
PIT	340.00	182.00	170.00
WST	41.01	11.16	20.51
WIL	1.06	1.00	0.53
YNG	200.00	200.00	100.00

NOTES:
1. *Metrics are measured in pounds of active ingredient applied.*
2. *The program area goal calls for a 50 percent reduction in active ingredient applied by the end of FY 2000.*

2.3.7 Volatile Air Emissions Program Area

AFRC bases do not currently collect volatile organic compound (VOC) emissions metrics for the pollution prevention program; therefore, there are no metrics to report in this section.

2.3.8 Environmentally Preferable Products/Affirmative Procurement Program Area

The USAF Pollution Prevention Program Guide states that 100 percent of all products purchased each year in each of EPA's "Guideline Item" categories shall contain recycled materials meeting EPA's Guideline Criteria. Currently, AFRC bases are not tracking the purchase of products with recycled content; therefore, it was difficult to quantify the status of compliance with this goal. A subjective assessment of each base's affirmative procurement program is presented in Section 6.0 of this plan. An affirmative procurement plan for AFRC that provides implementation plans and tracking procedures can be found in Appendix B.

3.0 POLLUTION PREVENTION METRICS

3.1 INTRODUCTION TO POLLUTION PREVENTION METRICS

The USAF has established pollution prevention goals for numerous program areas for bases to meet (see Section 2.1.3 for details on these goals). Tracking these goals establishes a base's compliance with pollution prevention standards. The bases must have adequate procedures in place to accurately inventory the purchase, consumption, emission, or disposal of items that comprise the various program areas. This data is referred to as pollution prevention metrics. Each base is required to report these metrics quarterly or annually (depending on the program area). Each base has established procedures for collecting this data and reporting it to HQ AFRC/CEV.

Pollution prevention metrics data and the tracking of this data are important for measuring each base's progress in meeting and exceeding pollution prevention goals. Metrics data is tracked at the AFRC bases for each program area to determine what goals have been met, what goals have not been met, and what the status is for meeting future goals. Metrics data can also help to determine the sources of problems in meeting pollution prevention goals, which will assist the bases with determining where to direct available resources to meet goals.

The following subsection summarizes and analyzes the metrics data for AFRC bases by program area. Significant anomalies in the data exist and will be addressed in the individual program area discussions in this section and in the base-specific discussions in Section 5. Numerous tables are presented in this section to summarize and display the metrics data. (NOTE: Most of the metrics data presented in this plan were provided by HQ AFRC/CEV.)

3.2 SUMMARY AND ANALYSIS OF METRIC DATA

The pollution prevention metrics data for the AFRC bases is categorized by seven program areas. This section is divided into subsections that discuss each of these program areas. Each program area is defined and the corresponding reduction goals are presented along with the status for achieving the goals, including specific examples and anomalies. The program areas are discussed in the following subsections:

3.2.1 Municipal Solid Waste
3.2.2 Hazardous Waste (includes Industrial Waste)
3.2.3 EPA-17 Chemicals
3.2.4 Ozone Depleting Substances
3.2.5 TRI Chemicals
3.2.6 Pesticides
3.2.7 Volatile Air Emissions

Table 3-1 provides key characteristic data for each base in the Command. This information is provided as a way to identify some of the characteristics that influence the chemical usage and waste generation metrics at each base. This table will be referenced throughout the program area discussions that follow.

Table 3-1. Key Characteristic Data for Each Base[1]

CHARACTERISTIC	BASE										
	DOB	GMT	GRI	HOM	MAR	MSP[2]	NFS	PIT	WST	WIL	YNG
Aircraft Type	C-130H[3] Commuter Helicopter	C-130H	KC-135R	F-16A/B F-15 Commuter	C-141B F-16 KC-135E Commuter	C-130E	C-130H KC-135R	C-130H	C-5A Helicopter	C-130E A-10	C-130H
No. of Aircraft[4]	9/9/8	12	22	17/3/13	18/4/20/11	8	8/9	9	16/10	12/16	16
Age of Primary Aircraft (yrs)[5]	10-20	10-20	<10	<10	20+	20+	10-20	<10	20+	20+	7-9
No. of Motor Vehicles Serviced	515	189	257	200	449	127	281	135	350	255	310
No. of Powered AGE Equipment	128	53	176	110	350	80	123	52	104	135	109
No. of Full-Time Personnel[6]	820	420	700	700	2,300	360	1,100	360	1,050	900	541
UTA Personnel[6]	1,500	1,400	1,300	1,400	4,900	1,200	2,500	1,250	3,380	2,400	1,300
Full Service Base Exchange	Yes	No	No	Yes	No	Yes	No	No	Yes	No	No
No. of Dining Facilities	2	1	2	1	1	4	2	2	2	1	1
Lodging Facilities	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

NOTES:
1. Tenant data is included in the table, unless otherwise indicated.
2. At MSP, characteristic data for the 133 AW (ANG unit) are not included, because their chemical usage and waste disposal data is not included in the base's metrics.
3. These aircraft have been rewinged in the previous five years, which usually indicates less maintenance and repair work.
4. When more than one type of aircraft exists, the numbers are separated by a "/" in the same order as in the preceding row.
5. Primary aircraft are listed first in row one.
6. These numbers are approximations.

3.2.1 Municipal Solid Waste (MSW)

3.2.1.1 Definitions and Goals

Municipal solid waste (MSW) can be defined in general terms as all items that are discarded and are, or could be, taken to a sanitary landfill. Typical MSW items generated at AFRC bases include paper, cardboard, food wastes, beverage containers, construction and demolition debris, yard wastes, and scrap wood, metal and plastics. Wastes that are not allowed in sanitary landfills are classified as hazardous and industrial wastes. These wastes include oils, paints, and solvents. Discussions of hazardous and industrial wastes are provided in Section 3.2.2.

Solid waste reduction, pollution prevention, and conservation of natural resources are the goals of the USAF Qualified Recycling Program (QRP). The USAF goals for this program area call for reducing solid waste disposal 50 percent by 1997 based on a 1992 calendar year baseline. Interim objectives call for a 10 percent reduction by 1993 and a 30 percent reduction by 1996.

In keeping with the USAF QRP, the following objectives are outlined as a means of accomplishing these goals:

- Minimize the amount of waste discarded in landfills
- Increase the percentage of waste that is recycled
- Stimulate market demand for environmentally preferable products by increasing the type and amount of products purchased
- Expand education to increase public awareness and support of recycling and composting programs
- Maximize proceeds [from the recycling program] both now and in future
- Comply with Federal, state, and local mandates.

Apart from USAF goals and any local recycling goals, the greatest incentive for applying pollution prevention to municipal solid wastes is the cost savings from reduced disposal fees. In addition, recycling programs may generate some revenue from the sale of recycled materials or result in saving on the procurement costs of virgin materials.

3.2.1.2 Status for Achieving MSW Pollution Prevention Goals

All of the AFRC bases have prepared MSW disposal figures for the baseline year (1992) and successive calendar years to chart the progress of their solid waste pollution prevention programs. Table 3-2 presents the MSW disposal figures in tons for all of the bases for calendar years 1992 through 1997. The table shows that eight bases met the goal of at least a 30 percent reduction

Table 3-2. MSW Disposal Metrics for AFRC Bases[1]

BASES	1992		1993		1994		1995		1996		1997	
	TONS	% REDUCTION	TONS	% REDUCTION	TONS	% REDUCTION	TONS	% REDUCTION	TONS	% REDUCTION	TONS	% REDUCTION
DOB	1,114	Baseline	965	13	1,145	(3)	1,198	(8)	853	23	843	24
GMT	334	Baseline	179	46	212	37	166	50	99	70	184	45
GRI	1,549	Baseline	1,274	18	842	46	1,045	33	460	70	246	84
HOM	540	Baseline	440	18	117	78	150	72	122	77	93	83
MAR	3,135	Baseline	2,435	22	1,953	38	1,515	52	1,604	49	1,267	60
MSP	358	Baseline	240	33	274	23	234	35	332	7	294	18
NFS	984	Baseline	598	39	602	39	609	38	614	38	507	49
PIT	380	Baseline	347	9	272	28	168	56	145	62	116	69
WST	1,164	Baseline	1,164	0	1,000	14	789	32	765	34	893	23
WIL [2]	–	–	–	–	–	–	–	–	–	–	–	–
YNG	283	Baseline	137	52	170	40	152	47	169	40	147	48

NOTES:
1. USAF solid waste disposal goals call for a 10% reduction by 1993, a 30% reduction by December 31, 1996, and a 50% reduction by December 31, 1997.
2. Municipal solid waste is collected by the Naval Air Station (NAS) at Willow Grove; therefore, solid waste metrics are generated by the NAS and not by Willow Grove ARS.

in calendar year 1996. The table also shows that four bases achieved the goal of 50 percent reduction by calendar year 1997 and two bases came within two percentage points of the 50 percent reduction.

AFI 32-7080 specifically identifies nine items that are required to be recycled at a minimum. Table 3-3 is a matrix that identifies how each of the AFRC bases are doing with respect to recycling these nine items.

Table 3-3. AFRC Recycling Status of the Nine Items Identified in AFI 32-7080

TYPE OF MATERIAL BEING RECYCLED	DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Batteries, Lead Acid	x	x	x	x	x	x	x	x	x	x	x
Cardboard	x	x	x	x	x	x	x	x	x	x	x
Glass	x	x						x	x		x
Scrap Metal		x	x	x	x	x	x	x	x	x	x
Newspaper	x	x	x	x			x	x	x		x
Office Paper	x	x	x	x	x	x	x	x	x	x	x
Plastic	x	x						x			x
Tires	x		x	x			x	x	x		x
Oil	x	x	x	x	x	x	x	x	x	x	x

Notes: x – Indicates that HQ AFRC has received quarterly figures showing some amount of that material being recycled.

3.2.1.3 MSW Metrics Data

Each USAF base is required to maintain records and report to HQ AFRC on the amount of MSW generated, disposed, and recycled at the base. The reports submitted to HQ AFRC break down solid waste numbers into three major categories: disposed, recycled (by numerous categories of recycled materials), and composted. These reports have been collated and sorted in tabular form according to various criteria by HQ AFRC/CEV. The output of these data collection efforts has been used to prepare this subsection, as well as the base-specific solid waste pollution prevention discussion found in Section 5.0.

Analysis of the MSW metrics shows large disparities between bases for most of the data. Such disparities include disposal rates, recycling rates, percent reductions achieved, and types of materials reported as recycled. This subsection will attempt to explain some of the reasons for these disparities in an effort to identify true anomalies between bases.

The single biggest reason for the disparities is the difference in how solid waste metrics are reported by bases. Some bases may interpret a data category to exclude certain materials that another base may include. Furthermore, some bases may not provide the required data or provide inaccurate or inconsistent data.

Some general examples that illustrate these problems include the following:

- Several bases do not include aluminum cans recycled by persons other than the base recycling contractors
- Some bases report the quantities of tires recycled/retreaded and others do not, even though all bases send aircraft and vehicle tires off-site to be retreaded
- Some bases do not report numbers for construction and demolition waste disposed/recycled, but may include these wastes in the MSW generated or disposed numbers
- Some bases were asked to report certain recycling metrics in a category one quarter and in another category in a later quarter.

In addition, the large disparities between AFRC bases for the MSW disposal quantities for the baseline year 1992 are also attributable to problems with how the quantities were calculated. Two significant reasons for these disparities include: 1) several bases may have made errors in estimating the tons of MSW disposed from volume figures and 2) former active-duty bases that were downsized may have had inaccurate estimates for the baseline quantities.

For example, Table 3-2 shows Grissom ARB had a baseline year figure for MSW disposed of 1,549 tons, which is relatively high when compared to other AFRC bases. In fact, it is 40 percent more than the baseline for Dobbins ARB and Westover ARB, despite having fewer full-time or UTA personnel (see Table 3-1). This anomaly probably resulted from the difficulty in apportioning out the AFRC component of solid waste disposed from the active base's metrics.

A second example is Youngstown ARS. The baseline for Youngstown ARS is 283 tons of MSW disposed. This figure is the lowest in the AFRC despite the fact that Youngstown ARS was larger in 1992 than several other bases. Youngstown ARS and many of the other AFRC bases used inconsistent assumptions and estimations to determine the tonnage of MSW disposed for their baselines. Variability in MSW metrics is also affected by the method a base uses to obtain MSW disposal weights. Table 3-4 identifies the specific method used by each base to determine MSW disposal and recycling weights.

Because of the problems with the baseline figures, a more objective viewpoint would be to compare the MSW recycling rates (i.e., quantity MSW recycled/quantity MSW generated) for each AFRC base. In fact, the existing solid waste goal is currently being revised, and the new goal will be a diversion rate of 40 percent by 2005. Table 3-5 shows the MSW disposed and recycled figures and recycling rates for each base for 1997. As can be seen in the tables, some bases have much higher recycling rates that are attributable to good recycling programs and active solid waste coordinators. Recycling rates should be similar from base to base. If bases have rates below the top few bases, then improvements in their recycling programs are needed and should be readily achievable.

Table 3-4. Methods Used to Determine MSW Weights at Each Base

BASE	METHOD USED TO DETERMINE MSW WEIGHTS	
	DISPOSED	RECYCLED
DOB	• Truck scales on contractor collection vehicle • Landfill weight ticket	• Weight ticket from recycling process center
GMT	• Contractor certified weight reports	• Contractor certified weight reports
GRI	• Contractor weight ticket	• Contractor weight ticket • Scales have been purchased to confirm recycle weights
HOM	• Truck Scales	• Construction & demolition waste by weight ticket from offsite contractor
MAR	• Data not available	• Data not available
MSP	• Computerized truck scales	• Computerized truck scales
NFS	• Estimates by dumpster volume and density (95 lbs/cubic yard)	• Estimates by dumpster volume and density (95 lbs/cubic yard)
PIT	• Contractor weight ticket • Uses base scales	• Contractor weight ticket • Uses base scales
WST	• Local off-base scales • Contractor weight ticket	• Local off-base scales • Contractor weight ticket
WIL	• Navy weighs waste and maintains the data	• Navy weighs waste and maintains the data
YNG	• Truck scales for refuse, pallet, and cardboard	• Weight ticket for most recyclables • Estimates for compact discs and toner cartridges

Table 3-5. 1997 MSW Data and Recycling Rates

BASE	MSW GENERATED (Tons)	MSW RECYCLED (Tons)	RECYCLING RATE (%)
DOB	1,058	215	20
GMT	269	85	32
GRI	399	153	38
HOM	216	123	57
MAR	1,614	347	21
MSP	400	106	27
NFS	612	105	17
PIT	177	61	34
WST	1,123	230	20
WIL	N/A	N/A	N/A

YNG	200	53	27

Numerous potential anomalies were identified from the recycling metrics provided by HQ AFRC/CEV. Some of these potential anomalies are explained in the base-specific discussions in Section 5. Explanations of potential anomalies applicable to two or more AFRC bases are provided below.

It is important to note that just because a base does not report a particular recyclable in its metrics, it does not mean it is not recycled. For some recyclables, it is either extremely time consuming or impossible to track how much is recycled by the bases. Furthermore, some recyclables may be accumulated over a larger period than a calendar year prior to shipment. In this case, no figures for these recyclables would be reported for the calendar year when no shipments occurred; however, the base is still recycling these materials during the calendar year. Examples of these anomalies and explanations are as follows:

- Toner Cartridges - The reason toner cartridge recycling is low or nonexistent at some bases as reflected in the metrics is that it is extremely difficult to track. Individual organizations do their own recycling of toner cartridges and do not track these figures or report them to CEV.

- Aluminum Cans - Aluminum can recycling at many bases is performed by an individual that collects the cans for revenue for themselves or their personal organizations. This occurrence is particularly true for bases in states that have laws requiring a deposit be collected on the cans (e.g., Massachusetts). In these cases, it is nearly impossible to track aluminum can recycling.

- Tires - Aircraft and/or vehicle tires are recycled by all of the bases, but many of them are sent for retreading through base supply or the Defense Reutilization and Marketing Office (DRMO). These numbers are not always tracked or reported to CEV.

- Scrap Metal - Many bases recycle scrap metal through DRMO. Consequently these numbers are not tracked or reported to CEV.

- Cardboard - Most of the Base Exchanges at the bases recycle their cardboard through their own contractor to keep the revenue for themselves. These Base Exchanges do not track or report these figures to CEV.

- Commingled Recyclables - Many bases commingle different types of paper or beverage containers. Because it is impossible to track the individual components of the commingled streams, the bases either make estimates or report the commingled recyclables under one of the individual recyclable categories.

- Wood - The large variability of wood recycling figures for bases is primarily due to the extreme difficulty in developing and tracking these numbers. Pallet recycling can be done by more than one base organization and is difficult to quantify. Similarly, brush and tree wood waste recycling and composting are difficult to quantify.

The degree to which each base has met or exceeded their solid waste reduction goals is dependent on the following primary factors:

- Mission and base activity changes that may have changed the number of base personnel
- Local regulations and conditions
- Support for program by Commanders
- Work load and enthusiasm of solid waste coordinator.

These factors are considered in the base-specific discussions in Section 5.0 regarding evaluation of metrics for each of the bases' solid waste pollution prevention programs.

For the most part, MSW disposal metrics should closely track the number of personnel at the base. Table 3-1 shows the number of full-time and Unit Training Assembly (UTA) personnel assigned to each base. Full-time personnel work at the base during the week and go home in the evenings; whereas, UTA personnel come to the base once per month and live at the base for a weekend.

The two bases with the largest contingent of personnel, March ARB (2,300 full-time and 4,900 UTA) and Westover ARB (1,050 full-time and 3,380 UTA), are also the top two generators of MSW. Likewise, Pittsburgh IAP-ARS and General Mitchell IAP-ARS have the lowest base populations and are two of the lowest MSW generators in the Command.

Two obvious anomalies to the correlation between number of personnel and MSW generation are Dobbins ARB and Minneapolis-St. Paul IAP-ARS. The high generation rate at Dobbins ARB may be explained by the full-service base exchange, high level of tenant operations, and the camping/RV park. Minneapolis-St. Paul IAP-ARS also has a full-service base exchange, as well as three dining facilities. In fact, one of the dining facilities is the Officer's Club, which is the busiest dining facility in the Command.

As shown in the above examples, factors other than the number of base personnel can affect MSW generation metrics.

3.2.2 Hazardous Waste (HW) and Industrial Waste (IW)

3.2.2.1 Definitions and Goals

Hazardous wastes (HWs) are regulated under the provisions of RCRA because of the hazards they pose to both human health and the environment. HWs are defined as solid wastes that exhibit any one of the characteristics of ignitability, corrosivity, reactivity, or toxicity as defined in 40 *CFR* Part 261 Subpart C. A waste is also considered hazardous if it is listed in any of the tables given in 40 *CFR* Part 261 Subpart D. HWs have special disposal requirements that prohibit their disposal in sanitary landfills. These disposal requirements are met through the use of several treatment technologies including deactivation, encapsulation, incineration, stabilization, and reclamation. Typical HW streams generated on AFRC bases include off-spec fuels, paint related

material, spent solvents, blast media contaminated with paint , excess or out-dated chemicals, and regulated spill debris.

Federal regulations require generators of RCRA-regulated waste to develop waste minimization programs. To demonstrate compliance with this requirement, generators should actively pursue waste minimization projects and show what steps have been taken to ensure the completion of these projects. The steps can be outlined in a formal waste minimization plan that includes the efforts undertaken during the year to reduce the volumes or toxicity of waste generated and the changes in the volume and toxicity actually achieved in comparison to previous years. In the past, pollution prevention management action plans have been used to satisfy this requirement.

Reductions in HW disposal are a major part of the USAF Pollution Prevention Program. The USAF goals for this program area include a 25 percent reduction in HW disposed by 1996 and a 50 percent reduction by 1999, based on a 1992 calendar year baseline. In meeting these goals, AFRC bases have followed several initiatives designed to facilitate reductions in HW disposal. These include:

- Product substitutions involving the use of non-hazardous chemicals in place of more hazardous ones
- On-site and off-site recycling of recurring waste streams
- Waste minimization efforts focusing on waste reduction and segregation at the source
- Implementation of the Hazmart program
- Increased training of shop personnel and environmental managers.

In addition to HW and MSW, AFRC bases frequently generate another type of waste known as non-hazardous industrial waste. Industrial waste (IW) is a solid waste that does not meet the RCRA definition of a hazardous waste, but may adversely affect human health and the environment if not managed in a responsible manner. Therefore, IW cannot be disposed with regular MSW in a sanitary landfill. IW is generated at all AFRC bases, and examples include used oil, spent non-hazardous solvents, spill debris contaminated with POL, used oil and fuel filters, oil/water separator waste, used antifreeze, and excess chemicals. (Note: California and Massachusetts regulate used oil and oil-contaminated spill debris as hazardous waste.)

IW is not specifically addressed in the USAF Pollution Prevention Program Guide, so there are no specified goals for annual reductions. IW is included in this pollution prevention effort because it is prevalent at all AFRC bases and reduction efforts would benefit the environment and greatly reduce disposal costs. In most cases, the amount of IW generated at AFRC bases is much greater than the amount of HW generated; therefore, the reduction potential for IW is great. IW is tracked internally by each base and is reported to HQ AFRC/CEV along with the HW metrics.

3.2.2.2 Status for Achieving Hazardous Waste Pollution Prevention Goals

HQ AFRC/CEV established baselines for HW disposal at all of the AFRC bases in 1992. All of the bases have collected HW disposal figures for that baseline year and successive calendar years to track the progress of their HW pollution prevention programs. Table 3-6 presents the HW disposal figures in pounds for all of the bases from 1992 through the end of 1997. The table indicates that all of the bases had met their goal of at least a 25 percent reduction by 1996. However, the table also shows that two of the bases have increased their HW disposal numbers in 1997 causing them to fall short of their goals. The reasons for these bases increasing their HW disposal numbers are explained in the base-specific discussions in Section 5.0 of this plan. Bases are required to meet a 50 percent reduction goal by the year 1999.

3.2.2.3 Hazardous Waste and Industrial Waste Metrics Data

Each AFRC base is required to maintain records and report to HQ AFRC on the amount of HW and IW generated, disposed, and recycled at the base. Since the USAF Pollution Prevention Program Guide only specifies goals for HW disposal, data for HW recycled and industrial wastes are not presented in Table 3-6.

HW disposal quantities are reported in pounds and include all hazardous waste disposed through the installation via contract with the DRMO or other installation contracts. Any IRP wastes removed or treated under the Environmental Restoration Account (ERA) program are considered one-time wastes and do not count toward total hazardous waste quantities included in baselines; therefore, these wastes are not reported in the disposal metrics.

Analysis of the HW and IW metrics shows disparity between the bases for much of the reported data. These disparities include generation rates, disposal quantities, and percent reductions achieved. This subsection will attempt to explain some of the reasons for these disparities in an effort to identify true differences in the way bases manage their HW and IW.

The differences in the way bases report their HW and IW metrics can be used to explain some of the anomalies that appear in the reported data. When reporting waste metrics for a certain data category, some bases are including waste streams that other bases are not. For example, nearly every base generates solvent waste from their parts washing solvent tanks. These solvent tanks are serviced by a recycling contractor who removes the used solvent and replaces it with new product. This waste stream should be reported in the "solvent" category as either HW recycled or IW recycled, depending on the type of parts that are being cleaned. However, some bases are not reporting it in the solvent category at all. For example, March ARB did not report any solvent waste in 1997, although they have numerous tanks on the installation. Instead, March ARB reported used solvents in the "paint waste" category, or in some cases, not at all. Another example is Westover ARB who generated several thousand pounds of solvent waste that was reported as "other" waste.

Table 3-6. HW Disposal Metrics from AFRC Bases[1]

NAME OF BASE	CY 92 BASELINE	1993		1994		1995		1996		1997	
		lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION
DOB	7,813	9,376	(20)	20,751	(165)	7,395	5	5,546	29	5,903	24
GMT	4,834	2,335	52	2,117	56	3,408	30	1,268	74	3,215	33
GRI	21,155	21,479	(2)	12,655	40	9,534	55	12,149	43	7,343	65
HOM	5,205	3,295	37	2,554	51	3,184	39	3,285	37	2,342	55
MAR	342,945	308,650	10	257,209	25	188,620	45	111,311	68	30,930	91
MSP	12,937	13,841	(7)	20,969	(62)	10,424	19	6,156	52	5,673	56
NFS	52,730	4,735	91	26,408	50	9,399	82	20,087	62	11,310	79
PIT	7,202	5,029	30	4,410	39	7,685	(7)	2,817	61	1815	75
WST	73,354	200,411	(173)	59,247	19	51,010	30	38,525	48	36,068	51
WIL	8,096	9,062	(12)	6,518	19	10,548	(30)	5,806	28	8,367	(3)
YNG	11,790	4,503	62	7,558	36	5,155	56	3,735	68	5,575	53

NOTES: 1. USAF hazardous waste disposal goals call for a 25% reduction by December 31, 1996 and a 50% reduction by December 31, 1999.

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Excess (expired shelf-life) material is also reported differently from base to base. Several bases that generate excess, out-dated, or off-spec paints and solvents often report these items in the "paint waste" or "solvent" category, instead of in the "excess material" category. By doing so, these bases are mistakenly increasing the metrics data reported for paint waste and solvent waste, while decreasing the amount of excess material reporting. All chemicals and materials that have either exceeded their shelf lives or will no longer be used for their intended purposes should be reported as excess material.

The reasons behind these reporting discrepancies can be attributed mostly to difficulties at the base level in determining the appropriate metric category to report a waste in. In many instances, bases must use their best judgment when deciding what category to report a specific wastestream. Therefore, if all AFRC bases are making their own metrics reporting decisions based on base-specific assumptions, these disparities will consistently stand out when comparing HW and IW generation metrics across the Command. Ultimately, HQ AFRC/CEV needs to establish a more comprehensive guide for IW and HW metrics reporting to generate consistent data and eliminate these problems.

In addition to the reporting inconsistencies, there are other factors that affect how certain waste streams are reported. Differences in state regulatory requirements affect how each base reports a certain waste stream. For example, most AFRC bases manage their used oil as an IW and report it as such. However, bases in California and Massachusetts are required to report their used oil as HW because it is a state regulated waste.

As mentioned above, some bases are required to manage their used oil as HW. This requirement may also apply to oil-soaked rags, pads, and other oil-contaminated debris. In certain states, these waste streams have to be disposed of as a HW. This can significantly impact HW disposal, because other bases are not required to report oily debris as HW. For example, Westover ARB in Massachusetts generated over 23,000 pounds of oil spill debris that they had to manage as HW due to state regulation. In comparison, Homestead ARB in Florida generated about 5,500 pounds of oil spill debris that was managed as IW.

Also, some bases are unable to utilize certain pollution prevention technologies due to restrictions imposed by their respective states. Until recently, Minnesota, Wisconsin, and Pennsylvania were not permitted to use plastic bead media (PBM) leasing; which is a program that allows for the recycling of PBM as an alternative to disposal. The States of Wisconsin and Pennsylvania are currently modifying their regulations to allow for the use of this technology in the future.

Table 3-7 provides hazardous and industrial waste generation metric rankings for each base. The top five recurring HW and IW wastes generated at each base are listed along with quantities and ranks. Upon viewing the table, the disparities and inconsistencies mentioned above are evident.

It is important to note that the type, number, and age of the aircraft maintained at a particular base will directly affect the quantity of wastes generated (see Table 3-1 for this information). For example, C-5 maintenance activities generate far more waste oil than does maintenance activities on C-130 or F-16 aircraft. This is the major reason that Westover ARB generates more used oil than other bases in the Command, with the exception of March ARB. The age of the aircraft also plays a role in the amount of used oil generated. For example, even though

Grissom ARB has 22 KC-135R aircraft, they generate less used oil than some of the other bases because the "R" model aircraft are newer and require less servicing.

Table 3-7. 1997 Hazardous/Industrial Waste Generation Data and Rankings by Base

	DOB		GMT		GRI		HOM		MAR		MSP		NFS		PIT		WST		WIL		YNG	
	RANK	lbs	RANK	lbs	RANK	lbs	RANK	lbs	RANK	lbs	RANK	lbs	RANK	lbs	RANK	lbs	RANK	Lbs	RANK	lbs	RANK	lbs
Top Five Hazardous Waste Streams (Disposed and Recycled)																						
Paint Waste	3	1,709	1	1,701	2	3,570	3	1,798	4	14,280	4	957	6	1,084	2	589	4	1,466	2	5,341	2	1,483
Spent Solvent	1	6,694	4	576	1	19,304	1	7,672	-	-	2	1,528	-	-	4	372	-	-	1	9,136	1	6,249
Excess Mat.	2	2,260	-	-	5	475	4	64	-	-	-	-	-	-	3	438	5	1,356	5	207	-	-
Waste Fuel		825	-	-	4	534	-	-	3	27,059	-	-	-	-	-	-	-	-	4	524	3	1,465
Blast Media	-	-	2	1,644	-	-	-	-	6	2,177	3	803	-	-	5	303	-	-	-	-	-	-
Spill Debris/ Rags	-	-	-	-	3	2,093	-	-	5	6,154	1	1,928	4	2,467	-	-	2	23,048	-	-	-	-
Contaminated Wash Water	-	-	-	-	-	-	-	-	-	-	-	-	3	3,996	-	-	-	-	3	3,299	4	1,463
Used Oil	-	-	-	-	-	-	-	-	2	84,901	-	-	-	-	-	-	1	49,760	-	-	-	-
OWS Waste	-	-	-	-	-	-	-	-	1	176,515	-	-	1	78,020	-	-	-	-	-	-	-	-
Field Items (e.g., gas mask filters)	5	163	-	-	-	-	-	-	-	-	-	-	2	4,849	1	734	-	-	-	-	-	-
Miscellaneous	-	-	3	922	-	-	2	3,375	-	-	5	411	5	2,086	-	-	3	3,833	-	-	5	1,165
Top Five Industrial Waste Streams (Disposed and Recycled)																						
Used Oil	1	14,476	1	20,839	1	13,743	2	10,715	-	-	1	12,767	2	24,371	3	11,873	-	-	2	31,454	1	20,640
Solvents	2	4,938	2	2,826	5	876	-	-	-	-	-	-	4	3,830	4	3,004	-	-	-	-	-	-
Water/Fuel Mix.	3	3,398	4	435	4	2,450	3	6,911	-	-	-	-	3	5,328	-	-	-	-	-	-	-	-
Oil/Fuel Filters	-	-	3	665	-	-	-	-	-	-	3	1,653	5	2,881	-	-	4	5,520	5	1,155	5	2,041
Excess Mat.	4	1,062	5	143	2	5,168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spill Debris	5	701	-	-	-	-	4	5,538	-	-	-	-	-	-	5	2,020	3	7,641	3	7,583	4	2,675
Batteries	-	-	-	-	-	-	-	-	-	-	2	3,285	-	-	-	-	2	10,601	-	-	2	3,702
Waste Fuel	-	-	-	-	-	-	1	43,291	-	-	-	-	-	-	-	-	1	77,224	-	-		
OWS Waste	-	-	-	-	-	-	-	-	-	-	5	608	1	55,857	2	20,910	-	-	1	77,467	-	-

Miscellaneous	-	-	-	-	**3**	*1,778*	**5**	*1,422*	**1**	*1,278*	**4**	*781*	-	-	**1**	*28,440*	**5**	*4,061*	**4**	*6,724*	**3**	*3,174*

There is also a correlation between the number of motor vehicle sand powered-AGE equipment that a base services (see Table 3-1 for this information) and the amount of used oil generated. This correlation could explain why Dobbins ARB (515 vehicles) generates more used oil than Minneapolis-St. Paul IAP-ARS (127 vehicles) and Pittsburgh IAP-ARS (135 vehicles) despite having about the same number and type of aircraft. One final note, the high used oil generation figures for General Mitchell IAP-ARS are explained by the fact that they report their spill debris/absorbent waste in the used oil category.

There is a new HW being generated by the bases that has not yet become prevalent in the metrics: aqueous jet washer waste. Willow Grove ARS is the first base to have this waste significantly impact its metrics, but several other bases will be impacted in 1998. The root of the problem is that the wastewater from the jet washers is being drummed and sent for disposal as HW or IW rather than being discharged to the sanitary sewer much like the discharge from a household dish washer.

When aqueous jet washers were originally recommended as a way to reduce VOC emissions, it was anticipated that these units would be connected to the sanitary sewer, but this has not been the case. Therefore, the environmental and economic benefits of reducing VOC emissions from solvent tanks has been small relative to the environmental and economic costs of generating and disposing of an industrial/hazardous waste. Each base is managing this waste stream differently. The current status of how each base is handling waste from their aqueous jet washers is presented below:

- Dobbins ARB – Dobbins has yet to generate waste from their jet washers. Several of the units have been in operation for close to two years with the same wash water solution. They simply add water and detergent as needed. The dirty, murky wash water continues to clean effectively. They plan on reusing the same water until cleaning efficiency is no longer acceptable.

- General Mitchell IAP-ARS – Disposes of their wash water and sludge as hazardous waste due to high levels of lead.

- Grissom ARB – Has not yet disposed of their wash water.

- Homestead ARS – Plans to dispose of their wash water as hazardous waste; although, none has been generated yet.

- March – The wash solution is sent out as hazardous waste and is given a State Waste Code of 134.

- Minneapolis-St. Paul IAP-ARS – Discharges this wastewater directly to the sanitary sewer.

- Pittsburgh IAP-ARS – Are not currently using aqueous jet washers; therefore, they have not generated any waste.

- Westover ARB – The Wheel and Tire Shop is the only shop that has generated this waste. It has been changed out twice in roughly six months. The waste was shipped off base as a hazardous waste due to high metals content.

- Willow Grove ARS – Disposes of their wash water as hazardous waste.

- Youngstown ARS – Discharges their waste wash water directly into their on-base wastewater treatment plant.

It is recommended that bases discontinue purchasing new aqueous jet washers until a suitable disposable alternative is identified (see PPO HW-10 for disposal alternatives). Some possible disposal alternatives are summarized below:

- Hook aqueous jet washers to the sanitary sewer and discharge to the POTW or FOTW.

- Where restrictions prohibit the discharge of this wastewater to the sanitary sewer, negotiate with the POTW or FOTW on allowing this discharge (this wastewater should be acceptable to most treatment authorities).

- Pump out the water and remove the sludge at the bottom of the holding tank monthly, then pump the water back into the holding tank (the water is never actually disposed and the volume of waste is dramatically reduced).

- Decrease the frequency of wastewater clean-out to 12 to 24 months (depending on usage) to reduce the volume of waste generated. Several bases have done this and have stated that the dirty, murky wash water **does not** harm cleaning efficiency.

3.2.3 EPA-17 Chemicals

3.2.3.1 Definitions and Goals

The EPA-17 target chemicals (also referred to as the Industrial Toxic Pollutants [ITPs]) are 17 chemicals targeted by EPA for reduction or elimination of their use. These chemicals were targeted because of their high volume of usage, toxicity, and their persistence and mobility in the environment. The list of 17 target chemicals is provided in Table 3-8.

The USAF goal for EPA-17 chemicals is to reduce purchases of these chemicals by 50 percent from the baseline calendar year 1992. Progress will be assessed by measuring the weight in pounds of chemical purchased compared to the baseline. For this program area, it is important to examine mixed-constituent chemical products to include the correct proportion of pounds of EPA-17 chemicals in these products. For example, a particular paint may contain toluene, xylene, and

Table 3-8. EPA-17 Chemicals and Common Uses

EPA-17 CHEMICAL	COMMON USES
Benzene	Fuels
Toluene	Paints
Xylene (includes ortho-, meta- and para-)	Paints
Carbon Tetrachloride	Bearing Cleaning
Chloroform	Bearing Cleaning
Dichloromethane (Methylene Chloride)	Cold Wipedown Cleaner; Paint Stripping
1,1,1-Trichloroethane (Methyl Chloroform)	Parts Cleaning; Propellants
Trichloroethylene	Degreaser; Parts Cleaning
Perchloroethylene	Degreaser
Methyl Ethyl Ketone (MEK)	Degreaser/Cleaner; Paint Stripping
Methyl Isobutyl Ketone (MIBK)	Paints
Cadmium and compounds	Plating for Corrosion Control
Chromium and compounds	Plating; Paints
Cyanides	Plating Solutions
Lead and compounds	Batteries; Paint; Solder
Mercury and compounds	Laboratories
Nickel and compounds	Plating for Corrosion Control

chromium. To determine the EPA-17 chemicals purchased for this paint, the percentage of each of these chemicals needs to be multiplied by the pounds of the paint purchased to get individual component and total purchase quantities. (Note: Because hazardous materials are controlled centrally by the Hazmart at AFRC bases, EPA-17 chemical metrics are actually tracked and reported by pounds issued rather than pounds purchased. Issuance records are much more indicative of the types and quantities of chemicals used by different shops and organizations at the base.)

At the same time individual installations are expected to reduce EPA-17 chemical purchases, the USAF is working on changing Technical Orders and MILSPECs to allow for substitution of chemicals with completely eliminated or reduced levels of EPA-17 chemicals. This effort is a long process, and it could take several years to change many of the Technical Orders. However, it is important to check revisions to Technical Orders, because some have already changed to allow EPA-17 chemical substitutes.

3.2.3.2 Status for Achieving EPA-17 Pollution Prevention Goals

All of the AFRC bases have prepared EPA-17 chemical issuance figures for the baseline year (1992) and successive calendar years to track the progress of their EPA-17 chemical pollution prevention programs. The bases are required to report to HQ AFRC/CEV on the amount of EPA-17

chemicals they issue each year. These reports have been collated and sorted in tabular form by HQ AFRC/CEV. The output of these efforts is presented in Table 3-9.

Table 3-9 presents the EPA-17 chemical issuance figures in pounds for all of the bases for calendar years 1992 through 1997. The table shows that all of the 11 bases met the goal of at least a 50 percent reduction in calendar year 1996, based on the baseline year 1992. The table also shows that all of the bases continued to meet the goal in 1997; however, some bases increased their issuances in 1997, thereby lowering their reductions.

AFRC bases have had significant reductions in the use of EPA-17 chemicals as noted in the data presented in Table 3-9. The goal of 50 percent reduction in EPA-17 chemical purchases was achieved primarily through the following pollution prevention efforts at the AFRC bases:

1. Many of the aerosol cans of cleaners, paints, corrosion preventive compounds, etc. that contained EPA-17 chemicals have been replaced with EPA-17-free substitutes.

2. Most of the cleaning solvents containing EPA-17 chemicals were switched to solvents not containing these chemicals or to water-based cleaning agents.

3. The ban on purchasing ODSs for non-mission critical applications also resulted in a large reduction in EPA-17 chemicals used.

4. Painting of vehicles using paints containing EPA-17 chemicals has been reduced by buying new vehicles already painted blue and contracting for painting of vehicles off-base. Aircraft painting conducted off-base has also increased, which has also reduced the usage of EPA-17 chemicals. Furthermore, use of high-volume low-pressure spray guns and efficient painting practices have decreased paint usage.

5. The implementation of the Hazmart program has reduced EPA-17 chemical usage by restricting which shops get the chemicals and reducing the quantities dispensed to them.

6. EPA-17 chemical paint strippers (e.g., MEK and Methylene Chloride) were replaced with physical stripping processes.

3.2.3.3 EPA-17 Chemicals Metrics Data

Analysis of the EPA-17 chemicals metrics shows large disparities between bases for reductions in EPA-17 chemical purchases. For example, the 1997 data shows reductions for the bases range from 51 percent to 96 percent. This subsection will attempt to explain some of the reasons for these disparities.

Table 3-9. EPA-17 Chemical Issue Metrics for AFRC Bases[1]

BASES	1992		1993		1994		1995		1996		1997	
	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION
DOB	7,078	Baseline	2,187	69	636	91	964	86	746	89	250	96
GMT	5,332	Baseline	673	87	945	82	790	85	615	88	2,191	59
GRI	6,221	Baseline	5,163	17	1,355	78	1,663	73	1,396	78	1,396	78
HOM	1,877	Baseline	785	58	377	80	1,214	35	892	52	926	51
MAR	3,991	Baseline	3,450	14	2,850	29	2,350	41	1,767	56	279	93
MSP	4,534	Baseline	4,553	4	2,723	40	1,237	73	310	93	203	96
NFS	3,228	Baseline	1,252	61	733	77	1,415	56	461	86	1,463	55
PIT	3,072	Baseline	3,232	Increased	2,028	34	1,373	55	834	73	732	76
WST	8,396	Baseline	5,095	39	2,716	68	3,728	56	2,397	71	1,223	85
WIL	7,867	Baseline	6,179	21	1,294	84	2,597	67	2,252	71	1,518	81
YNG	2,900	Baseline	1,508	48	563	81	543	81	369	87	406	86

NOTE: 1. The USAF EPA-17 chemical pollution prevention goal is a 50% reduction in EPA-17 chemicals issued by the end of CY 1996 based on the CY 1992 baseline.

The single biggest reason for the disparities is the difference in how EPA-17 chemical metrics are tracked and reported by bases. These differences and resulting inaccuracies include the following:

- The bases report EPA-17 chemicals issued not purchased, which can lead to various problems including double counting of free issue chemicals at some bases.
- Many bases did not include all inorganic EPA-17 chemicals purchased.
- Many bases made estimates of pounds purchased without actually using real purchase data during the first few reporting years.
- Some bases are continuing to make estimates of purchase quantities without accurately tracking purchases.
- The baseline figures do not necessarily reflect the size and extent of operations at AFRC bases. For example, General Mitchell ARS's baseline figure is much higher than March ARB's figure despite having 31 fewer aircraft to operate and maintain.
- Most bases did not include EPA-17 chemicals in all mixed constituent products (e.g., paints, cleaners, sealants, etc.).
- Almost all of the bases have used more than one method to estimate EPA-17 chemical purchases during the years from 1992 to 1997, thus resulting in inconsistencies in reporting and difficulties in making comparisons.
- Some bases include tenants in the EPA-17 metrics, however most do not.
- Some of the chemical constituent data in the EMIS database are inaccurate because they are based on information in old, outdated MSDSs.

Many of the problems listed above resulted in poor metrics for the earlier years (1992-1995) of tracking and reporting EPA-17 chemical purchases. The metrics data for 1996 and 1997 appear to be more accurate, because the data for most of the bases are based on Hazmart database information for hazardous materials issued. Although not always accurate, the figures are better than those obtained before the Hazmart systems were available.

Because of the problems with tracking data before 1996 and because all of the bases have met the 1996 goals, the base-specific discussions for EPA-17 chemicals in Section 5.0 primarily address 1996 and 1997 calendar years.

3.2.4 Ozone Depleting Substances (ODSs)

3.2.4.1 Definitions and Goals

Ozone Depleting Substances (ODSs) are chemicals that deplete the earth's stratospheric ozone layer. Some examples include chlorofluorocarbon (CFC) refrigerants used in air conditioning

and refrigerant systems and halons used in fire suppression systems. Table 3-10 lists the Class I ODSs.

Table 3-10. Class I Ozone Depleting Chemicals

CFC-11 (Trichlorofluoromethane)
CFC-12 (Dichlorodifluoromethane)
CFC-13 (Chlorotrifluoromethane)
CFC-111 (Pentachlorofluoroethane)
CFC-112 (Tetrachlorodifluoroethane)
CFC-113 (Trichlorotrifluoroethane)
CFC-114 (Dichlorotetrafluoroethane)
CFC-115 (Chloropentafluoroethane)
CFC-211 (Heptachlorofluoropropane)
CFC-212 (Hexachlorodifluoropropane)
CFC-213 (Pentachlorotrifluoropropane)
CFC-214 (Tetrachlorotetrafluoropropane)
CFC-215 (Trichloropentafluoropropane)
CFC-216 (Dichlorohexafluoropropane)
CFC-217 (Chloroheptafluoropropane)
Halon 1202 (Dibromodifluoromethane)
Halon 1211 (Bromochlorodifluoromethane)
Halon 1301 (Bromotrifluoromethane)
Halon 2402 (Dibromotetrafluoroethane)
Carbon Tetrachloride
Methyl Bromide
Trichloroethane (all isomers)

The Class I ODSs can be grouped into three categories for discussion of AFRC bases. These categories are halons, refrigerants, and other ODS-containing chemicals. Subsections 3.2.4. 3 through 3.2.4.5 of this plan describe each of these categories of Class I ODSs.

The USAF pollution prevention goal for ODSs was to minimize or eliminate purchases of Class I ODSs starting on June 1, 1993. The purchase of mission essential Class I ODSs is still permitted. The baseline year for measuring reductions of ODS purchases was set as CY 1992.

This pollution prevention goal has been facilitated by the fact that Class I ODSs can no longer be produced. The manufacture of halons was phased out at the end of 1993 and the manufacture of other Class I ODSs was phased out at the end of 1995. The sources of ODSs currently available to the AFRC bases are the following:

- ODSs and ODS-containing chemicals that were produced prior to the phase-out
- ODSs recovered from equipment
- ODSs obtained from the Defense Logistics Agency (DLA) ODS bank.

3.2.4.2 Status for Achieving Pollution Prevention Goals

All of the AFRC bases have prepared Class I ODS issuance figures for the baseline year (1992) and successive calendar years to chart the progress of their ODS pollution prevention programs. Table 3-11 presents the Class I ODS purchase figures in pounds and percentage reductions for all of the bases for calendar years 1992 through 1997. The table shows that all of the AFRC bases have significantly reduced purchases of Class I ODSs. In fact, in 1997, 9 of the 11 bases achieved over a 93 percent reduction in Class I ODS purchases from their baseline year 1992 purchases. The two bases that did not exceed 93 percent still had impressive reductions of approximately 88 percent. The reasons for these bases having lower reductions than the other bases are discussed in Section 5.0, Base-Specific Discussions.

The achievement of high reductions of purchases of ODSs has primarily resulted from the following efforts:

1. Replacement of aerosol cans using CFCs as a propellant with aerosols that use CFC-free propellants or non-aerosol applicators.

2. Substitution of ODS-containing cleaners and degreasers with ODS-free cleaners and degreasers (e.g., ODS-free electrical contact cleaners).

3. Replacement of much of the CFC refrigeration and air conditioning equipment on the bases with CFC-free substitutes. This includes buying new vehicles with CFC-free air conditioning units.

4. Replacement of halon fire suppression systems with systems without halons.

5. Recovery of CFC refrigerants and halons from old equipment for reuse in other equipment on base.

6. Requiring all base contracts to have a provision prohibiting the acquisition of Class I ODSs or equipment containing ODSs.

Table 3-11. ODS Issue Metrics for AFRC Bases[1]

BASES	1992		1993		1994		1995		1996		1997	
	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION	lbs	% REDUCTION
DOB	6,072	Baseline	1,987	67	584	90	471	92	149	98	20	100
GMT	1,817	Baseline	243	87	21	99	3	100	4	100	5	100
GRI	1,879	Baseline	3,898	Increased	1	100	11	99	10	99	3	100
HOM	365	Baseline	63	83	49	87	232	36	72	80	23	94
MAR	4,887	Baseline	3,650	25	2,450	50	1,200	75	108	98	21	100
MSP	804	Baseline	608	24	283	65	172	79	21	97	10	99
NFS	1,313	Baseline	319	76	57	96	21	98	7	99	61	88
PIT	1,470	Baseline	1,445	2	558	62	121	92	101	93	183	88
WST	3,486	Baseline	1,009	71	361	90	145	96	195	94	95	97
WIL	2,185	Baseline	1,850	15	437	80	0	100	20	99	6	100
YNG	2,397	Baseline	1,671	30	836	65	39	98	65	97	17	99

NOTE: 1. The USAF pollution prevention goal for ODSs is to minimize or eliminate purchase of Class I ODSs by the end of CY 1996.

Similarly to other program areas, reporting of Class I ODS purchases by the AFRC bases was not always accurate and consistent. Some of the problems causing these inaccuracies included the following:

- Reporting usage figures instead of purchases
- Estimating chemical usage data instead of using real purchase data
- Non-reporting of tenants' purchases
- Non-reporting of ODS constituents in some mixed chemical products.

3.2.4.3 Halons and Halon Management Plans

The USAF halon management program was developed to ensure that an adequate supply of Halon 1301 is available for USAF weapon systems with stock recovered from fire suppression systems. A Halon Management Plan (HMP) is a major part of the halon management program. The requirements of the HMP include identifying all halon fire suppression systems and documenting a strategy for their replacement; reconfiguring all Halon 1301 systems from automatic activation to manual activation; and developing a Halon 1301 removal and replacement schedule. HMPs are also required for Halon 1211 fire suppression systems, although no AFRC bases have these systems. AFI 32-7080 and ETL 95-1 provide the specific requirements for HMPs.

Three of the 11 AFRC bases (Homestead ARS, March ARB, and Westover ARB) have fire suppression systems with Halon 1301. As shown in Table 3-12, none of these bases has an adequate HMP. However, it should be noted that these bases are scheduled to have these systems removed or replaced as soon as funding is available.

Table 3-12. Evaluation of RMPs and HMPs at AFRC Bases

	BASE										
PLAN	DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Halon Management Plan	NP/R	NP/NR	NP/NR	NP/R	NP/R	NP/NR	NP/NR	NP/NR	NP/R	NP/NR	NP/NR
Refrigerant Management Plan	P/A	NP/R	P/A	NP/NR	P/A	NP/R	P/A	P/A	NP/R	NP/NR	P/A

Legend: *P/A = Plan is present and adequate*
NP/R = No plan is present and plan is required
NP/NR = No plan is present and no plan is required

An HMP at a base that has just one or two halon fire suppression systems does not need to be long and elaborate. Instead, the documentation needed can be collected from existing information sources into a brief, but complete plan.

All AFRC bases have mission critical fire extinguishers that contain Class I ODS halons. HMPs are not required for halon fire extinguishers; however, halon fire extinguishers should be inventoried and alternative fire suppressors should be considered as part of the ODS pollution prevention efforts. All AFRC bases utilize halon recovery equipment to collect halons from leaking

fire extinguishers or to capture halon during servicing. Collected halons are saved for reuse on base and excess halons are sent to the DLA ODS bank. Halon equipment must be turned in to and tracked by the Robins AFB halon equipment shop..

3.2.4.4 Refrigerants and Refrigerant Management Plans

The USAF refrigerant management program was developed to ensure that adequate refrigerant supplies will be available to meet mission needs until the last of the units using CFC refrigerants have achieved their full economic lives. The program was not designed to replace CFC-containing equipment solely for the purpose of becoming a CFC-free installation.

A Refrigerant Management Plan (RMP) is an integral part of the refrigerant management program. The RMP inventories and describes air conditioning/refrigeration (AC/R) systems on the base and then provides for programming for removal or replacement of these systems. The USAF Refrigerant Management Handbook provides the specific requirements for RMPs.

Currently, RMPs are required only for AC/R equipment containing Class I ODSs. Essentially if a base operates AC/R equipment that contains Class I ODSs, then an RMP is required. Based on discussions with HQ AFRC/CEV, the requirement for an RMP can be satisfied with a short document (1 to 10 pages) in place of a large formal plan if the base has very few Class I ODS systems.

Alternatively, the USAF has made available refrigerant management software for managing base refrigerant programs. Use and input of all applicable data into this software could also satisfy the requirement of an RMP.

Eight of the 11 AFRC bases have AC/R systems with Class I ODSs. As shown in Table 3-12, only 6 of these 8 bases have adequate RMPs. Although not all bases have RMPS, all AFRC bases have made tremendous strides in replacing these systems as the end of their service lives is reached or when leaks and repairs warrant replacement.

As noted above, most of the AFRC bases have some equipment utilizing Class I ODS refrigerants. These bases utilize refrigerant recovery equipment to collect refrigerants from leaking equipment, equipment being serviced, and equipment taken out of service. Collected refrigerants are saved for reuse on base and excess stocks are sent to the DLA ODS bank.

In addition, all AFRC bases have vehicles with air conditioning systems. Because new vehicles purchased in the last few years all use Class II ODSs instead of Class I ODSs, very few vehicles on AFRC bases have Class I ODSs anymore. Those vehicles that have the Class I ODSs in air conditioning equipment, because they are older and more expensive (e.g., buses), are being retrofitted with new air conditioning equipment that use Class II ODSs. This is done as malfunctions and leaks warrant replacement. Alternatively, these older systems can be replaced with Class II ODSs that are drop-in replacements (see PPO ODS-1 in the PPOA for more information). All AFRC bases with Class I ODS air conditioning equipment in vehicles have refrigerant recovery units for collecting the refrigerants for reuse.

3.2.4.5 Other ODS-Containing Chemicals

In addition to halons and refrigerants, AFRC bases have in the past used numerous other chemicals containing Class I ODSs. However, as a result of the ban on production of Class I ODSs, there are very few ODS-containing chemicals available for purchase by base and tenant organizations.

During the base site visits, numerous ODS-containing chemicals were identified in shops. Most of these chemicals were purchased before the ban on production and are being consumed per their intended uses. Still there were some cases of new purchases of ODS-containing chemicals where Technical Orders reportedly required that these chemicals be used. Many Class I ODS-free substitute chemicals have become available that satisfy these Technical Orders and should be utilized wherever possible (see PPO EPA-1, Product Substitution Methodology, for more information).

3.2.5 Toxic Release Inventory (TRI) Chemicals

3.2.5.1 Definitions and Goals

Executive Order 12856, dated August 3, 1993, requires Federal facilities to comply with portions of the Emergency Planning and Community Right-to-Know Act (EPCRA). For Federal facilities, EO 12856 triggers two kinds of requirements. First, inventories, releases, and/or quantities of toxic chemicals must be reported to certain state and/or local emergency response agencies. Second, under Section 313 of EPCRA routine releases of toxic chemicals must be reported to the EPA annually, via a document called "Form R." For releases, reporting is required only when certain threshold quantities have been met for each individual toxic chemical. A list of toxic chemicals subject to inventory and reporting requirements was established in Section 313(c) of EPCRA. The chemicals in this list are commonly referred to as the Toxic Release Inventory (TRI) chemicals. When EO 12856 was signed, there were about 300 listed TRI chemicals, including all of the EPA-17 chemicals and many ozone depleting substances. Since that time, EPA has increased the number of TRI chemicals to more than 600. Most of the additions are active ingredients in pesticides and fertilizers.

The key requirements of EPCRA applicable to AFRC bases are summarized in Table 3-13. With respect to pollution prevention activities at USAF installations, TRI issues focus primarily on release reporting requirements contained in Section 313 of EPCRA. It is important to note that none of the AFRC bases have exceeded the thresholds for EPCRA Section 313 reporting, but they are still required to comply with reporting requirements in other sections of the statute.

TRI chemicals are principally products or constituents of products that are used, stored, manufactured, or otherwise processed at industrial facilities. In general, TRI chemicals are not wastes generated from industrial activities; they are product component inputs to industrial processes. Typically, a portion of the chemical is consumed in the process and the remainder is released to the environment, recycled (on or off-site), or captured as waste. Therefore, reducing the use of TRI chemicals in a process is, by definition, pollution prevention through source reduction. For this reason, EO 12856 explicitly identifies source reduction as the preferred method of achieving reductions in TRI chemical releases and off-site transfers.

Table 3-13. Key Requirements of EPCRA Applicable to AFRC Bases

EPCRA SECTION(s)	REQUIREMENT
301-303	Facilities must notify Local Emergency Planning Committees (LEPCs) and State Emergency Response Commissions (SERCs) of any Extremely Hazardous Substances (EHSs) produced, used, or stored on-site in amounts exceeding Threshold Planning Quantities (TPQs).
304	Facilities must notify LEPCs and SERCs when an EHS or CERCLA section 102(a) hazardous substance is released in excess of certain specified quantities. Initial notification is by telephone, with a written follow-up.
311	Facilities must submit a copy of MSDSs (or a list of MSDSs), for all substances requiring an MSDS, to the LERC, SERC, and local fire department annually.
312	Annual reporting of the amount, location, and storage conditions of chemical substances reported under section 311. This is called Tier I/Tier II reporting, and the recipients of these reports are the same entities listed for section 311.
313	Requires annual submission of Form R reports to EPA detailing releases of listed TRI chemicals, meeting certain thresholds. TRI chemicals used for personal use, motor vehicles, grounds maintenance are exempt from section 313 release reporting requirements. Form R data are made available to the public via the EPA.

There are a few important, practical considerations with respect to TRI release reporting requirements. First, it is standard practice to use engineering estimates to calculate TRI threshold quantities and releases. Usually, inventory data and process specific algorithms are used for threshold and release computations, respectively. Second, for simplicity, TRI calculations often assume that the weight of TRI chemicals released in a process equals the weight of chemical input to the process (i.e.,
no consumption of the chemical in-process). Finally, a number of processes or activities are exempted from TRI reporting requirements. Of these, the most significant are TRI chemicals used for personal comfort (e.g., fuels for heating), vehicle maintenance (acid for batteries, glycol in antifreeze), and grounds maintenance (pesticide and fertilizer active ingredients).

As a result of EO 12856, both DoD and the USAF have adopted program goals for a 50 percent reduction in the release and off-site transfer of TRI chemicals by December 31, 1999, from a 1994 baseline. Each USAF facility is expected to identify its own reduction strategy and prepare a written plan (e.g., the PPMAP) outlining how it will contribute to the DoD-wide 50 percent reduction goal.

3.2.5.2 Status for Achieving TRI Chemical Pollution Prevention Goals

Starting with CY 1994, all of the AFRC bases have examined their TRI chemical usage, and none have exceeded the thresholds established for Form R/TRI release reporting. Table 3-14 contains the data generated with respect to TRI chemicals for all 11 of the AFRC bases. As shown in this table, eight bases have already achieved significant reductions in TRI chemical releases or off-site transfers. As a whole, AFRC has reduced releases and off-site transfers of TRI chemicals by 40 percent since the 1994 baseline year.

Table 3-14. Baseline and 1996 TRI Data[1]

AFRC BASE	1994 BASELINE (lbs)	1996 ESTIMATED RELEASES (lbs)	% REDUCTION from Baseline	1999 50% REDUCTION GOAL (lbs)
DOB	1,464	1,074	27	732
GMT	1,159	743	36	580
GRI	1,627	1,687	-4	814
HOM [2]	1,735	1,156	33	868
MAR	4,480	2,361	47	2,240
MSP	3,607	397	89	1,804
NFS	940	560	40	470
PIT	3,103	1,122	64	1,552
WST	3,690	3,110	16	1,845
WIL	2,077	2,726	-31	1,039
YNG	1,687	521	69	839
AFRC Totals	25,907	15,458	40	13,353

NOTES:
1. The USAF goal for TRI chemicals is for a 50% reduction in the release and off-site transfer of TRI chemicals by December 31, 1999.
2. The baseline is based on 1995 data.

3.2.5.3 Methodology for Determining the TRI 1994 Baseline and 1996 Metrics

Three basic approaches were examined for the development of baseline and 1996 metrics for TRI chemical releases. The first approach was to gather waste stream data and trace its origin to TRI chemicals used at each base. The second approach involved collecting data generated by Bioenvironmental and/or CEV personnel when determining thresholds for TRI reporting. Actual TRI Form R reports could not be used since none of the bases prepared them because they did not exceed the reporting thresholds. The third and final approach was to estimate the 1994 baseline figures and 1996 releases from existing, related data associated with other ongoing pollution prevention programs. Ultimately, this third method provided the most feasible, consistent method of calculating TRI chemical releases.

Waste stream data collected from several AFRC bases showed that TRI chemicals appear in hazardous wastes and other waste streams. However, the available waste stream data did not always contain enough information to ascertain releases to all media (air, land, and water), or the nature of the process generating the waste (exempt or nonexempt under EPCRA section 313). This methodology also fails to capture quantities of TRI chemicals in-use but not yet released to a waste stream. For instance, a TRI chemical in a solvent tank would be missed until the solvent was disposed of.

Threshold calculations prepared by base personnel provided better data for estimating TRI chemical releases. Typically, base Bioenvironmental personnel or consultants prepared threshold calculations based on supply M-15 purchase reports. The data generated using the M-15 reports captured inventory data suitable for estimating TRI chemical releases in a manner consistent with current government and industry practices for TRI release reporting. Despite this advantage, several problems with this methodology were evident. Some bases calculated releases for only a representative sample of TRI chemicals, thus many chemicals were omitted from the data. Other bases generated estimates for CY 1994 but not for subsequent years. In addition, the TRI estimates derived from M-15 reports treated chemicals that were purchased, but not used or released, as sources of TRI chemical releases. Finally, many of the TRI chemicals identified from the M-15 reports were exempt from release reporting requirements, but were still included in the threshold calculations.

Because of the drawbacks associated with the other two methodologies, the third approach was determined to be the most accurate, and therefore was used to develop the 1994 baseline and CY 1996 metrics presented in Table 3-14. This methodology uses pollution prevention data from the ODS and EPA-17 chemical program areas as benchmarks for estimating TRI chemical releases. Data collected from the EMIS system at several AFRC bases indicate that by weight, ODSs and EPA-17 chemicals typically comprise 80 percent or more of the TRI chemical releases. Therefore, the baseline and 1996 metrics were estimated from the total annual usage of ODSs plus EPA-17 chemical usage, plus a factor of 20 percent to account for chemicals not contained in the ODS or EPA-17 categories. This 20 percent factor was obtained by taking a representative sample of TRI chemical purchase data from a few bases and comparing it to EPA-17 chemical and ODS purchase data previously reported. Since data for ODS and EPA-17 chemical usage have been collected and reported since 1992, they are believed to be reasonably accurate and consistent for use in estimating TRI chemical releases.

The methodology described in the previous paragraph ignores that fraction of a TRI chemical which is consumed in a process rather than released to the environment or transferred off-site. This assumption is consistent with TRI estimating as practiced by both the public and private sectors. The methodology also relies heavily on existing data, consistent with both the USAF guidance on TRI reporting and the EPCRA legislation itself. Both recommend using existing sources of data to estimate TRI chemical releases. Because the TRI baseline and metrics have been developed using existing EPA-17 and ODS metrics, the TRI data will only be as accurate as this data.

The Homestead ARS and March ARB TRI baselines were computed differently than the other AFRC bases. In 1994, Homestead ARS was still recovering from Hurricane Andrew and was not operating at its current level. Therefore, the baseline for Homestead ARS was computed by using 1995 data to get a number for 1994. March ARB already had developed baseline and metric figures for 1994 and 1996; however, these figures did not take into account the vehicle maintenance exemption. Therefore, the TRI metrics for March ARB were recalculated by subtracting all antifreeze and brake fluid chemicals (glycols) from the old figures.

3.2.5.4 TRI Chemical Metrics Data

Table 3-14 represents the first comprehensive presentation of TRI metrics for AFRC bases. It indicates that significant reductions in TRI chemical releases and off-site transfers have

already occurred. This result is directly related to the fact that most TRI chemicals used by AFRC bases are either ODSs or EPA-17 chemicals which have been targeted for reduction since 1992. However, a few of the bases show an unexpected increase in TRI chemical usage between the baseline year and CY 1996. In addition, the magnitude of TRI releases appears excessive for certain bases.

Several factors can impact the metrics for TRI chemical releases. A few of the factors that can affect the metrics are listed below:

- Number and type of aircraft at the base
- Aircraft age and changes in maintenance requirements
- Level of commitment to the concept
- Changes in mission and/or downsizing.

3.2.5.5 Future TRI Chemical Metrics

With the implementation of the Hazmart and EMIS, future TRI chemical reporting should be simpler and more accurate than the methodology used to develop the baseline and CY 1996 metrics. Using EMIS, each base should print a report of all the TRI chemicals issued to all shops for a given calendar year. Following the USAF Guidance for TRI Reporting (1995), TRI chemicals used for exempt processes such as vehicle maintenance and grounds maintenance must then be eliminated from the report. (Note: Fuels used in vehicles and aircraft fall under the vehicle maintenance exemption; therefore, benzene from fuels should not be reported.) A little research and/or input from individual shops may be required to distinguish exempt chemicals from non-exempt chemicals. The base's annual TRI metrics will consist of the total weight of the remaining TRI chemicals. Like the present methodology for calculating TRI metrics, this approach makes use of existing data and assumes that none of the TRI chemicals are consumed in-process.

3.2.5.6 Recommended TRI Chemical PPOs

The most critical PPO relative to TRI chemical releases is positive inventory control and management of products containing TRI chemicals. In practical terms, this means operating an efficient Hazmart that issues controlled amounts of hazardous materials only to authorized individuals. The data generated from Hazmart operations should be used to identify and target shops and processes that use products containing large quantities of TRI chemicals. Thereafter, process specific PPOs can be identified for implementation.

Product substitution is critical to reducing TRI chemical purchases. To identify the top users of TRI chemicals and the TRI chemicals used in the greatest quantities, CEV personnel or the EPC should obtain the hazardous material usage printouts from the EMIS database. With this information in hand, CEV personnel can then identify product substitutions by implementing PPO No. EPA-7, Product Substitution. This PPO is loaded with lots of reference information on how and where to best find product substitutions.

Since TRI chemical releases are predominantly releases of EPA-17 chemicals and ODSs, PPOs for these two chemical categories should be implemented as much as possible, consistent with operational requirements and mission readiness. See Sections 3.2.3 and 3.2.4 of this plan for specific discussion relevant to EPA-17 chemicals and ODSs.

3.2.6 Pesticides

3.2.6.1 Definitions and Goals

Pesticides are defined as chemical agents that are used to kill undesirable and unwanted insects, rodents, plants, or fungus. Pesticides are typically sprayed directly on pests or in areas that pests are thought to inhabit. AFRC bases utilize pesticides primarily to control insects in and around buildings and to kill weeds in landscaped areas and along fence lines. Pesticides include insecticides, rodenticides, herbicides, and fungicides.

The AFRC Entomology Office has implemented an integrated pest management (IPM) program that is based on non-chemical measures and the judicious use of pesticides in controlling pests on the base. The program incorporates the provisions of DoD Instruction 4150.7. The instruction states that it is DoD policy to establish and maintain safe, effective, and environmentally sound IPM programs to prevent or control pests and disease vectors that may adversely impact readiness or military operations by affecting the health of personnel or damaging structures, material, or property. It sets the Measures of Merit for base pest management, which are as follows:

- Merit 1 - All DoD installations will have a Pest Management Plan (PMP) prepared, reviewed, and updated annually by the end of fiscal year (FY) 1997.
- Merit 2 - By the end of FY 2000, DoD installations will reduce the amount of pesticides applied annually by 50 percent from the FY 1993 baseline in pounds of active ingredients.
- Merit 3 - By the end of FY 1998, all DoD base pesticide applicators will be properly certified within 2 years of employment.

IPM should employ physical, chemical, biological, and educational methods to maintain pests at populations low enough to prevent undesirable damage or annoyance. In addition, application of the least toxic chemical should be utilized when other methods fail.

Fertilizers are used by several bases to provide essential nutrients to lawn areas to promote growth and a lush green appearance. Typical fertilizers used by AFRC bases contain the macronutrients nitrogen, phosphorus, and potassium. Fertilizers are broadcast applied to the lawns by contractor or base personnel. Fertilizer usage is not addressed by the pollution prevention program and there are no pollution prevention goals for fertilizer reduction; however, because fertilizers are harmful to the environment, base specific discussion on fertilizer usage is presented in Section 5.0 of this document.

3.2.6.2 Status for Achieving Pollution Prevention Goals

Pesticide usage data has been collected from each base for FY 1993 (the baseline year) and FY 1996. This data is presented in Table 3-15. As evidenced by the data, there is a very large disparity in the quantities of pesticide being used by the different bases. Two of the bases, Niagara Falls ARS and Willow Grove ARS, used less than ten pounds of active ingredient per year. On the other hand, several bases used in excess of 100 pounds of active ingredient per year. In fact, Homestead ARS used 2,696 pounds of malathion in 1996. This malathion usage is absolutely critical for the control of mosquitoes around the runway during the rainy season.

Table 3-15. AFRC Pesticide Metric Data for FY 1993 and FY 1996

BASES	PESTICIDE USAGE (lbs. of Active Ingredient)		NOTES
	FY 1993 (Baseline)	FY 1996	
DOB	436.95	506.74	Metrics were obtained from data reported to HQ AFRC/CEV using the WIMS system; the data was verified during the site survey
GMT	57.33	131.12	Actual pesticide usage in and around buildings was reported accurately (7.33 lbs in 1993 and 81.12 lbs in 1996); however no records for herbicide applications by contractors are kept; this usage was estimated to be 50 lbs in both 1993 and 1996
GRI	467.00	198.38	FY 1993 data is used as the baseline; data was obtained from the base during the site survey
HOM	3,820.00	2,696.54	FY 1995 data is used as the baseline; metrics were obtained from data reported to HQ AFRC/CEV; data includes malathion fogging for mosquitoes, which accounts for more than 90% of the pesticides applied at the base
MAR	144.78	144.78	FY 1996 data is used as the baseline; metrics were obtained from data reported to HQ AFRC/CEV and includes the ANG unit
MSP	256.40	245.68	99% of pesticide usage comes from herbicide applications to the lawns; metrics were obtained during the site survey and do not include the ANG unit
NFS	0.49	7.00	1996 increase is due to increased spraying for ants; metrics were obtained from the data reported to HQ AFRC/CEV via the WIMS system; the data was verified by base personnel and does not include the ANG unit
PIT	340.00	182.00	Metrics were obtained from base personnel during the site survey; metrics are calendar year data
WST	41.01	11.16	Metrics were obtained from data reported to HQ AFRC/CEV using the WIMS system; the data could not be verified during the site survey
WIL	1.06	1.00	Glyphosphate usage was not available, but was estimated at 1.00 lb in 1993 and 1996; no other pesticides were used in 1996; data includes the ANG unit

YNG	*200.00*	*200.00*	*Data reported to HQ AFRC/CEV was computed incorrectly, and determining the actual amounts of active ingredient used was impossible; therefore, metrics are estimates*

According to the metrics, from 1993 to 1996, there were no clear trends in the reduction of pesticide usage. Several bases had decreases in pesticide usage while others remained the same or even increased. Specific information about the metrics at each base can be found in the base specific discussions found in Section 5.0.

3.2.6.3 Pesticide Metrics Data

The first task in assessing pesticide management at all of the AFRC installations was quantifying the pesticide programs by attempting to collect pesticide usage data for FY 1993 (the baseline year) and FY 1996. At most of the installations, licensed contractors apply pesticides; however, at Dobbins ARB, Pittsburgh IAP-ARS, and Youngstown ARS, licensed base personnel apply pesticides. Each installation has been forwarding pesticide usage information to HQ AFRC for several years, and a few of the installations have submitted independently prepared reports or have incorporated them in the WIMS system to satisfy their reporting requirements.

While on-site, information was collected on the use of all types of pesticides, including insecticides, rodenticides, herbicides, and fungicides. Pesticide applicators (contractor or base personnel), Base Quality Assurance Engineers (QAEs) overseeing pesticide contractors, and Hazmart personnel were interviewed. In general, the on-site collection and verification of pesticide metric data was difficult. There were a number of reasons for this difficulty, which include the following:

- Pesticide application records for previous years were non-existent because the data was never retained, or was discarded or misplaced as a result of personnel changes or base conversions.

- Pesticide applications were not tracked accurately on the WIMS-ES system due to a lack of user comfort with or an insufficient knowledge of the system.

- Installation personnel receive pesticide application data from contractors or Roads and Grounds personnel in varying and often confusing formats, with report forms ranging from monthly invoices to application log sheets. In addition, installation personnel were also required to perform numerous calculations to convert the data they received into a useable format. Lastly, the data forwarded on the report forms to installation personnel was inconsistent, and frequently did not represent all of the pesticides applied on an installation (e.g., several installations did not track herbicide data).

- The data received by HQ AFRC from base personnel concerning pesticide usage was, for the most part, inconsistent and did not report the total pounds of active ingredient used as required by DoD Instruction 4150.7. Several installations forwarded pesticide data to HQ AFRC in terms of the total amount of pesticide mixture that was applied, which includes the weight of inert or other compounds. Reporting pesticide applications in this manner significantly skews the data, and represents an inflated amount of total pesticides applied by a given installation.

An important factor in pesticide usage (and evident in Table 3-15) is that pesticide usage is often significantly higher at AFRC installations that maintain the runway. Insecticides are needed

around runways to control insects so birds do not feed near the runway and create bird air strike hazard (BASH). For example, Homestead ARS, Dobbins ARB, and Grissom ARB all use pesticides around the runway for this purpose. One notable exception to this trend is Westover ARB who has been willing to tolerate a certain amount of insects as acceptable. The cool Northern climate at Westover ARB also keeps insect populations down.

3.2.6.4 Recommendations to Improve Pesticide Metrics Reporting

Tracking pesticide usage data accurately and in a uniform manner Command-wide can be accomplished through the use of a common report form or the WIMS system that allows each installation to report pesticide usage in a format consistent with the tracking requirements of DoD Instruction 4150.3. Appendix D provides a sample copy of a pesticide data collection form. This form could be submitted quarterly by each installation to HQ AFRC, either by fax or the Internet. Installations that presently utilize licensed pesticide application contractors should modify their contracts and require contractors to submit their usage information in this format to the base QAE. Having the contractors complete this form will not only save base personnel a tremendous amount of time and ease their current reporting requirements, but will also provide base QAEs a means by which to determine the accuracy of contractor invoices.

3.2.6.5 Pest Management Plans

DoD Instruction 4150.7 also requires all installations to have prepared a Pest Management Plan (PMP) by the end of FY 1997. Table 3-16 shows the status of each base's PMP. Several Installations, including General Mitchell ARS, Minneapolis-St. Paul ARS, Pittsburgh IAP-ARS, and Willow Grove ARS, have historically only used nominal amounts of pesticides annually. HQ AFRC has stated that, at these installations, a one or two page policy letter/memo would satisfy the requirement for a PMP.

Table 3-16. Characteristics of Base Pesticide Programs

BASE	APPLY PESTICIDES IN BUILDINGS (Y/N)	APPLY HERBICIDES TO LANDSCAPED AREAS (Y/N)	APPLY FERTILIZERS TO LANDSCAPED AREAS (Y/N)	ADEQUATE PEST MANAGEMENT PLAN (Y/N)	INSTALLATION PESTICIDE APPLICATOR (CONTRACTOR OR BASE PERSONNEL)
DOB	Y	Y	Y	N	Base Personnel
GMT	Y	Y	Y	N	Contractor
GRI	Y	N	N	N	Base Personnel
HOM	Y	Y	N	N	Contractor
MAR	Y	Y	N	N	Contractor
MSP	Y	Y	Y	Y	Contractor
NFS	Y	N	N	Y	Contractor
PIT	Y	Y	N	Y	Base Personnel
WST	Y	N	N	Y	Contractor
WIL	Y	Y	N	Y	Contractor

YNG	Y	N	N	Y	Base Personnel/ Contractor

A PMP should be a long-range, comprehensive installation planning and operational document that establishes the strategy and methods for conducting a safe, effective, and environmentally sound IPM program. It is a narrative document that stresses IPM. Requirements of a satisfactory PMP are found on page 19 of DoD Instruction 4150.7 and are summarized below:

- Describe all pest management requirements and programs, including those for contracts, natural resources, golf courses, and outleases.
- Describe IPM procedures.
- Identify resources such as work-years, facilities, and equipment.
- Identify all pesticides (with EPA registration numbers) that have been approved by the HQ AFRC pesticide reviewer.
- Describe health and safety measures for personnel and the public.
- Provide cost comparisons with performing pest management functions through an outside contractor.
- Describe practices with special environmental considerations: a) restricted use pesticides, b) pesticides that could contaminate surface or ground water, and c) activities that could affect endangered species and their habitats.
- Identify animal control efforts for feral cats, feral dogs, or wildlife.

Most of the installations did not have a PMP that met the requirements of DoD Instruction 4150.3. Proper implementation of IPM requires the identification of what type of pesticide should be applied, where, how often, and the specific pests being targeted. A schedule should also be identified. Although several installations had plans that set forth pesticide application strategies, most of these plans did not adequately address IPM.

3.2.7 Volatile Air Emissions

3.2.7.1 Definitions

Volatile air emissions are defined as the emission of volatile organic compounds (VOCs). VOCs, according to the EPA, are volatile compounds of carbon excluding methane, ethane, methylene chloride, trichloroethane, hydrochloro-fluorocarbons (HCFCs), and chlorofluorocarbons (CFCs). As these VOCs vaporize and move up through the atmosphere, they engage in atmospheric photochemical reactions that produce ozone. (The exempted VOCs do not contribute to ozone formation.) Ozone is the primary constituent of smog, which aggravates respiratory conditions, irritates the eyes and mucous membranes, and reduces visibility.

A number of VOCs are also considered Hazardous Air Pollutants (HAPs). VOC emission sources on installations include the storage, transfer, and burning of hydrocarbon fuels and the use and storage of organic solvents (e.g., paints and solvent parts washers).

3.2.7.2 VOC Emission Sources and PPOs

VOC emissions are difficult to quantify. VOC emission estimates not only include chemical usage data, but the percentage of a particular product that volatilizes, as well as the percentage of VOCs in the vaporized product. The base Title V reports can be used to get gross estimates of VOC emissions from stationary sources. According to the Title V reports, the top VOC sources at AFRC installations, excluding aircraft operations, are painting operations; the transfer of hazardous materials (HAZMATs) from storage tanks and from tankers to the planes (includes mostly JP-8, diesel, and gasoline transfers); AGE equipment; boilers, heaters, and emergency generators; and solvent cleaning/degreasing tanks.

VOC reductions throughout the Command have been primarily achieved through equipment and product substitution. Most bases have implemented changes in painting operations and procedures to reduce VOC emissions. Some of the most common changes include the use of high-solids, low-VOC paints; the substitution of solvent-based paints with water-based latex paints; the efficient use of high-volume, low-pressure (HVLP) paint-guns; and the reduction of spray painting through the use of vinyl lettering machines.

It is difficult to reduce VOC emissions from solvent-based paints applied to aircraft and other equipment that are governed by Technical Orders that specify these types of paints. Where painting operations are not governed by Technical Orders, such as on munitions containers, roads, parking lots, airfields, and buildings, the use of water-based paints should be investigated. Where tests show these substitute paints to be effective, their use should be permanently implemented.

VOC reductions have also been possible through fuel substitutions. For example, extensive VOC emission reductions have been possible through the switch from JP-4 to JP-8 aviation fuel. JP-4, with a vapor pressure of 1.0, is forty times more volatile than JP-8, with a vapor pressure of 0.025. (The higher the vapor pressure, the greater chance the material will volatilize.)

Fuel substitutions for base vehicles through the use of alternative-fueled vehicles (AFVs) and carts (e.g., electric, compressed natural gas (CNG), etc.) can effectively reduce VOC emissions. With AFVs, VOC emissions from fuel combustion and fuel dispensing and loading are predominately eliminated. Furthermore, AFVs are safer than gasoline-powered vehicles because of the reduced explosion hazard. For example, CNG gas will immediately dissipate into the atmosphere when a CNG tank is punctured. Also, CNG is non-toxic, non-corrosive and more difficult to ignite than gasoline.

Several bases have been extremely active in AFVs conversion efforts. Those bases that have acquired electric trucks and cars include Youngstown ARS, Homestead ARS, Pittsburgh IAP-ARS, March ARB, and Dobbins ARB. Several other bases have been proactive in converting vehicles to dual-fuel CNG/gasoline vehicles; these bases are March ARB, Dobbins ARB and Grissom ARB. AFVs include vehicles that were designed to run solely on alternative fuels and vehicles that had been "converted" to run entirely or partially on alternative fuels. Converted engines are those that were originally designed to operate on gasoline or diesel fuel and were subsequently modified to operate exclusively or in conjunction with CNG or liquefied petroleum gas (LPG or propane).

Although vehicle conversions have contributed to VOC emission reductions throughout the Command, HQ AFRC has suspended in-house CNG vehicle conversion efforts. A recent policy

statement by the EPA states that the alteration from the original configuration of a certified vehicle or engine may be considered "tampering" according to the CAA. Vehicle modifications, therefore, must be accompanied by a Federal Certification to ensure compliance with the CAA. The Air Force Alternate Fueled Vehicle System Program Office (AFVSPO) is the only source for vehicle conversions now. AFVs can still play a role in VOC reduction efforts because bases can still purchase designed and certified, electric, CNG, and other AFVs direct from vehicle manufacturers.

Other substitutions that can reduce VOCs include the replacement of solvent tanks with aqueous and bioremediating parts washers. Many shops are discovering that the aqueous machines clean as well as the solvent parts washers and are less hazardous to shop personnel. Solvent tanks are not necessary in Vehicle Maintenance or AGE Shops as evidenced by the fact that numerous Vehicle Maintenance and AGE Shops throughout the Command have successfully eliminated the use of solvent tanks. Corrosion should not be a concern for vehicle components cleaned with aqueous parts washers because the wash solutions have rust inhibitors and, because the jet washers are so hot, the parts literally flash dry when removed from the jet washer. March ARB, however, has indicated that they have spoken with the T.O. managers and aqueous parts washers can be used if followed by a heat drying cycle and if a corrosion preventative compound is utilized.

The complete elimination of solvent tanks, however, is not yet feasible. Many aircraft maintenance shops still need to use solvents to clean aircraft parts according to Technical Order requirements. For example, at pneudraulics shops, water-based cleaners can contaminate hydraulic aircraft components; therefore, these components must be cleaned with solvent-based cleaners. Also, wheel and tire shops need solvent-based parts washers to clean wheel bearings because of corrosion concerns and Technical Order requirements. Finally, because JP-8 combustion leaves significant carbon deposits on engine components, several of the engine shops have stated that solvent tanks are still necessary to clean aircraft engine components.

Where solvent tanks are still needed, bases should consolidate several solvent tanks to one centrally-located tank that several adjacent shops can share. Through the use of aqueous parts washers and the sharing of solvent tanks, bases should be able to significantly reduce the number of solvent tanks and, in turn, reduce VOC emissions.

> (NOTE: Many bases are or will be disposing of their aqueous jet washer wastewater as a hazardous or industrial waste; thus creating a very large waste stream. Bases should probably discontinue acquiring aqueous jet washers until a suitable disposal alternative is identified. See Section PPO HW-10 for more discussion about this issue.)

Pollution prevention tries to reduce VOC emissions by going to the source and altering the industrial process through training, process modification, or the purchase of new equipment. Some examples of this include painter training, HVLP paint guns, and aqueous parts washers. However, despite pollution prevention measures, there are still a number of industrial processes that generate significant VOC emissions. For example, many solvents and solvent-containing paints are still required for use at AFRC bases. In these instances, bases may want to consider VOC treatment technologies that control VOC emissions after they are created. For example, Homestead ARS is constructing a new aircraft paint booth that is equipped with an activated carbon filtration unit that is supposed to capture more than 90 percent of all VOC emissions. Of course, treatment technologies can be expensive and may only be applicable to AFRC bases in a few select instances.

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4.0 POLLUTION PREVENTION OPPORTUNITIES

4.1 INTRODUCTION TO PPOS

The purpose of Section 4.0 is to define, describe, and summarize the different Pollution Prevention Opportunities (PPOs) existing at or recommended for the AFRC bases. PPOs can be defined as opportunities for implementing Pollution Prevention Alternatives. Pollution Prevention Alternatives are defined in the USAF Pollution Prevention Model Shop Reports (USAF 1996) as methods of reducing the adverse effects of hazardous materials by making changes in the types of materials used or how they are used. Alternatives, as applied to hazardous material decision-making, include, but are not limited to, such possibilities as substituting less hazardous or non-hazardous material; redesigning a component such that HAZMATs are not needed in its manufacture, use, or maintenance; modifying processes or procedures; restricting users, consumptive use, on-demand supply, and direct ordering; extending shelf life; regenerating spent material; downgrading and reuse of spent material; using waste as raw material in other manufacturing; and combinations of these possibilities. PPOs can range from simple product substitutions (e.g., isopropyl alcohol substituted for MEK) to procurement and installation of equipment (e.g., a jet washer replacing a solvent parts cleaner).

PPOs also include best management practices (BMPs). Best management practices are things other than actual product substitutions and process changes that serve to reduce the quantity of waste generated or hazardous materials used. Examples of pollution prevention BMPs include preventive maintenance programs, training and awareness-building programs, effective supervision, employee participation, scheduling and planning (USEPA 1992).

Table 4-1 presents a full listing of all PPOs that are existing, planned, or recommended for one or more of the AFRC bases. The table provides the title and description of each PPO. This table is presented as a reference to subsequent tables to prevent repetition of descriptions of PPOs in these later tables.

The full descriptions and other related information for all of the PPOs are contained in the AFRC Pollution Prevention Database (Appendix C). An overview of this database is presented in Subsection 4.2. The discussions in this overview will include a description of the contents and potential uses of the database.

The existing PPMAPs developed for the AFRC bases had proposed numerous PPOs to be implemented. Some of these PPOs were not implemented - many for obvious reasons. Subsection 4.3 summarizes these PPOs and briefly identifies why they were not implemented.

Numerous PPOs have been developed and implemented at AFRC bases. Subsection 4.4 summarizes existing PPOs at AFRC bases and identifies pollution prevention equipment at each AFRC base.

During the site visits to the bases and through other project activities, numerous PPOs were recommended for use at AFRC bases. Also, several of the bases already had plans to implement several other PPOs. Subsection 4.5 summarizes the planned and recommended PPOs for AFRC bases.

Table 4-1. PPOs that are Existing, Planned, or Recommended at AFRC Bases

PPO NO.	PPO NAME	PPO DESCRIPTION
Municipal Solid Waste		
MSW-1	On-Base Recycle Center	An on-base recycle center will allow the base to centrally collect and segregate different recyclable waste streams, which will lead to a greater percentage of the solid wastes being recycled, as well as cheaper solid waste disposal costs.
MSW-2	Improve MSW Recycling Program	This PPO involves the introduction of a full-scale recycling program to capture all recyclable goods that are currently entering the solid waste stream. This program will reduce solid waste disposal quantities and costs.
MSW-3	Quarterly Dumpster Inspections	Inspect dumpsters quarterly for the presence of recyclable materials.
MSW-4	On-Base Recycling of Wood, Asphalt, and Concrete	An industrial grinder can be rented annually to grind wood, asphalt, and concrete waste for reuse on-base.
MSW-5	Off-Base Recycling of Sand Applied to Roads in Winter	Excess sand that is applied to base roads in the winter is collected and taken to the local municipal authority's facility. The sand is then screened to remove foreign objects and brought back to the base for storage and reused the following winter.
MSW-6	Composting of Yard Wastes	Dispose of yard waste in compost piles located on or off-base instead of in the garbage as MSW.
MSW-7	Food Waste Processors	Food waste processors can be used to reduce the volume of food wastes being disposed as MSW from dining facilities.
MSW-8	Styrofoam Reduction and Recycling System	A solvent is used to reduce Styrofoam plates, cups, packing materials, etc., into a gel-like form that can be shipped off-site for recycling.
MSW-9	Construction and Demolition Waste Recycling	Construction and demolition waste from on-base projects are taken to off-base recycle centers for recycling.
Hazardous Waste		
HW-1	Encapsulating Absorbents for Spill Clean-Up	Improved absorbents that pass TCLP can be used to reduce the quantity of hazardous and industrial waste disposed.
HW-2	Efficient Oil/Water Separator Management	Better, more efficient management of oil/water separators will reduce the amount of hazardous and industrial waste generated.
HW-3	Reuse of JP-8 Aircraft Fuel	JP-8 fuel that is removed from aircraft during maintenance and other activities should be returned to the POL Complex for reuse whenever possible.
HW-4	Improve Gas Mask Canister Management	Improve gas mask canister management on base by using expired service life canisters during training and other non-critical exercises
HW-5	Plastic Bead Media Leasing	Spent plastic bead media is generated during paint stripping activities on many bases. This bead blast media can be leased through a broker to avoid having to dispose of the spent material as a hazardous waste.
HW-6	Selective Paint Filter Replacement	Paint booth filters can be inspected more carefully before they are changed out. The filters that appear less contaminated can be left in place until the next filter change. The status of those filters can be evaluated then.
HW-7	Use of Dissolvable Styrofoam Paint Booth Filters	Reduce the volume of waste generation by using Styrofoam paint booth filters for use in paint booths throughout AFRC. When the filters have been used they are dissolved in used paint thinner and disposed of with the liquid paint waste.

HW-8	*Bicarbonate of Soda Paint Stripping and Parts Cleaning*	*Use a bicarbonate of soda stripping unit to remove paint, grease, and dirt from aircraft parts and equipment.*

Table 4-1. PPOs that are Existing, Planned, or Recommended at AFRC Bases (continued)

PPO NO.	PPO NAME	PPO DESCRIPTION
HW-9	Segregation of Wastes at the C-130 Propulsion/Engine Shop	Segregate waste rags and absorbents used in the Propulsion/Engine Shop from the waste rags generated in other shops at the base. The Propulsion/Engine Shop rags can have trace levels of cadmium and need to be disposed of separately from other rags to reduce HW generation.
HW-10	Aqueous Jet Washer Waste Disposal	This PPO provides numerous alternatives for reducing the amount of hazardous waste generated from aqueous-based jet washers.
Industrial Waste		
IW-1	Improved Absorbent Management	Sound absorbent management practices can significantly reduce the amount of waste absorbent generated in a shop.
IW-2	Absorbent Reconditioning Program	Used absorbent pads and rags can be collected and processed under an absorbent reconditioning program. The absorbents are cleaned at the reconditioning facility and are distributed for reuse.
IW-3	Antifreeze Testing and Recycling	Antifreeze testing and antifreeze recycling units can be used in shops where a significant amount of antifreeze is changed out each year. The recycling unit processes waste antifreeze, separating water and other impurities from the antifreeze mixture. The processed antifreeze can then be reused.
IW-4	Motor Oil Testing	Use an oil analyzer in shops where oil and other lubricating fluids are changed out. The analyzer can detect if the oil is still serviceable, thereby permitting longer intervals between oil changes.
IW-5	Shop Rag Laundering	A majority of industrial shops use rags to wipe down greasy or oily equipment. The used shop rags are collected and replaced with newly laundered rags on an as-needed basis.
IW-6	Use of Rechargeable Batteries	Use a rechargeable alkaline battery system in place of disposable alkaline batteries. The use of rechargeable batteries will significantly reduce battery purchase costs as well as battery disposal costs and amounts.
IW-7	Dryer for Fuel Contaminated Absorbent	Fuel contaminated absorbent is put in a dryer unit which draws air through the absorbent to remove the volatile organics and water in the absorbent. The absorbent can then be reused.
IW-8	Microbial Breakdown of Petroleum Products	Microbial-based detergents are applied to petroleum spills or added to oil/water separators to breakdown the petroleum, essentially making the petroleum disappear.
EPA-17 Chemicals		
EPA-1	Product Substitution Methodology	This PPO provides the methodology needed to identify processes that are using hazardous materials so they can be replaced with non-hazardous substitute products.
EPA-2	Substitute for MEK in Fuel Cell Shop	Replace MEK with a less hazardous substitute at fuel cell repair shops.
EPA-3	Substitute for MEK in Corrosion Control Shops	Use non-EPA-17 chemical containing products to wipe down parts prior to painting in corrosion control shops.
EPA-4	Alternative Paint Gun Cleaner	Use N-Methyl-2-Pyrrolidone or mineral spirits to clean paint guns at the paint shop, instead of using EPA-17 containing solvents like methylene chloride and MEK.
EPA-5	Use Marking Inks in Place of Spray Paints	Use a non-EPA-17 marking ink in place of spray paints for marking and stenciling.
EPA-6	Consolidate Paint Shops	Some bases have three or more paint shops. Numerous environmental benefits could be achieved by closing the under-used paint shops and consolidating their activities.

Table 4-1. PPOs that are Existing, Planned, or Recommended at AFRC Bases (continued)

PPO NO.	PPO NAME	PPO DESCRIPTION
EPA-7	Include Base Tenants in the Hazmart Program	The Hazmart should begin handling all hazardous material inventory management operations and purchases for base tenants.
EPA-8	Improved Hazmart Procedures	Hazardous chemical usage and expired shelf-life wastes can be reduced by improving several Hazmart procedures.
Ozone Depleting Substances		
ODS-1	Refrigerant and Halon Substitutions	Substitute Class I ODSs with Class II ODSs or ODS-free materials in refrigerant or fire suppression systems.
ODS-2	ODS Equipment Survey and Leak Testing	Survey all ODS containing equipment to determine which equipment is not necessary and can be removed.
ODS-3	Substitute for Trichloroethane in C-130 Shops	Use isopropyl alcohol or another non-EPA-17 solvent instead of trichloroethane to wipe down aircraft parts.
Pesticides		
PST-1	Implement Integrated Pest Management	Control pests through a combination of biological, chemical, cultural, and physical control practices rather than solely using pesticides.
PST-2	Fertilizer Reductions on Landscaped Areas	Reduce fertilizer applications on lawns through improved landscaping techniques and an increased tolerance for an imperfect lawn.
Volatile Organic Compounds		
VOC-1	Compressed Natural Gas (and Propane) Vehicles	Eliminate VOC and other hazardous air emissions from gasoline and diesel powered vehicles by converting to dual-fuel gasoline/compressed natural gas vehicles.
VOC-2	Electric Vehicles	Eliminate VOC emissions from gasoline and diesel powered vehicles by converting to electric cars and trucks.
VOC-3	Electric Utility Carts and Bicycles	Prevent the emission of VOCs from gasoline-powered vehicles by using electric utility carts for transportation on-base.
VOC-4	Vinyl Lettering Machine	Use vinyl lettering to label and identify equipment, walls, and doors rather than using spray paints.
VOC-5	Painter Training	Train AFRC paint shop personnel to more efficiently perform their painting operations in an effort to reduce the amount of paint used and to lower VOC emissions and paint waste generation.
VOC-6	Electrostatic Paint Spray System	Use electrostatic painting equipment in place of conventional painting equipment.
VOC-7	Reduce/Eliminate Solvent Tanks	Remove all unnecessary solvent tanks and, where solvents are still needed, consolidate several tanks to one centrally-located tank.
VOC-8	Aqueous Parts Washers	Solvent-free, aqueous-based parts washers are used to replace solvent-based dip tanks for cleaning and degreasing dirty parts.
VOC-9	Mogas Vapor Recovery Systems	Install a Stage II vapor recovery systemon vehicle fuel pumps to capture gasoline vapors that would escape into the atmosphere as vehicles are refueled.
VOC-10	Self-Priming Topcoat Polyurethanes	Self-priming topcoat polyurethanes are applied to parts without the need for a primer coating; therefore, only one coat of paint is needed.
VOC-11	Protective Coating for Aircraft	A protective coating is applied regularly to aircraft to protect the paint from dirt, grime, and friction, which reduces the need for touch-up painting.

4.2 OVERVIEW OF THE AFRC POLLUTION PREVENTION DATABASE

An integral part of this PPSP is the Pollution Prevention Database, which is provided on disk in Appendix C of this plan. The database contains numerous PPOs that have been, or could be, implemented at AFRC bases. It has been developed using Microsoft Access 97 database software, which is compatible with the computer systems at AFRC installations.

The intended users of the database are HQ AFRC/CEV, individual base CEV, Hazmart, Bioenvironmental Engineering, and the EPC/P2 Subcommittee. These users can query the database for extensive information about PPOs, including implementation strategies, vendors, and costs. One of the important features of the database is the shop-specific fields that allow the users to identify the PPOs being used or recommended at specific shops at other bases. The name and phone number of shop personnel are provided, as well as comments from shop personnel and discussion about the PPOs being used in the shop. Therefore, prior to implementing a PPO, personnel at one base can contact shop personnel at another base that is already using the PPO to get their opinion. For example, Corrosion Control Shop personnel at Minneapolis-St. Paul IAP-ARS use Safe-Strip paint gun cleaner (see PPO EPA-4) and are a great source information about this PPO. Personnel at other bases can contact Minneapolis-St. Paul IAP-ARS personnel to discuss the use of Safe-Strip.

The database also has a search feature that allows bases to search for PPOs using keywords. For example, if a base wants to check if there is an opportunity to reduce Styrofoam waste, they can type in the keywords "Styrofoam" or "packaging" and the database will open PPO MSW-8, Styrofoam Reduction and Recycling System.

Another feature of the database is a tracking function. HQ AFRC/CEV and bases will be able to use this function to track the progress of pollution prevention projects using the A-106 media number. It will provide a consistent method to estimate future project costs and to later compare these projections to actual costs.

A variety of reports can be generated by the database. Reports that can be generated and a brief description of what each report includes are listed below:

- PPO Listing – A report that displays all PPOs that are associated with an individual base. This report can be customized to show all bases, all status types, and all program areas, or any combination of specific and generic areas.

- PPO Narratives – This report generates the same PPO narratives that are included in the PPOA. This report can be customized in the same manor as the PPO Listing Report. It is expected that the PPO Narrative Report will be used during ECAMP surveys as a fact sheet that can be distributed to shop personnel.

- Show Actual Base Project Costs – This generates a report specific to a base that shows the actual costs associated with implementing PPOs. This report can be customized by showing all program areas, or showing only project costs associated with a specific program area.

- Summary of Areas/Shops – This report shows all information about a base's areas or shops. The report can be customized to show all bases or one specific base.

- POC Comments Associated with PPOs – Comments made by shop personnel regarding a PPO can be shown with this report. Comments for specific PPOs can be generated from the PPO input list or from the PPO input screen.

Additionally, those users that are proficient in Microsoft Access 97 can manipulate the data fields in the database to generate custom reports.

It is expected that the database will eventually become a "living" entity that is frequently updated with new information on PPOs, vendors, shops, etc. For this to occur, the database will probably be made available through the AFRC-wide area network sometime during the next couple years, and individual bases will be able to access the database using a password.

4.3 PROPOSED BUT NOT IMPLEMENTED PPOS FROM PREVIOUS POLLUTION PREVENTION EFFORTS

Large reductions in waste generation and chemical usage have been achieved over the past several years through the implementation of key PPOs. These PPOs were implemented because they greatly contributed to pollution prevention goals and they required little effort to implement. Nevertheless, there are still several PPOs that have not been implemented for one reason or another. The PPOs that were recommended in previous pollution prevention plans but not implemented are discussed in this subsection. The reasons that bases did not implement a particular PPO are provided. One common reason is that many of the bases do not have the time or the resources to effectively research the potential environmental benefit of all recommended PPOs. Another reason is simply that the PPOs were not practical. There are several reasons why a PPO may be considered impractical, including:

- PPO did not contribute to pollution prevention goals
- Personnel are unwilling or are hesitant to change to new process
- PPO will not work due to climatic or other base-specific conditions
- No local market or means available to implement PPO
- Cost of implementing PPO will far outweigh any environmental benefit realized
- Labor required to implement PPO will offset any environmental benefit.

Those PPOs that proved to be impractical or cost prohibitive will not be recommended in the new plan. Those PPOs that were not implemented for other reasons, but are still feasible, will continue to be recommended in the new plan. In addition, this plan recommends new opportunities that were not previously identified.

It should also be noted that a majority of the PPOs that were not implemented deal with reducing VOC emissions. Because goals and baselines have not been established for VOCs, there is little incentive to devote time and resources to research these PPOs.

Table 4-2 provides a list of PPOs that were recommended for the bases in previous plans but have not been implemented. The reasons for the PPOs not being implemented are also identified.

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Dobbins ARB	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Use of Plastic Bead Media Leasing	*The base is in the process of setting up a contract to use this technology; it is still recommended by this PPSP.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Incineration of VOC emissions	*Not practical nor cost effective*
General Mitchell IAP-ARS	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Leasing of Plastic Bead Media	*At present, this technology is not permitted by Wisconsin*
Record keeping of Painting Requirements	*Not practical*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Electric Lawn Maintenance Equipment	*Not practical or efficient*
Grissom ARB	
Reduce Paint Thinner Waste Through Distillation	*This PPO has been superceded by a new PPO that replaces thinners with an alternative paint gun cleaner (see PPO EPA-4).*
Install VOC Capture System for MOGAS Tanks	*Not practical or cost effective.*
Capture VOCs from Painting Operations	*Not practical or cost effective.*
Recover MOGAS Vapors	*Not practical or cost effective.*
Use Portable VOC Capture System	*Not practical or cost effective.*
Homestead ARS	
Record keeping of Painting Requirements	*Not practical.*
On-Site Antifreeze Recycling	*Not cost effective; very little waste antifreeze generated because of antifreeze testing procedures.*
Reduce Paint Thinner Waste Through Distillation	*This PPO has been superseded by a new PPO that replaces thinners with an alternative paint gun cleaner (see PPO EPA-4).*
Reduce Hydrazine Spill Residue	*Not practical and no obvious solutions.*
Install VOC Capture System for MOGAS Tanks	*Not practical or cost effective.*
Capture VOCs from Painting Operations	*Not practical or cost effective.*
Recover MOGAS Vapors	*Not practical or cost effective.*
Minneapolis-St. Paul IAP-ARS	
Recycling of Construction and	*This is still a viable PPO and continues to be recommended in this*

Demolition Waste	*PPSP.*

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts (continued)

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Minneapolis-St. Paul IAP-ARS (continued)	
Record keeping of Painting Requirements	*Not practical.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Use of Plastic Bead Media Leasing	*This is still a viable PPO and continues to be recommended in this PPSP.*
Incineration of VOC emissions	*Not practical or cost effective.*
Use of Electric Utility Vehicles	*Base personnel have been concerned that electric utility vehicles would not work well in cold weather, but they have proven to work well at other cold-weather bases and continue to be recommended by this PPSP.*
Pittsburgh IAP-ARS	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Willow Grove ARS	
Mercury Battery Recycling	*Not practical or cost effective.*
Incineration of VOC emissions	*Not practical or cost effective.*
Plastic Bead Media Leasing	*The base has not researched this opportunity yet, and it is still recommended by this PPSP.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Westover ARB	
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*
Incineration of VOC emissions	*Not practical or cost effective.*
Use of Electric Utility Vehicles	*Has not been researched enough by the base, and continues to be recommended by this PPSP.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts (continued)

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Youngstown ARS	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Burning Off-Spec JP-8 for Heat Value	*Not practical and it is messy. The base does not generate enough off-spec fuel for this PPO to be cost effective.*
Incineration of VOC emissions	*Not practical or cost effective.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*

NOTE: 1. Niagara Falls ARS and March ARB are not included in this table because their previous PPOAs were completed in 1997; therefore, it is too soon to monitor their progress towards implementing PPOs.

4.4 SUMMARY OF IMPLEMENTED PPOS

AFRC bases have been active for many years in developing and implementing PPOs. Implemented PPOs at AFRC bases include those involving process changes and substitutions, as well as those requiring purchase and operation of equipment.

This subsection summarizes implemented PPOs at AFRC bases through the use of tables. Table 4-3 lists the significant PPOs implemented at each base. The table lists the number and title for each implemented PPO. The reader can then use the Pollution Prevention Database (Appendix C) to find the description of the PPO and other important information. The full database descriptions and related information on the PPOs can be found in the PPOA (Appendix A).

Many of the implemented PPOs employ pollution prevention equipment. Table 4-4 lists the type and quantity of pollution prevention equipment present at each of the AFRC bases.

4.5 RECOMMENDED AND PLANNED PPOS

During the base site surveys, numerous potential PPOs were identified for waste streams and HAZMATs used at each AFRC base. These PPOs were initially drawn from past experience and through research of literature, the Internet, and DoD databases. As additional PPOs were identified during and after the site surveys, they were added as potential PPOs for AFRC bases.

The potential PPOs for each AFRC base were suggested to applicable shop, CEV, and other base personnel for their input and opinion about the feasibility of implementation. If these consultations did not identify any serious objections, then these PPOs were determined to be recommended PPOs and were detailed in the site visits outbriefings to base personnel. Some of the PPOs had already been identified by base personnel and have been planned for implementation. These PPOs are also included as recommended PPOs in the section.

Table 4-3. Significant PPOs Implemented at AFRC Bases

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Municipal Solid Waste												
MSW-1	On-Base Recycle Center	x		x	x	x				x		
MSW-3	Quarterly Dumpster Inspections			x			x				x	
MSW-4	On-Base Recycling of Wood, Asphalt, and Concrete			x								x
MSW-5	Off-Base Recycling of Sand Applied to Roads in Winter									x		
MSW-7	Food Waste Processors									x		
MSW-9	Construction and Demolition Waste	x		x								
Hazardous Waste												
HW-5	Plastic Bead Media Leasing			x	x							x
HW-6	Selective Paint Filter Replacement				x							
HW-7	Use of Dissolvable Styrofoam Paint Booth Filters									x		
HW-8	Bicarbonate of Soda Paint Stripping and Parts Cleaning	x			x	x	x					
HW-10	Aqueous Jet Washer Waste Disposal						x					x
Industrial Waste												
IW-1	Improved Absorbent Management				x							x
IW-2	Absorbent Reconditioning Program	x										
IW-3	Antifreeze Testing and Recycling	x	x	x	x	x	x		x	x	x	x
IW-4	Motor Oil Testing	x			x		x					x
IW-5	Shop Rag Laundering	x	x	x	x	x	x	x	x	x	x	x
IW-6	Use of Rechargeable Batteries	x				x	x		x			x
IW-7	Dryer for Fuel Contaminated Absorbent				x							
IW-8	Microbial Breakdown of Petroleum Products		x									
EPA-17 Chemicals												
EPA-2	Substitute for MEK in Fuel Cell Shop	x						x		x		
EPA-4	Alternative Paint Gun Cleaner						x					
EPA-5	Use Marking Inks in Place of Spray Paints										x	
Volatile Organic Compounds												
VOC-1	Compressed Natural Gas (and Propane) Vehicles	x	x	x		x	x				x	
VOC-2	Electric Vehicles	x				x						
VOC-3	Electric Utility Carts		x		x	x		x	x		x	x
VOC-4	Vinyl Lettering Machine	x	x	x	x	x	x	x	x	x	x	x
VOC-6	Electrostatic Paint Spray System				x		x					
VOC-7	Reduce/Eliminate Solvent Tanks	x								x		x
VOC-8	Aqueous Parts Washers	x	x	x	x	x	x	x	x	x	x	x
VOC-9	Mogar Vapor Recovery System										x	

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases

BASE	BUILDING NO. / LOCATION	EQUIPMENT
DOB	501 – CE Paint Shop	Vinyl Lettering Machine
	516 – Vehicle Maintenance	Bioremediating Parts Washer
	516 – Vehicle Maintenance	Aqueous Brake Cleaning Machine
	516 – Vehicle Maintenance	Aqueous Jet Washer
	516 – Vehicle Maintenance	Antifreeze Recycler
	530 – Base Exchange	Cardboard Bailer
	555 – GA ARNG	Bioremediating Parts Washer
	731 – Corrosion Control	Aqueous Jet Washer
	731 – Corrosion Control	HVLP Paint Guns
	731/741 – Corrosion Control	Vinyl Lettering Machine
	746 – Wheel and Tire Shop	Aqueous Jet Washer
	829 Counter Drug Logistics	Aqueous Jet Washer
	910 – 283 Power Pro	Vinyl Lettering Machine
	965 – 283 Vehicle Maintenance	Aqueous Jet Washer
	965 – 283 Vehicle Maintenance	Antifreeze Recycler
	1011 – Army Reserve Maintenance	Bioremediating Parts Washer
	Basewide	Electric Vehicles (25)
	Basewide	CNG Vehicles (12)
	Firing Range	Bullet Trap
GMT	104 – Vehicle Maintenance	Bioremediating Parts Washer
	104 – Vehicle Maintenance	Aqueous Jet Washer
	104 – Vehicle Maintenance	Antifreeze Recycler
	217 – Corrosion Control	HVLP Paint Guns
	217 – Corrosion Control	Vinyl Lettering Machine
	219 – AGE	Antifreeze Recycler
	222 – Wheel and Tire	Aqueous Jet Washer
	501 – CE Paint Shop	Vinyl Lettering Machine
	Basewide	CNG Vehicles (10)
	Basewide	Electric Utility Carts (2)
GRI	209 - Base Supply	Cardboard Baler
	221 – Base Civil Engineering	Antifreeze Recycler
	421 – Vehicle Maintenance	Antifreeze Recycler
	426 – Hydraulics	Aqueous Jet Washer
	453 – Corrosion Control	Vinyl Lettering Machine
	453 – Corrosion Control	HVLP Spray Guns
	687 – Recycling Facility	Can Crusher
	687 – Recycling Facility	Drum Compactor
	687 – Recycling Facility	Bailer
	Basewide	CNG Vehicles (18)

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
HOM	191 – Flightline Maintenance	Absorbent Pad Wringer
	192 – Armament	Aqueous Jet Washer
	193 – Corrosion Control	Electrostatic Paint Sprayer
	193 – Corrosion Control	HVLP Paint Guns
	193 – Corrosion Control	Drum Compactor
	194 – Wheel and Tire	Aqueous Jet Washer
	200 – AGE	Vinyl Lettering Machine
	203 - Firing Range	Bullet Trap
	232 – Power Pro	Oil Analyzer
	248 - Munitions	Aqueous Parts Washer
	307 – Refueler Maintenance	Aqueous Parts Washer
	312 – Vehicle Maintenance	Aqueous Parts Washer
	312 – Vehicle Maintenance	Aqueous Brake Cleaning Machine
	312 – Vehicle Maintenance	Oil Analyzer
	312 – Vehicle Maintenance	Bioremediating Parts Washer (Not in Use)
	343 – Recycling Center	Bailer
	820 – Base Exchange	Cardboard Baler
	874 – Florida Air National Guard	Vinyl Lettering Machine
	874 – Florida Air National Guard	Oil Analyzer
	4709 - Washrack	Bicarbonate of Soda Stripping Machine
	Basewide	Propane Converted Vehicles (18)
	Basewide	Electric Utility Carts (many)
MAR	2272 – Wheel and Tire	Aqueous Parts Washer
	2274 – ANG Vehicle Maintenance	Aqueous Parts Washer
	2274 – ANG Vehicle Maintenance	HVLP Paint Guns
	2315 – ANG Corrosion Control	Vinyl Lettering Machine
	2320 – Propulsion Shop	Aqueous Jet Washer
	2500 – Vehicle Maintenance	Aqueous Parts Washers (3)
	2500 – Vehicle Maintenance	Antifreeze Recycler
	440 – AGE	Antifreeze Recycler
	440 – AGE	Vinyl Lettering Machine
	453 – Corrosion Control	Vinyl Lettering Machine
	453 – Corrosion Control	HVLP Paint Guns
	RRP Yard	Cardboard Baler
	Basewide	CNG Vehicles (20)
	Basewide	Electric Vehicles (10)
	Basewide	Methanol Vehicles (8)

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
MSP	662 – ANG Vehicle Maintenance	Aqueous Parts Washer
	662 – ANG Vehicle Maintenance	Aqueous Brake Cleaning Machine
	745 – Vehicle Maintenance	Aqueous Parts Washer
	745 – Vehicle Maintenance	Antifreeze Recycler
	751 – Base Exchange	Cardboard Baler
	813 – Corrosion Control	Electrostatic Paint Sprayer
	813 – Corrosion Control	HVLP Paint Guns
	822 – NDI	Vinyl Lettering Machine
	822 – Propulsion	Aqueous Parts Washer
	Firing Range	Bullet Trap System
	Basewide	CNG Vehicle (7)
NFS	620 – Vehicle Maintenance	Bioremediating Parts Washer
	706 – AGE	Bioremediating Parts Washer
	706 – AGE	Vinyl Lettering Machine
	850 – Phase Dock	Vinyl Lettering Machine
	850 – Pneudraulics	Aqueous Jet Washer
	850 – R&R Shop	Aqueous Jet Washer
	854 – Corrosion Control	HVLP Paint Guns
	854 – Corrosion Control	Bicarbonate of Soda Paint Stripper
	920 – ANG Vehicle Maintenance	HVLP Paint Guns
	Basewide	Electric Utility Vehicles (2)
PIT	127 – Avionics	Vinyl Lettering Machine
	129 – Pneudraulics	Aqueous Jet Washer
	306 – Vehicle Maintenance	Antifreeze Recycler
	319	Drum Crusher
	333	Airless Paint Stripping Machine
	333	Rechargeable Batteries
	411 – Propulsion	Aqueous Jet Washer
	416 – Corrosion Control	HVLP Paint Guns
	417 – ISO Dock	Aqueous Jet Washer
	420 – AGE	Aqueous Jet Washer
	Basewide	Wood Shredder
	Basewide	Electric Utility Carts (6)
WST	6640 – Club	Industrial Food Grinder
	7000 – Pneudraulics	Aqueous Jet Washer
	7000 – Wheel and Tire	Aqueous Jet Washer
	7071 – AGE	Vinyl Lettering Machine
	7072 – Corrosion Control	HVLP Paint Guns
	7072 – Corrosion Control	Aqueous Jet Washer
	7073 – Vehicle Maintenance	Aqueous Jet Washer
	7073 – Vehicle Maintenance	Oil Analyzer
	7073 – Vehicle Maintenance	HVLP Paint Guns
	7073 – Vehicle Maintenance	Bioremediating Parts Washer

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
WIL	201 – AGE	Antifreeze Recycler
	201 – AGE	Aqueous Jet Washer
	201 – Corrosion Control	Vinyl Lettering Machine
	229 – Propulsion	Aqueous Jet Washer
	237 – Vehicle Maintenance	Aqueous Jet Washer
	320 – ANG Engine Shop	Aqueous Parts Washer
	320 – ANG Pneudraulics	Aqueous Jet Washer
	320 – ANG Structural Maintenance	Vinyl Lettering Machine
	320 – Munitions Corrosion Control	HVLP Paint Guns
	348 – ANG Corrosion Control	HVLP Paint Guns
	348 – ANG Corrosion Control	Aqueous Jet Washer
	370 – Munitions	Bioremediating Parts Washer
	Basewide	CNG Vehicles (5)
	Basewide	Electric Golf Carts (4)
YNG	301 – AGE	Absorbent Rag Wringer
	301 – AGE	Antifreeze Recycle Unit
	301 – Engine Shop	Aqueous Jet Washer
	305 – Corrosion Control	HVLP Paint Guns
	511 – CE Paint Shop	Vinyl Lettering Machine
	Firing Range	Bullet Trap
	Basewide	Electric Utility Carts (10)
	Basewide	Wood Shredder
	Basewide	Vinyl Lettering Machine

This subsection summarizes recommended and planned PPOs for AFRC bases through the use of one large table. Table 4-5 provides a list of the significant PPOs recommended for each base. The table lists the number and title for each recommended PPO, along with a brief description. The reader can find more detailed information about each PPO in the PPOA in Appendix A of this plan or by accessing the Pollution Prevention Database.

The final component of this subsection provides a detailed listing of all the PPOs recommended at each base. Tables 4-6 through 4-16 identify the specific shops where PPOs are recommended or planned. These tables also compile the specific costs associated with the recommendations for each shop and the entire base. The costs are broken into two categories: capital costs and annual costs/savings. The capital costs are the initial costs associated with purchasing and installing a PPO. The annual cost/savings are the expected costs of operation, maintenance, and repair of the equipment, less the annual savings associated with implementing the PPO (e.g., lower disposal costs). The capital and annual costs are totaled at the end of the table. Except where noted in the footnotes, the costs presented in this table are generic costs based on an average sized AFRC installation.

Table 4-5. Recommended and Planned PPOs at AFRC Bases

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Municipal Solid Waste												
MSW-1	On-Base Recycle Center	x										
MSW-2	Improve MSW Recycling Program	x	x		x	x	x	x	x	x	x	x
MSW-3	Quarterly Dumpster Inspections	x	x		x	x		x	x	x		x
MSW-4	On-Base Recycling of Wood, Asphalt, and Concrete	x			x	x	x	x				
MSW-5	Off-Base Recycling of Sand Applied to Roads in Winter		x	x				x	x			
MSW-6	Composting of Yard Wastes	x		x	x	x	x	x		x		
MSW-7	Food Waste Processors	x	x	x	x	x	x	x	x			
MSW-8	Styrofoam Reduction and Recycling System		x									
MSW-9	Construction and Demolition Waste Recycling		x		x	x	x	x	x	x	x	x
Hazardous Waste												
HW-1	Encapsulating Absorbents for Spill Clean-Up		x	x	x	x	x	x	x	x	x	x
HW-2	Efficient Oil/Water Separator Management	x	x	x	x	x		x	x	x	x	
HW-3	Reuse of JP-8 Aircraft Fuel				x							
HW-4	Improve Gas Mask Canister Management	x	x	x	x	x	x	x		x		x
HW-5	Plastic Bead Media Leasing	x				x		x	x	x	x	
HW-6	Selective Paint Filter Replacement	x	x	x		x	x	x	x	x	x	x
HW-7	Use of Dissolvable Styrofoam Paint Booth Filters	x	x	x	x	x	x	x	x	x		x

Table 4-5. Recommended and Planned PPOs at AFRC Bases (continued)

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Hazardous Waste (continued)												
HW-9	Segregation of Wastes at the C-130 Propulsion/Engine Shop						x					
HW-10	Aqueous Jet Washer Waste Disposal	x	x	x	x	x		x	x	x	x	
Industrial Waste												
IW-1	Improved Absorbent Management		x	x	x	x	x	x	x	x	x	x
IW-2	Absorbent Reconditioning Program		x	x	x		x	x	x	x	x	x
IW-3	Antifreeze Testing and Recycling							x			x	
IW-4	Motor Oil Testing	x	x	x		x	x	x	x	x	x	x
IW-6	Use of Rechargeable Batteries		x	x	x			x		x	x	x
IW-7	Dryer for Fuel Contaminated Absorbent	x	x	x		x	x	x	x	x	x	x
IW-8	Microbial Breakdown of Petroleum Products	x		x	x	x	x	x	x	x	x	x
EPA-17 Chemicals												
EPA-1	Product Substitution Methodology	x	x	x	x	x	x	x	x	x	x	x
EPA-2	Substitute for MEK in Fuel Cell Shop			x		x	x	x	x		x	x
EPA-3	Substitute for MEK in Corrosion Control Shops		x				x				x	
EPA-4	Alternative Paint Gun Cleaner	x	x	x	x	x	x	x	x	x	x	x
EPA-5	Use Marking Inks in Place of Spray Paints	x	x		x		x	x	x			x
EPA-6	Consolidate Paint Shops				x						x	
EPA-7	Include Base Tenants in the Hazmart Program	x			x		x			x		x

Table 4-5. Recommended and Planned PPOs at AFRC Bases (continued)

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
EPA-17 Chemicals (continued)												
EPA-8	Improved Hazmart Procedures	x			x	x			x	x	x	
Ozone Depleting Substances												
ODS-1	Refrigerant and Halon Substitutions	x	x	x	x	x	x	x	x	x	x	
ODS-2	ODS Equipment Survey and Leak Testing	x	x			x		x	x		x	
ODS-3	Substitute for Trichloroethane in C-130 Shops									x		
Pesticides												
PST-1	Implement Integrated Pest Management			x	x	x	x		x			x
PST-2	Fertilizer Reductions on Landscaped Areas	x	x				x					
Volatile Organic Compounds												
VOC-1	CNG (and Propane) Vehicles				x							
VOC-2	Electric Vehicles		x	x	x		x	x	x	x	x	
VOC-3	Electric Utility Carts and Bicycles		x	x			x	x		x	x	
VOC-4	Vinyl Lettering Machine		x				x					
VOC-5	Painter Training	x	x	x	x	x	x	x	x	x	x	x
VOC-7	Reduce/Eliminate Solvent Tanks	x	x	x	x	x	x	x	x	x	x	x
VOC-8	Aqueous Parts Washers		x	x	x		x		x		x	x
VOC-10	Self-Priming Topcoat Plyurethanes	x	x	x	x	x	x	x	x	x	x	x
VOC-11	Coating for Aircraft to Reduce Touch-Up Painting	x	x	x	x		x	x	x	x	x	x

Table 4-6. Recommended and Planned PPOs at Dobbins ARB: Shops and Costs

Table 4-7. Recommended and Planned PPOs at General Mitchell IAP-ARS: Shops and Costs

Table 4-8. Recommended and Planned PPOs at Grissom ARB: Shops and Costs

Table 4-9. Recommended and Planned PPOs at Homestead ARS: Shops and Costs

Table 4-10. Recommended and Planned PPOs at March ARB: Shops and Costs

Table 4-11. Recommended and Planned PPOs at Minneapolis-St. Paul IAP-ARS: Shops and Costs

Table 4-12. Recommended and Planned PPOs at Niagara Falls ARS: Shops and Costs

Table 4-13. Recommended and Planned PPOs at Pittsburgh IAP-ARS: Shops and Costs

Table 4-14. Recommended and Planned PPOs at Westover ARB: Shops and Costs

Table 4-15. Recommended and Planned PPOs at Willow Grove ARS: Shops and Costs

Table 4-16. Recommended and Planned PPOs at Youngstown ARS: Shops and Costs

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Table 4-16. Recommended and Planned PPOs at Youngstown ARS: Shops and Costs

Table 4-15. Recommended and Planned PPOs at Willow Grove ARS: Shops and Costs

Table 4-14. Recommended and Planned PPOs at Westover ARB: Shops and Costs

Table 4-13. Recommended and Planned PPOs at Pittsburgh IAP-ARS: Shops and Costs

Table 4-12. Recommended and Planned PPOs at Niagara Falls ARS: Shops and Costs

Table 4-11. Recommended and Planned PPOs at Minneapolis-St. Paul IAP-ARS: Shops and Costs

Table 4-10. Recommended and Planned PPOs at March ARB: Shops and Costs

Table 4-9. Recommended and Planned PPOs at Homestead ARS: Shops and Costs

Table 4-8. Recommended and Planned PPOs at Grissom ARB: Shops and Costs

Table 4-7. Recommended and Planned PPOs at General Mitchell IAP-ARS: Shops and Costs

Table 4-6. Recommended and Planned PPOs at Dobbins ARB: Shops and Costs

Table 4-5. Recommended and Planned PPOs at AFRC Bases (continued)

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
EPA-17 Chemicals (continued)												
EPA-8	Improved Hazmart Procedures	x			x	x			x	x	x	
Ozone Depleting Substances												
ODS-1	Refrigerant and Halon Substitutions	x	x	x	x	x	x	x	x	x	x	
ODS-2	ODS Equipment Survey and Leak Testing	x	x			x		x	x		x	
ODS-3	Substitute for Trichloroethane in C-130 Shops									x		
Pesticides												
PST-1	Implement Integrated Pest Management			x	x	x	x		x			x
PST-2	Fertilizer Reductions on Landscaped Areas	x	x				x					
Volatile Organic Compounds												
VOC-1	CNG (and Propane) Vehicles				x							
VOC-2	Electric Vehicles		x	x	x		x	x	x	x	x	
VOC-3	Electric Utility Carts and Bicycles		x	x			x	x		x	x	
VOC-4	Vinyl Lettering Machine		x				x					
VOC-5	Painter Training	x	x	x	x	x	x	x	x	x	x	x
VOC-7	Reduce/Eliminate Solvent Tanks	x	x	x	x	x	x	x	x	x	x	x
VOC-8	Aqueous Parts Washers		x	x	x		x		x		x	x
VOC-10	Self-Priming Topcoat Plyurethanes	x	x	x	x	x	x	x	x	x	x	x
VOC-11	Coating for Aircraft to Reduce Touch-Up Painting	x	x	x	x		x	x	x	x	x	x

Table 4-5. Recommended and Planned PPOs at AFRC Bases (continued)

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Hazardous Waste (continued)												
HW-9	Segregation of Wastes at the C-130 Propulsion/Engine Shop						x					
HW-10	Aqueous Jet Washer Waste Disposal	x	x	x	x	x		x	x	x	x	
Industrial Waste												
IW-1	Improved Absorbent Management		x	x	x	x	x	x	x	x	x	x
IW-2	Absorbent Reconditioning Program		x	x	x		x	x	x	x	x	x
IW-3	Antifreeze Testing and Recycling							x			x	
IW-4	Motor Oil Testing	x	x	x		x	x	x	x	x	x	x
IW-6	Use of Rechargeable Batteries		x	x	x			x		x	x	x
IW-7	Dryer for Fuel Contaminated Absorbent	x	x	x		x	x	x	x	x	x	x
IW-8	Microbial Breakdown of Petroleum Products	x		x	x	x	x	x	x	x	x	x
EPA-17 Chemicals												
EPA-1	Product Substitution Methodology	x	x	x	x	x	x	x	x	x	x	x
EPA-2	Substitute for MEK in Fuel Cell Shop			x		x	x	x	x		x	x
EPA-3	Substitute for MEK in Corrosion Control Shops		x				x				x	
EPA-4	Alternative Paint Gun Cleaner	x	x	x	x	x	x	x	x	x	x	x
EPA-5	Use Marking Inks in Place of Spray Paints	x	x		x		x	x	x			x
EPA-6	Consolidate Paint Shops				x						x	
EPA-7	Include Base Tenants in the Hazmart Program	x			x		x			x		x

Table 4-5. Recommended and Planned PPOs at AFRC Bases

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Municipal Solid Waste												
MSW-1	On-Base Recycle Center	x										
MSW-2	Improve MSW Recycling Program	x	x		x	x	x	x	x	x	x	x
MSW-3	Quarterly Dumpster Inspections	x	x		x	x		x	x	x		x
MSW-4	On-Base Recycling of Wood, Asphalt, and Concrete	x			x	x	x	x				
MSW-5	Off-Base Recycling of Sand Applied to Roads in Winter		x	x				x	x			
MSW-6	Composting of Yard Wastes	x		x	x	x	x	x		x		
MSW-7	Food Waste Processors	x	x	x	x	x	x	x	x			
MSW-8	Styrofoam Reduction and Recycling System		x									
MSW-9	Construction and Demolition Waste Recycling		x		x	x	x	x	x	x	x	x
Hazardous Waste												
HW-1	Encapsulating Absorbents for Spill Clean-Up		x	x	x	x	x	x	x	x	x	x
HW-2	Efficient Oil/Water Separator Management	x	x	x	x	x		x	x	x	x	
HW-3	Reuse of JP-8 Aircraft Fuel				x							
HW-4	Improve Gas Mask Canister Management	x	x	x	x	x	x	x		x		x
HW-5	Plastic Bead Media Leasing	x				x		x	x	x	x	
HW-6	Selective Paint Filter Replacement	x	x	x		x	x	x	x	x	x	x
HW-7	Use of Dissolvable Styrofoam Paint Booth Filters	x	x	x	x	x	x	x	x	x		x

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
WIL	201 – AGE	Antifreeze Recycler
	201 – AGE	Aqueous Jet Washer
	201 – Corrosion Control	Vinyl Lettering Machine
	229 – Propulsion	Aqueous Jet Washer
	237 – Vehicle Maintenance	Aqueous Jet Washer
	320 – ANG Engine Shop	Aqueous Parts Washer
	320 – ANG Pneudraulics	Aqueous Jet Washer
	320 – ANG Structural Maintenance	Vinyl Lettering Machine
	320 – Munitions Corrosion Control	HVLP Paint Guns
	348 – ANG Corrosion Control	HVLP Paint Guns
	348 – ANG Corrosion Control	Aqueous Jet Washer
	370 – Munitions	Bioremediating Parts Washer
	Basewide	CNG Vehicles (5)
	Basewide	Electric Golf Carts (4)
YNG	301 – AGE	Absorbent Rag Wringer
	301 – AGE	Antifreeze Recycle Unit
	301 – Engine Shop	Aqueous Jet Washer
	305 – Corrosion Control	HVLP Paint Guns
	511 – CE Paint Shop	Vinyl Lettering Machine
	Firing Range	Bullet Trap
	Basewide	Electric Utility Carts (10)
	Basewide	Wood Shredder
	Basewide	Vinyl Lettering Machine

This subsection summarizes recommended and planned PPOs for AFRC bases through the use of one large table. Table 4-5 provides a list of the significant PPOs recommended for each base. The table lists the number and title for each recommended PPO, along with a brief description. The reader can find more detailed information about each PPO in the PPOA in Appendix A of this plan or by accessing the Pollution Prevention Database.

The final component of this subsection provides a detailed listing of all the PPOs recommended at each base. Tables 4-6 through 4-16 identify the specific shops where PPOs are recommended or planned. These tables also compile the specific costs associated with the recommendations for each shop and the entire base. The costs are broken into two categories: capital costs and annual costs/savings. The capital costs are the initial costs associated with purchasing and installing a PPO. The annual cost/savings are the expected costs of operation, maintenance, and repair of the equipment, less the annual savings associated with implementing the PPO (e.g., lower disposal costs). The capital and annual costs are totaled at the end of the table. Except where noted in the footnotes, the costs presented in this table are generic costs based on an average sized AFRC installation.

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
MSP	662 – ANG Vehicle Maintenance	Aqueous Parts Washer
	662 – ANG Vehicle Maintenance	Aqueous Brake Cleaning Machine
	745 – Vehicle Maintenance	Aqueous Parts Washer
	745 – Vehicle Maintenance	Antifreeze Recycler
	751 – Base Exchange	Cardboard Baler
	813 – Corrosion Control	Electrostatic Paint Sprayer
	813 – Corrosion Control	HVLP Paint Guns
	822 – NDI	Vinyl Lettering Machine
	822 – Propulsion	Aqueous Parts Washer
	Firing Range	Bullet Trap System
	Basewide	CNG Vehicle (7)
NFS	620 – Vehicle Maintenance	Bioremediating Parts Washer
	706 – AGE	Bioremediating Parts Washer
	706 – AGE	Vinyl Lettering Machine
	850 – Phase Dock	Vinyl Lettering Machine
	850 – Pneudraulics	Aqueous Jet Washer
	850 – R&R Shop	Aqueous Jet Washer
	854 – Corrosion Control	HVLP Paint Guns
	854 – Corrosion Control	Bicarbonate of Soda Paint Stripper
	920 – ANG Vehicle Maintenance	HVLP Paint Guns
	Basewide	Electric Utility Vehicles (2)
PIT	127 – Avionics	Vinyl Lettering Machine
	129 – Pneudraulics	Aqueous Jet Washer
	306 – Vehicle Maintenance	Antifreeze Recycler
	319	Drum Crusher
	333	Airless Paint Stripping Machine
	333	Rechargeable Batteries
	411 – Propulsion	Aqueous Jet Washer
	416 – Corrosion Control	HVLP Paint Guns
	417 – ISO Dock	Aqueous Jet Washer
	420 – AGE	Aqueous Jet Washer
	Basewide	Wood Shredder
	Basewide	Electric Utility Carts (6)
WST	6640 – Club	Industrial Food Grinder
	7000 – Pneudraulics	Aqueous Jet Washer
	7000 – Wheel and Tire	Aqueous Jet Washer
	7071 – AGE	Vinyl Lettering Machine
	7072 – Corrosion Control	HVLP Paint Guns
	7072 – Corrosion Control	Aqueous Jet Washer
	7073 – Vehicle Maintenance	Aqueous Jet Washer
	7073 – Vehicle Maintenance	Oil Analyzer
	7073 – Vehicle Maintenance	HVLP Paint Guns
	7073 – Vehicle Maintenance	Bioremediating Parts Washer

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases (continued)

BASE	LOCATION	EQUIPMENT
HOM	191 – Flightline Maintenance	Absorbent Pad Wringer
	192 – Armament	Aqueous Jet Washer
	193 – Corrosion Control	Electrostatic Paint Sprayer
	193 – Corrosion Control	HVLP Paint Guns
	193 – Corrosion Control	Drum Compactor
	194 – Wheel and Tire	Aqueous Jet Washer
	200 – AGE	Vinyl Lettering Machine
	203 - Firing Range	Bullet Trap
	232 – Power Pro	Oil Analyzer
	248 - Munitions	Aqueous Parts Washer
	307 – Refueler Maintenance	Aqueous Parts Washer
	312 – Vehicle Maintenance	Aqueous Parts Washer
	312 – Vehicle Maintenance	Aqueous Brake Cleaning Machine
	312 – Vehicle Maintenance	Oil Analyzer
	312 – Vehicle Maintenance	Bioremediating Parts Washer (Not in Use)
	343 – Recycling Center	Bailer
	820 – Base Exchange	Cardboard Baler
	874 – Florida Air National Guard	Vinyl Lettering Machine
	874 – Florida Air National Guard	Oil Analyzer
	4709 - Washrack	Bicarbonate of Soda Stripping Machine
	Basewide	Propane Converted Vehicles (18)
	Basewide	Electric Utility Carts (many)
MAR	2272 – Wheel and Tire	Aqueous Parts Washer
	2274 – ANG Vehicle Maintenance	Aqueous Parts Washer
	2274 – ANG Vehicle Maintenance	HVLP Paint Guns
	2315 – ANG Corrosion Control	Vinyl Lettering Machine
	2320 – Propulsion Shop	Aqueous Jet Washer
	2500 – Vehicle Maintenance	Aqueous Parts Washers (3)
	2500 – Vehicle Maintenance	Antifreeze Recycler
	440 – AGE	Antifreeze Recycler
	440 – AGE	Vinyl Lettering Machine
	453 – Corrosion Control	Vinyl Lettering Machine
	453 – Corrosion Control	HVLP Paint Guns
	RRP Yard	Cardboard Baler
	Basewide	CNG Vehicles (20)
	Basewide	Electric Vehicles (10)
	Basewide	Methanol Vehicles (8)

Table 4-4. Major Pollution Prevention Equipment at AFRC Bases

BASE	BUILDING NO. / LOCATION	EQUIPMENT
DOB	501 – CE Paint Shop	Vinyl Lettering Machine
	516 – Vehicle Maintenance	Bioremediating Parts Washer
	516 – Vehicle Maintenance	Aqueous Brake Cleaning Machine
	516 – Vehicle Maintenance	Aqueous Jet Washer
	516 – Vehicle Maintenance	Antifreeze Recycler
	530 – Base Exchange	Cardboard Bailer
	555 – GA ARNG	Bioremediating Parts Washer
	731 – Corrosion Control	Aqueous Jet Washer
	731 – Corrosion Control	HVLP Paint Guns
	731/741 – Corrosion Control	Vinyl Lettering Machine
	746 – Wheel and Tire Shop	Aqueous Jet Washer
	829 Counter Drug Logistics	Aqueous Jet Washer
	910 – 283 Power Pro	Vinyl Lettering Machine
	965 – 283 Vehicle Maintenance	Aqueous Jet Washer
	965 – 283 Vehicle Maintenance	Antifreeze Recycler
	1011 – Army Reserve Maintenance	Bioremediating Parts Washer
	Basewide	Electric Vehicles (25)
	Basewide	CNG Vehicles (12)
	Firing Range	Bullet Trap
GMT	104 – Vehicle Maintenance	Bioremediating Parts Washer
	104 – Vehicle Maintenance	Aqueous Jet Washer
	104 – Vehicle Maintenance	Antifreeze Recycler
	217 – Corrosion Control	HVLP Paint Guns
	217 – Corrosion Control	Vinyl Lettering Machine
	219 – AGE	Antifreeze Recycler
	222 – Wheel and Tire	Aqueous Jet Washer
	501 – CE Paint Shop	Vinyl Lettering Machine
	Basewide	CNG Vehicles (10)
	Basewide	Electric Utility Carts (2)
GRI	209 - Base Supply	Cardboard Baler
	221 – Base Civil Engineering	Antifreeze Recycler
	421 – Vehicle Maintenance	Antifreeze Recycler
	426 – Hydraulics	Aqueous Jet Washer
	453 – Corrosion Control	Vinyl Lettering Machine
	453 – Corrosion Control	HVLP Spray Guns
	687 – Recycling Facility	Can Crusher
	687 – Recycling Facility	Drum Compactor
	687 – Recycling Facility	Bailer
	Basewide	CNG Vehicles (18)

Table 4-3. Significant PPOs Implemented at AFRC Bases

POLLUTION PREVENTION OPPORTUNITY		BASE										
		DOB	GMT	GRI	HOM	MAR	MSP	NFS	PIT	WST	WIL	YNG
Municipal Solid Waste												
MSW-1	On-Base Recycle Center	x		x	x	x				x		
MSW-3	Quarterly Dumpster Inspections			x			x				x	
MSW-4	On-Base Recycling of Wood, Asphalt, and Concrete			x								x
MSW-5	Off-Base Recycling of Sand Applied to Roads in Winter									x		
MSW-7	Food Waste Processors									x		
MSW-9	Construction and Demolition Waste	x		x								
Hazardous Waste												
HW-5	Plastic Bead Media Leasing			x	x							x
HW-6	Selective Paint Filter Replacement				x							
HW-7	Use of Dissolvable Styrofoam Paint Booth Filters									x		
HW-8	Bicarbonate of Soda Paint Stripping and Parts Cleaning	x			x	x	x					
HW-10	Aqueous Jet Washer Waste Disposal						x					x
Industrial Waste												
IW-1	Improved Absorbent Management				x							x
IW-2	Absorbent Reconditioning Program	x										
IW-3	Antifreeze Testing and Recycling	x	x	x	x	x	x		x	x	x	x
IW-4	Motor Oil Testing	x			x		x					x
IW-5	Shop Rag Laundering	x	x	x	x	x	x	x	x	x	x	x
IW-6	Use of Rechargeable Batteries	x				x	x		x			x
IW-7	Dryer for Fuel Contaminated Absorbent				x							
IW-8	Microbial Breakdown of Petroleum Products		x									
EPA-17 Chemicals												
EPA-2	Substitute for MEK in Fuel Cell Shop	x						x		x		
EPA-4	Alternative Paint Gun Cleaner						x					
EPA-5	Use Marking Inks in Place of Spray Paints										x	
Volatile Organic Compounds												
VOC-1	Compressed Natural Gas (and Propane) Vehicles	x	x	x		x	x				x	
VOC-2	Electric Vehicles	x				x						
VOC-3	Electric Utility Carts		x		x	x		x	x		x	x
VOC-4	Vinyl Lettering Machine	x	x	x	x	x	x	x	x	x	x	x
VOC-6	Electrostatic Paint Spray System				x		x					
VOC-7	Reduce/Eliminate Solvent Tanks	x								x		x
VOC-8	Aqueous Parts Washers	x	x	x	x	x	x	x	x	x	x	x
VOC-9	Mogar Vapor Recovery System										x	

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts (continued)

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Youngstown ARS	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Burning Off-Spec JP-8 for Heat Value	*Not practical and it is messy. The base does not generate enough off-spec fuel for this PPO to be cost effective.*
Incineration of VOC emissions	*Not practical or cost effective.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*

NOTE: 1. Niagara Falls ARS and March ARB are not included in this table because their previous PPOAs were completed in 1997; therefore, it is too soon to monitor their progress towards implementing PPOs.

4.4 SUMMARY OF IMPLEMENTED PPOS

AFRC bases have been active for many years in developing and implementing PPOs. Implemented PPOs at AFRC bases include those involving process changes and substitutions, as well as those requiring purchase and operation of equipment.

This subsection summarizes implemented PPOs at AFRC bases through the use of tables. Table 4-3 lists the significant PPOs implemented at each base. The table lists the number and title for each implemented PPO. The reader can then use the Pollution Prevention Database (Appendix C) to find the description of the PPO and other important information. The full database descriptions and related information on the PPOs can be found in the PPOA (Appendix A).

Many of the implemented PPOs employ pollution prevention equipment. Table 4-4 lists the type and quantity of pollution prevention equipment present at each of the AFRC bases.

4.5 RECOMMENDED AND PLANNED PPOS

During the base site surveys, numerous potential PPOs were identified for waste streams and HAZMATs used at each AFRC base. These PPOs were initially drawn from past experience and through research of literature, the Internet, and DoD databases. As additional PPOs were identified during and after the site surveys, they were added as potential PPOs for AFRC bases.

The potential PPOs for each AFRC base were suggested to applicable shop, CEV, and other base personnel for their input and opinion about the feasibility of implementation. If these consultations did not identify any serious objections, then these PPOs were determined to be recommended PPOs and were detailed in the site visits outbriefings to base personnel. Some of the PPOs had already been identified by base personnel and have been planned for implementation. These PPOs are also included as recommended PPOs in the section.

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts (continued)

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Minneapolis-St. Paul IAP-ARS (continued)	
Record keeping of Painting Requirements	*Not practical.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Use of Plastic Bead Media Leasing	*This is still a viable PPO and continues to be recommended in this PPSP.*
Incineration of VOC emissions	*Not practical or cost effective.*
Use of Electric Utility Vehicles	*Base personnel have been concerned that electric utility vehicles would not work well in cold weather, but they have proven to work well at other cold-weather bases and continue to be recommended by this PPSP.*
Pittsburgh IAP-ARS	
Recycling of Construction and Demolition Waste	*This is still a viable PPO and continues to be recommended in this PPSP.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Willow Grove ARS	
Mercury Battery Recycling	*Not practical or cost effective.*
Incineration of VOC emissions	*Not practical or cost effective.*
Plastic Bead Media Leasing	*The base has not researched this opportunity yet, and it is still recommended by this PPSP.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*
Westover ARB	
Electric Lawn Maintenance Equipment	*Not practical or efficient.*
Conversion of Vehicles to CNG	*Conversions are not practical because there is no nearby source of CNG fuel.*
Incineration of VOC emissions	*Not practical or cost effective.*
Use of Electric Utility Vehicles	*Has not been researched enough by the base, and continues to be recommended by this PPSP.*
Use of an Electrostatic Spray Paint Gun	*No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.*

Demolition Waste	*PPSP.*

Table 4-2. Proposed But Not Implemented PPOs From Previous Pollution Prevention Efforts

PPO NAME	REASON FOR NOT IMPLEMENTING THE PPO
Dobbins ARB	
Recycling of Construction and Demolition Waste	This is still a viable PPO and continues to be recommended in this PPSP.
Use of Plastic Bead Media Leasing	The base is in the process of setting up a contract to use this technology; it is still recommended by this PPSP.
Use of an Electrostatic Spray Paint Gun	No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.
Incineration of VOC emissions	Not practical nor cost effective
General Mitchell IAP-ARS	
Recycling of Construction and Demolition Waste	This is still a viable PPO and continues to be recommended in this PPSP.
Leasing of Plastic Bead Media	At present, this technology is not permitted by Wisconsin
Record keeping of Painting Requirements	Not practical
Use of an Electrostatic Spray Paint Gun	No longer recommended for use on AFRC bases due to high cost, limited application, and the explosion hazard created by the unit.
Electric Lawn Maintenance Equipment	Not practical or efficient
Grissom ARB	
Reduce Paint Thinner Waste Through Distillation	This PPO has been superceded by a new PPO that replaces thinners with an alternative paint gun cleaner (see PPO EPA-4).
Install VOC Capture System for MOGAS Tanks	Not practical or cost effective.
Capture VOCs from Painting Operations	Not practical or cost effective.
Recover MOGAS Vapors	Not practical or cost effective.
Use Portable VOC Capture System	Not practical or cost effective.
Homestead ARS	
Record keeping of Painting Requirements	Not practical.
On-Site Antifreeze Recycling	Not cost effective; very little waste antifreeze generated because of antifreeze testing procedures.
Reduce Paint Thinner Waste Through Distillation	This PPO has been superseded by a new PPO that replaces thinners with an alternative paint gun cleaner (see PPO EPA-4).
Reduce Hydrazine Spill Residue	Not practical and no obvious solutions.
Install VOC Capture System for MOGAS Tanks	Not practical or cost effective.
Capture VOCs from Painting Operations	Not practical or cost effective.
Recover MOGAS Vapors	Not practical or cost effective.
Minneapolis-St. Paul IAP-ARS	
Recycling of Construction and	This is still a viable PPO and continues to be recommended in this

- POC Comments Associated with PPOs – Comments made by shop personnel regarding a PPO can be shown with this report. Comments for specific PPOs can be generated from the PPO input list or from the PPO input screen.

Additionally, those users that are proficient in Microsoft Access 97 can manipulate the data fields in the database to generate custom reports.

It is expected that the database will eventually become a "living" entity that is frequently updated with new information on PPOs, vendors, shops, etc. For this to occur, the database will probably be made available through the AFRC-wide area network sometime during the next couple years, and individual bases will be able to access the database using a password.

4.3 PROPOSED BUT NOT IMPLEMENTED PPOS FROM PREVIOUS POLLUTION PREVENTION EFFORTS

Large reductions in waste generation and chemical usage have been achieved over the past several years through the implementation of key PPOs. These PPOs were implemented because they greatly contributed to pollution prevention goals and they required little effort to implement. Nevertheless, there are still several PPOs that have not been implemented for one reason or another. The PPOs that were recommended in previous pollution prevention plans but not implemented are discussed in this subsection. The reasons that bases did not implement a particular PPO are provided. One common reason is that many of the bases do not have the time or the resources to effectively research the potential environmental benefit of all recommended PPOs. Another reason is simply that the PPOs were not practical. There are several reasons why a PPO may be considered impractical, including:

- PPO did not contribute to pollution prevention goals
- Personnel are unwilling or are hesitant to change to new process
- PPO will not work due to climatic or other base-specific conditions
- No local market or means available to implement PPO
- Cost of implementing PPO will far outweigh any environmental benefit realized
- Labor required to implement PPO will offset any environmental benefit.

Those PPOs that proved to be impractical or cost prohibitive will not be recommended in the new plan. Those PPOs that were not implemented for other reasons, but are still feasible, will continue to be recommended in the new plan. In addition, this plan recommends new opportunities that were not previously identified.

It should also be noted that a majority of the PPOs that were not implemented deal with reducing VOC emissions. Because goals and baselines have not been established for VOCs, there is little incentive to devote time and resources to research these PPOs.

Table 4-2 provides a list of PPOs that were recommended for the bases in previous plans but have not been implemented. The reasons for the PPOs not being implemented are also identified.

4.2 OVERVIEW OF THE AFRC POLLUTION PREVENTION DATABASE

An integral part of this PPSP is the Pollution Prevention Database, which is provided on disk in Appendix C of this plan. The database contains numerous PPOs that have been, or could be, implemented at AFRC bases. It has been developed using Microsoft Access 97 database software, which is compatible with the computer systems at AFRC installations.

The intended users of the database are HQ AFRC/CEV, individual base CEV, Hazmart, Bioenvironmental Engineering, and the EPC/P2 Subcommittee. These users can query the database for extensive information about PPOs, including implementation strategies, vendors, and costs. One of the important features of the database is the shop-specific fields that allow the users to identify the PPOs being used or recommended at specific shops at other bases. The name and phone number of shop personnel are provided, as well as comments from shop personnel and discussion about the PPOs being used in the shop. Therefore, prior to implementing a PPO, personnel at one base can contact shop personnel at another base that is already using the PPO to get their opinion. For example, Corrosion Control Shop personnel at Minneapolis-St. Paul IAP-ARS use Safe-Strip paint gun cleaner (see PPO EPA-4) and are a great source information about this PPO. Personnel at other bases can contact Minneapolis-St. Paul IAP-ARS personnel to discuss the use of Safe-Strip.

The database also has a search feature that allows bases to search for PPOs using keywords. For example, if a base wants to check if there is an opportunity to reduce Styrofoam waste, they can type in the keywords "Styrofoam" or "packaging" and the database will open PPO MSW-8, Styrofoam Reduction and Recycling System.

Another feature of the database is a tracking function. HQ AFRC/CEV and bases will be able to use this function to track the progress of pollution prevention projects using the A-106 media number. It will provide a consistent method to estimate future project costs and to later compare these projections to actual costs.

A variety of reports can be generated by the database. Reports that can be generated and a brief description of what each report includes are listed below:

- PPO Listing – A report that displays all PPOs that are associated with an individual base. This report can be customized to show all bases, all status types, and all program areas, or any combination of specific and generic areas.

- PPO Narratives – This report generates the same PPO narratives that are included in the PPOA. This report can be customized in the same manor as the PPO Listing Report. It is expected that the PPO Narrative Report will be used during ECAMP surveys as a fact sheet that can be distributed to shop personnel.

- Show Actual Base Project Costs – This generates a report specific to a base that shows the actual costs associated with implementing PPOs. This report can be customized by showing all program areas, or showing only project costs associated with a specific program area.

- Summary of Areas/Shops – This report shows all information about a base's areas or shops. The report can be customized to show all bases or one specific base.

Table 4-1. PPOs that are Existing, Planned, or Recommended at AFRC Bases (continued)

PPO NO.	PPO NAME	PPO DESCRIPTION
EPA-7	Include Base Tenants in the Hazmart Program	The Hazmart should begin handling all hazardous material inventory management operations and purchases for base tenants.
EPA-8	Improved Hazmart Procedures	Hazardous chemical usage and expired shelf-life wastes can be reduced by improving several Hazmart procedures.
Ozone Depleting Substances		
ODS-1	Refrigerant and Halon Substitutions	Substitute Class I ODSs with Class II ODSs or ODS-free materials in refrigerant or fire suppression systems.
ODS-2	ODS Equipment Survey and Leak Testing	Survey all ODS containing equipment to determine which equipment is not necessary and can be removed.
ODS-3	Substitute for Trichloroethane in C-130 Shops	Use isopropyl alcohol or another non-EPA-17 solvent instead of trichloroethane to wipe down aircraft parts.
Pesticides		
PST-1	Implement Integrated Pest Management	Control pests through a combination of biological, chemical, cultural, and physical control practices rather than solely using pesticides.
PST-2	Fertilizer Reductions on Landscaped Areas	Reduce fertilizer applications on lawns through improved landscaping techniques and an increased tolerance for an imperfect lawn.
Volatile Organic Compounds		
VOC-1	Compressed Natural Gas (and Propane) Vehicles	Eliminate VOC and other hazardous air emissions from gasoline and diesel powered vehicles by converting to dual-fuel gasoline/compressed natural gas vehicles.
VOC-2	Electric Vehicles	Eliminate VOC emissions from gasoline and diesel powered vehicles by converting to electric cars and trucks.
VOC-3	Electric Utility Carts and Bicycles	Prevent the emission of VOCs from gasoline-powered vehicles by using electric utility carts for transportation on-base.
VOC-4	Vinyl Lettering Machine	Use vinyl lettering to label and identify equipment, walls, and doors rather than using spray paints.
VOC-5	Painter Training	Train AFRC paint shop personnel to more efficiently perform their painting operations in an effort to reduce the amount of paint used and to lower VOC emissions and paint waste generation.
VOC-6	Electrostatic Paint Spray System	Use electrostatic painting equipment in place of conventional painting equipment.
VOC-7	Reduce/Eliminate Solvent Tanks	Remove all unnecessary solvent tanks and, where solvents are still needed, consolidate several tanks to one centrally-located tank.
VOC-8	Aqueous Parts Washers	Solvent-free, aqueous-based parts washers are used to replace solvent-based dip tanks for cleaning and degreasing dirty parts.
VOC-9	Mogas Vapor Recovery Systems	Install a Stage II vapor recovery systemon vehicle fuel pumps to capture gasoline vapors that would escape into the atmosphere as vehicles are refueled.
VOC-10	Self-Priming Topcoat Polyurethanes	Self-priming topcoat polyurethanes are applied to parts without the need for a primer coating; therefore, only one coat of paint is needed.
VOC-11	Protective Coating for Aircraft	A protective coating is applied regularly to aircraft to protect the paint from dirt, grime, and friction, which reduces the need for touch-up painting.

Table 4-1. PPOs that are Existing, Planned, or Recommended at AFRC Bases (continued)

PPO NO.	PPO NAME	PPO DESCRIPTION
HW-9	Segregation of Wastes at the C-130 Propulsion/Engine Shop	Segregate waste rags and absorbents used in the Propulsion/Engine Shop from the waste rags generated in other shops at the base. The Propulsion/Engine Shop rags can have trace levels of cadmium and need to be disposed of separately from other rags to reduce HW generation.
HW-10	Aqueous Jet Washer Waste Disposal	This PPO provides numerous alternatives for reducing the amount of hazardous waste generated from aqueous-based jet washers.
Industrial Waste		
IW-1	Improved Absorbent Management	Sound absorbent management practices can significantly reduce the amount of waste absorbent generated in a shop.
IW-2	Absorbent Reconditioning Program	Used absorbent pads and rags can be collected and processed under an absorbent reconditioning program. The absorbents are cleaned at the reconditioning facility and are distributed for reuse.
IW-3	Antifreeze Testing and Recycling	Antifreeze testing and antifreeze recycling units can be used in shops where a significant amount of antifreeze is changed out each year. The recycling unit processes waste antifreeze, separating water and other impurities from the antifreeze mixture. The processed antifreeze can then be reused.
IW-4	Motor Oil Testing	Use an oil analyzer in shops where oil and other lubricating fluids are changed out. The analyzer can detect if the oil is still serviceable, thereby permitting longer intervals between oil changes.
IW-5	Shop Rag Laundering	A majority of industrial shops use rags to wipe down greasy or oily equipment. The used shop rags are collected and replaced with newly laundered rags on an as-needed basis.
IW-6	Use of Rechargeable Batteries	Use a rechargeable alkaline battery system in place of disposable alkaline batteries. The use of rechargeable batteries will significantly reduce battery purchase costs as well as battery disposal costs and amounts.
IW-7	Dryer for Fuel Contaminated Absorbent	Fuel contaminated absorbent is put in a dryer unit which draws air through the absorbent to remove the volatile organics and water in the absorbent. The absorbent can then be reused.
IW-8	Microbial Breakdown of Petroleum Products	Microbial-based detergents are applied to petroleum spills or added to oil/water separators to breakdown the petroleum, essentially making the petroleum disappear.
EPA-17 Chemicals		
EPA-1	Product Substitution Methodology	This PPO provides the methodology needed to identify processes that are using hazardous materials so they can be replaced with non-hazardous substitute products.
EPA-2	Substitute for MEK in Fuel Cell Shop	Replace MEK with a less hazardous substitute at fuel cell repair shops.
EPA-3	Substitute for MEK in Corrosion Control Shops	Use non-EPA-17 chemical containing products to wipe down parts prior to painting in corrosion control shops.
EPA-4	Alternative Paint Gun Cleaner	Use N-Methyl-2-Pyrrolidone or mineral spirits to clean paint guns at the paint shop, instead of using EPA-17 containing solvents like methylene chloride and MEK.
EPA-5	Use Marking Inks in Place of Spray Paints	Use a non-EPA-17 marking ink in place of spray paints for marking and stenciling.
EPA-6	Consolidate Paint Shops	Some bases have three or more paint shops. Numerous environmental benefits could be achieved by closing the under-used paint shops and consolidating their activities.

5.0 BASE-SPECIFIC DISCUSSIONS

Many of the preceding discussions have focused on program areas and the AFRC as a whole Command. Individual discussions about particular bases have been presented as examples under program areas or within PPO discussions. This section presents base-specific discussions of the pollution prevention programs and metrics for all 11 AFRC bases. Subsections 5.1 through 5.11 provide the individual base discussions including:

- The status of the pollution prevention program and whether program area goals have been met
- Problems with baseline figures
- Explanations for significant anomalies
- Successful existing and recommended PPOs.

5.1 DOBBINS ARB (DOB)

5.1.1 Municipal Solid Waste (DOB)

Dobbins ARB met the 1993 goal of 10 percent reduction in MSW disposed. However, the base has not met the 1996 (30 percent) and 1997 (50 percent) reduction goals for reduction of MSW disposed. As shown in Table 3-2, Dobbins ARB achieved a 13 percent reduction in 1993; a 23 percent reduction in 1996; and a 24 percent reduction in 1997.

The major reason for not meeting these goals is the very low baseline figure developed for the base. The baseline figure did not include tenants that are now included in the MSW figures reported by the base. In addition, the baseline figure was based on an engineering estimate of 1,000 lbs. per dumpster. However, the actual dumpster weights have been determined to be typically between 1,400 and 1,800 pounds. These two major factors resulted in a baseline figure that was far less than what actually occurred, and this is making year-to-year comparisons difficult, especially now that tenants are included in the metrics.

The potential anomalies cited in the metrics for MSW that were not addressed in Section 3.2.1 can be explained as follows:

- The low pallet recycling figure is probably due to the high rate of reuse of pallets on the base.
- The high tire recycling is directly attributable to the commendable efforts of the vehicle maintenance personnel to use recapped tires whenever possible. They have found that recapped tires generally last longer than new tires.

- The high cardboard figures are due to the numerous cardboard dumpsters placed throughout the base. The figures would be even higher if the cardboard recycled by the BX was tracked and added to the figures for the base.

- The base Finance and Accounting Office (CAFO), which accounted for 90 percent of paper waste on the base, was closed in 1997.

Dobbins ARB has a good recycling program. A particularly positive note is the fact that all tenants have been included in the recycling program. The recycling contractor for the base picks up recycling containers from within buildings as well as in larger containers outside buildings. The base has done an excellent job of providing recycling containers for beverage containers, mixed paper, and scrap metal throughout the base. There are also cardboard dumpsters conveniently located near most buildings on the base, which has contributed to the high cardboard recycling metrics. The figures would be even higher if the cardboard recycled by the BX was tracked and added to the figures for the base (the BX sells the cardboard for their own profit, but does not keep track of the quantities recycled).

The base is building a recycle center to be operated by the recycling contractor. The center will be used to segregate and accumulate enough recyclables for cost-effective shipment to recycling facilities. This effort should significantly reduce the quantity of MSW disposed by Dobbins ARB.

The participation of base personnel (including tenants) in the recycling program could be improved. A survey of the MSW dumpsters on the base indicated some recyclables, particularly paper and cardboard, were still put in these dumpsters. The problem appears to relate more to culture than awareness. The solid waste coordinator has adequately educated base personnel and commanders and has placed recycling containers in visible and convenient locations; however, many of the Dobbins personnel have not incorporated recycling into their work habits. Command and supervisor emphasis should increase participation in the recycling program. Also, recycling is not something they normally do at home . It will take continuing promotion by CEV in conjunction with effective "top down" direction and emphasis from commanders and supervisors to improve the recycling program.

The best example of noncompliance with the recycling program is UTA personnel who train on weekends at the base. These people participate least in the recycling program and regularly discard recyclables into MSW containers. The UTA commanders and supervisors need to educate and direct their personnel to put recyclables in the many containers available to them throughout the base.

The base chips small branches for mulch. Large branches and stumps are brought to the county landfill's yard waste area or put in forested areas on the base. A compost facility run by the county has had many problems and is currently closed. The base will use this facility when it opens again.

An interesting PPO that has been implemented by the base is the attachment of key environmental specifications to all contracts. The language in the specifications related to solid waste is the requirement for all construction and demolition wastes generated by a contractor to be taken to a recycling facility.. In fact, the base even provides a list of local recyclers to each contractor. This list was provided by the Georgia Pollution Prevention Aid Division.

5.1.2 Hazardous Waste and Industrial Waste (DOB)

Dobbins ARB has an excellent hazardous and industrial waste management program. Through proactive environmental management, the base has greatly reduced the amount of hazardous and industrial waste it generates and disposes. Unfortunately, the hazardous waste disposal goals for Dobbins ARB are misleading and do not indicate the true success of the base's program.

According to the disposal metrics, Dobbins ARB did not meet their goal for 1997. The major reason for this is that their 1992 baseline is too low. In 1992, Dobbins ARB was already recycling much of its hazardous waste. In fact, Dobbins only disposed of 7,813 pounds of hazardous waste in 1992, one of the lowest figures in the command. What makes this figure so impressive, is that the base had a very large flying mission at that time with both a C-130 unit and F-16 unit.

Table 3-7 shows the top five HW streams that were generated by the base in 1997. Spent solvent waste was the largest HW stream generated. A majority of these solvents were used in degreasing tanks to clean aircraft and vehicle parts. The solvents have low flashpoints and often become contaminated with heavy metals. Typically, these solvent tanks are serviced by an outside contractor who replaces the used solvent with clean product. The used solvents are then recycled for future use. Dobbins ARB has since reduced the number of solvent tanks in the shops by replacing them with aqueous parts washers. The base has also eliminated the use of Citrikleen solvent. For additional information on aqueous parts washers and solvent tank reductions, see PPOs VOC-8 and VOC-9.

Excess material was the largest hazardous waste stream generated by the base in 1997. Dobbins ARB is a host for several tenants who do not fully participate in the Hazmart program. Instead, these tenants store their own supply of chemicals in their respective buildings. This wide spread storage of shop chemicals defeats the purpose of the Hazmart program, and is the main reason for such a high quantity of excess materials. The base is in the process of including all of its tenants in the Hazmart program. By doing so, Dobbins ARB will reduce the amount of chemicals stored throughout the base and will subsequently reduce the disposal of excess materials as hazardous waste.

Paint waste and waste fuel were the third and fourth largest HW streams at the base, respectively. The quantities of paint waste and waste fuel generated by the base are consistent with the number of aircraft serviced. The base (including tenants) maintains 9 C-130 and 6 commuter aircraft, as well as 13 helicopters.

Table 3-7 also shows the top five IW streams generated by the base in 1997. The table indicates that Dobbins ARB generated 14,476 pounds of used oil, 4,938 pounds of non-hazardous spent solvent, and 3,398 pounds of water/fuel waste. As discussed in Section 3.2.2.3, the amount of used oil generated by the base is slightly higher than other C-130 bases because of the large number of vehicles and powered-AGE equipment maintained at the base (including tenant operations). The spent solvent and water/fuel waste generation numbers are considered normal when compared to other bases in the command.

Dobbins ARB discovered an innovative method for reducing their disposal of absorbent pad waste. Instead of collecting the used absorbent pads for disposal, they are sent to a closed-loop dry cleaning facility where they are cleaned for reuse. This practice has nearly eliminated the

disposal of used absorbent pads on the installation. For more information on absorbent recycling, see PPO IW-2.

Also, the base has implemented a contract to lease plastic bead media (PPO HW-5). By doing so, the base will achieve additional reductions in hazardous waste disposal.

5.1.3 EPA-17 Chemicals (DOB)

Dobbins ARB has successfully reduced its EPA-17 chemical purchases from the 1992 baseline. As shown in Table 3-9, the base reported 89 and 96 percent reductions in EPA-17 chemical purchases in 1996 and 1997, respectively.

The reductions in EPA-17 chemical purchases can be attributed to the high 1992 baseline figure. Like most other AFRC bases, it is almost impossible to determine if the 1992 baseline number is a realistic depiction of chemical purchases or if it was overstated due to lack of accurate purchase data. Regardless, the accuracy of metric reporting for EPA-17 chemical purchases has improved dramatically since 1995 as the Hazmart and IMMS computer system came on-line. With the advent of the EMIS computer system, the 1997 data is even better.

The metrics numbers reported for EPA-17 chemical purchases do not include tenants of the base. If the base wants to get accurate metrics, tenants need to be included because tenants play a large role in chemical usage at Dobbins ARB accounting for about 40 percent of base personnel and about half of the maintenance activities. The EPA-17 survey conducted during the site visit identified substantial quantities of EPA-17 chemicals being used by tenant organizations. More information about including the tenants in the Hazmart is presented later in this subsection.

The primary reason that the base has been so successful in reducing EPA-17 chemical purchases is proactive SGPB and CEV staff and base personnel that have been diligent in finding less-hazardous substitute products. One example is in the Fuel Cell Repair Shop where personnel use 4-Part Cleaner containing 20 percent MEK instead of using straight MEK. Technical Order 1-1-3 allows the use of 4-Part Cleaner. The use of 4-Part Cleaner has allowed the shop to keep its MEK usage below 10 pounds in 1997, the lowest usage in the Command. Another reason for the low MEK usage in the Fuel Cell Repair Shop is that there have been fewer repairs since 1994 when many of the C-130 aircraft at the base were rewinged.

Although Dobbins ARB has done an excellent job reducing EPA-17 chemical usage, there are some areas where further reductions can be made. The Corrosion Control Shop has a large inventory of EPA-17 containing paints and uses a lacquer thinner containing more than 50 percent EPA-17 chemicals to clean its paint gun. A product substitution survey (PPO EPA-1) should be performed at the corrosion control shop and an alternative paint gun cleaner (PPO EPA-4) should be used. These recommendations also apply to the Civil Engineering Paint Shop, which still has numerous EPA-17 chemicals and a lacquer thinner paint gun cleaner.

The functionality of the Hazmart is another area of concern. Several shops complained that they are not always able to get prompt service from the Hazmart, because it is not always staffed. Additionally, Hazmart personnel do not consistently deliver or pick-up hazardous materials from the shops, which can be a problem at a base the size of Dobbins ARB. It can be very

inconvenient for shop personnel to drive to the Hazmart to drop-off a product. The Hazmart should be staffed during normal business hours and should provide delivery and pick-up.

Another concern with the Hazmart is lack of participation by the tenants. Because the tenants are funded by different agencies (e.g. the State), they purchase their own HAZMATs instead of using the 94 LG to procure them. This resulted in their purchasing larger quantities than they need. For example, the 283 CC Power Production Shop wanted to purchase 12 cans of spray paint, but ended up with 12 cases. These spray cans have been sitting in a corner of the shop for several months and will eventually become expired shelf-life material. Many of the other tenants also have inventories of EPA-17 containing chemicals. Dobbins is working with the tenant commanders to convince them of the benefits of participating in the Hazmart, and has been successful with two of the four tenants so far. Dobbins ARB should try to integrate the tenants into the Hazmart so they can better control EPA-17 chemical purchases.

Another item of concern includes the use of MEK for surface preparation prior to painting and MEK for paint gun cleaning at the Army Reserve Aviation Support Facility (Building 1011) and the Army Guard Aviation Support Facility (Bldg 555). This MEK usage by on-site contractors hired by these tenant units should be highlighted to the unit commanders, and contract modifications should be implemented as feasible (see PPO EPA-3 and PPO EPA-4 for more information).

Finally, the Propulsion Shop uses black spray paint with toluene to mark the tips of the propellers. A neoprene ink roller could be used to substitute for this paint (see PPO EPA-5 for more information).

5.1.4 Ozone Depleting Substances (DOB)

Dobbins ARB has done an excellent job reducing Class I ODS purchases by essentially 100 percent from their 1992 baseline figure. Class I ODS usage for 1997 was 20 pounds which consisted of the purchase of refrigerant for a chiller.

The base does not have an HMP and needs one because there is a halon fire suppression system (at the old Hush House). This system, however, has been disconnected and disarmed. There is no formal plan in place to remove the Hush House System, but there is a possibility that it will be shipped off-base sometime in the future.

Dobbins ARB is required to prepare an RMP, because they operate AC/R equipment that contains Class I ODS refrigerants. At the time of the site visit, the base did not have an RMP.

5.1.5 Pesticides (DOB)

Dobbins ARB has a Pesticides Management Plan, but it does not really address the issue of IPM. Roads and Grounds personnel apply fertilizers to all the improved lawns at the base, and a contractor has been tasked with keeping the 40,000 linear feet of fence line clear of vegetation. Additionally, the base has a pesticide applicator that applies insecticides at base facilities to prevent insect infestations.

The base has indicated that they would like to incorporate IPM into their pest management practices, but apparently, shop managers are continually requesting Roads and Grounds

personnel to spray whenever insects are present. The base pesticide applicator feels that the shops could improve their housekeeping practices to reduce the attractiveness to insects. In addition, the base does a good job of accurately tracking pesticide usage through the use of the WIMS system. The pesticide data obtained from HQ AFRC/CEV was verified as accurate during the site visit.

The base fertilizes its lawns several times per year. The base should consider eliminating or reducing fertilizer usage.

5.1.6 Volatile Air Emissions (DOB)

Dobbins ARB has done an excellent job reducing VOC emissions. Emissions from painting operations have been significantly reduced for several reasons, the most important being a reduced contingent of aircraft at the base. When the 116 FW of the GA ANG left the base at the end of 1996, Dobbins ARB was left with only eight C-130 aircraft, the lowest total in the Command. The GA ANG unit that replaced the 116 FW (the 283 CBCS) is a ground squadron and does not have aircraft. Additionally, all painting operations for the 283 CBCS occur off-base at another USAF facility. The low number of aircraft to be maintained combined with the extensive use of a vinyl lettering machine has greatly reduced the amount of painting operations by the Corrosion Control Shop.

There is another vinyl lettering machine in the CE Paint Shop. This machine has been a huge success and has led to significant decreases in spray paint usage. It is important to note that CE painting operations are now primarily performed by contractors, so controlling the types of paints and solvents being used (e.g., high or low VOC) for CE painting operations is now quite difficult. The base should consider specifying appropriate paints and solvents in contract language. Additionally, the vehicle maintenance paint shop is no longer used because vehicles are taken to off-base commercial paint shops for painting.

The base has done an excellent job reducing the number of solvent tanks being used by maintenance shops. Many solvent parts washers have been eliminated and replaced with aqueous parts washers, including some closed-loop bioremediating non-toxic parts washers.

Other efforts have contributed to the reduction of VOC emissions at Dobbins ARB. The base has done an outstanding job acquiring alternative fuel vehicles. They have 25 electric vehicles (Chevy S-10s) and 12 CNG vehicles. In fact, the 94 AW Vehicle Maintenance Shop is being used as a USAF test-site for electric vehicles, and shop personnel are well educated and enthusiastic regarding the program.

Base personnel are working towards further reductions. The base is working to eliminate a large solvent parts washer (190 gallons) in the Engine Shop. Vendors who service this shop are currently testing the use of the microbial wash solution that is normally used in bioremediating parts washers (e.g., Smart Washer) in the jet washer. If this test is unsuccessful the base should still be able to reduce solvents in this shop by getting a smaller solvent tank and/or sharing their tank with the Hydraulic Shop next door. The base will also be implementing a project to expand the natural gas distribution system to eliminate heating oil tanks and burners, which will further reduce VOC emissions.

5.2 GENERAL MITCHELL IAP-ARS (GMT)

5.2.1 Municipal Solid Waste (GMT)

General Mitchell IAP-ARS met the 1993 (10 percent) and 1996 (30 percent) goals for reduction of MSW disposed; however, the 1997 (50 percent) reduction goal was not met. In fact, MSW disposed in 1997 actually increased dramatically over the 1996 figure and represented only a 45 percent reduction from the 1992 baseline year.

One of the reasons the base was able to achieve a high reduction in 1996 may be attributable to an inflated baseline figure. The baseline figure was calculated from the number of dumpster tips performed even if the dumpster was not completely full, versus the way the base currently calculates MSW disposed based on disposal contractor-supplied weights.

The MSW recycling program is very good. The base's recycling rate is 32 percent. Commingled recycling of metal and aluminum cans and plastic and glass bottles, cardboard recycling, and office paper recycling have proven to be moderately successful at the base. In addition, the base's education and awareness program has been effective in promoting recycling initiatives.

However, some commingled recyclable bins still were found to have non-recyclables in them. It is important that the base continue to promote recycling and also inspect bins for non-recyclables and follow through with education of organizations which put non-recyclables in the bins.

The potential anomalies cited in the metrics for MSW that were not addressed in Section 3.2.1 can be explained as follows:

- No pallet/wood recycling. Pallets are collected and a contractor comes and collects them on a regular basis, but the base has not been tracking this. The Base is now tracking pallet recycling.

- No scrap metal recycling. CE just recently started scrap metal recycling. Therefore figures for this category should begin being reported in 1998.

A potential solid waste PPO is the on-site treatment or recycling of styrofoam. Styrofoam is generated throughout the base from packing materials and from consolidated open mess operations. The base is looking to reduce this waste stream with a machine that shreds the styrofoam and uses a solvent to reduce it into a gel-like substance that can be recycled (see PPO MSW-4 for more information).

Grass and leaves are not composted;, rather the base employs the use of mulching mowers. These mowers eliminate the need to bag and dispose of grass clippings and leaves.

5.2.2 Hazardous Waste and Industrial Waste (GMT)

General Mitchell IAP-ARS has been successful in meeting and exceeding the USAF pollution prevention goals for HW. According to Table 3-6, the base met its 1996 goal by reducing HW disposal by 74 percent; however, in 1997 HW disposal increased resulting in a reduction of only

33 percent from the baseline. The baseline set for General Mitchell IAP-ARS was 4,834 pounds. This increase in 1997 was brought about by the disposal of an additional 1,000 pounds of spent plastic bead media that was generated in 1996, but not disposed until 1997. Because the base generates so little waste throughout the course of a year, any increases in waste generation are significant. General Mitchell IAP-ARS has shown typical waste reductions when compared to the overall reductions achieved throughout the Command.

Table 3-7 shows the top five HW streams generated by General Mitchell IAP-ARS in 1997. Paint waste was the largest waste stream generated, consisting of paint, paint filters, and other paint related material that was either disposed or recycled. The amount of paint waste generated (1,700 pounds) is consistent with the amount of painting done at the base.

Plastic bead media (PBM) was the next largest waste stream generated in 1997. In the past, the base has had to dispose of waste PBM as a hazardous waste because Wisconsin had not approved the PBM leasing program; however, Wisconsin is currently in the process of changing this policy. The base can get a waiver from the state that allows PBM leasing until the regulatory change is finalized; therefore, General Mitchell IAP-ARS should look further into the use of leased PBM in order to reduce this waste stream. Additional information on PBM leasing can be obtained from the PPOA (see PPO HW-5).

The base generated quantities of spent solvent and excess materials that are consistent with the size of the base and the number of aircraft serviced. General Mitchell IAP-ARS maintains 12 C-130 aircraft.

In 1997, General Mitchell IAP-ARS generated approximately 25,600 pounds of IW, one of the lowest quantities reported within the Command. The generation of used oil accounts for nearly 21,000 pounds of this total, which is high relative to other C-130 bases. The reason for this apparent anomaly is that spill debris/absorbent material is being reported by the base in the used oil category. This explains why the base has reported high used oil figures and no spill debris waste.

The base also recycled 2,800 pounds of non-hazardous spent solvent used for parts degreasing and cleaning, which is one of the lowest quantities of solvent in the Command. This low solvent usage is attributable to proactive personnel who have been able to eliminate solvent usage altogether in several shops through the use of aqueous jet washers and the sharing of solvent tanks. Also, if solvent tanks are still needed, they are smaller tanks (35 gallons or less) and are on a longer change-out cycle.

5.2.3 EPA-17 Chemicals (GMT)

The base was successful in achieving and exceeding USAF goals of a 50 percent reduction in EPA-17 chemical purchases by the end of 1996; however, the reductions decreased substantially in 1997. The base achieved an 88 percent reduction in EPA-17 chemical usage in 1996, but only a 59 percent reduction in 1997.

The primary reason for the increase in EPA-17 chemical purchases in 1997 was the dramatic increase in MEK usage. The corrosion control shop used over 1,000 pounds of MEK to strip the tails of aircraft so they could be repainted with the letters "AFRC" rather than "AFRES". In the future, the base should employ non-chemical paint stripping methods like bead blasting; take

the aircraft to depot for stripping and painting; or paint over the "AFRES" in gray and repaint or use vinyl letters for the "AFRC".

During the site survey, additional recommended EPA-17 substitutes were identified including the following:

- The fuel cell maintenance shop uses about 10 gallons/year of MEK. There are approved substitutes for MEK for this shop such as 4-Part Cleaner (see PPO EPA-2 for more information).

- The Corrosion Control Shop uses Safety Kleen lacquer thinner containing more than 50 percent EPA-17 chemicals to wipe and clean parts. There are numerous substitute cleaners for this application. Isopropyl alcohol can be used to wipe down parts and Safe-Strip can be use to clean paint guns.

- The AGE, Corrosion Control, and Flightline Shops use paints that contain EPA-17 compounds. There are substitutes that have reduced or eliminated EPA-17 chemicals that meet the same MILSPECs.

- The Propulsion Shop uses black spray paint with toluene to mark the tips of the propellers. A neoprene ink roller could be used to substitute for this paint (see PPO EPA-5 for more information).

5.2.4 Ozone Depleting Substances (GMT)

The base has done a superb job reducing its Class I ODS purchases. The base reported purchasing only 5 pounds of ODS in 1997; essentially a 100 percent reduction from the 1992 baseline (see Table 3-11).

The base does not need an HMP, because it does not have fire suppression systems that contain halons. The base does have flightline halon fire extinguishers that are inventoried by the Fire Department.

The base does not have a Refrigerant Management Plan (RMP). The base operates AC/R equipment that contains Class I ODSs. The base manages their AC/R equipment by tracking servicing and unit relocation through the WIMS system. However, base personnel have voiced their frustration concerning the lack of user-friendliness and the inability to retrieve data from this system. The base should prepare an RMP or use the Refrigerant Management Software to meet the RMP requirements.

5.2.5 Pesticides (GMT)

The installation PMP and current statement of work for the contracted pesticide applicators does not incorporate the IPM strategies identified in DOD Instruction 4150.7. Specifically, pesticides are applied to installation buildings on a routine schedule without monitoring. However, the installation is planning on using baited traps instead of spraying in the near future, which will reduce the number of spot applications performed.

Pesticide applications for removal of insects from buildings increased in total product applied from FY 1993 (26.5 lbs.) to FY 1996 (32.13 lbs.). However, active ingredient usage decreased by 13 percent from FY 1993 (0.156 lbs) to FY 1996 (0.136 lbs) based on data obtained from CE.

No information was available on historic use of herbicides on the installation. The current Grounds Maintenance Plan calls for the use of chemicals as growth retardants and weed controls. In addition, in May 1997, the herbicide 2,4-D was broadcast applied to the turf areas of the base to suppress weed growth. The total area covered was about eight acres. It is estimated that herbicide applications contribute about 50 pounds per year to the base's pesticide metrics. Also, the base uses fertilizers on its grassy areas.

5.2.6 Volatile Air Emissions (GMT)

Enthusiastic General Mitchell IAP-ARS personnel have implemented cost effective opportunities to reduce VOC emissions. Vehicle Maintenance personnel use a bioremediating parts washer (i.e., Smart Washer) instead of a solvent tank, and use the microbial wash solution on the floor to "consume" the spilled oil there. For the parts that are not placed in the Smart Washer, an aqueous jet washer is also used. Several other shops have aqueous parts washers, as well.

The base has 10 CNG-converted vehicles, and personnel are working on an effort with a California USAF Base to test electric vehicles. Although personnel are concerned that electric vehicle batteries will exhibit decreased storage capacity in northern climates, base personnel are considering the use of electric vehicles in the spring, summer, and fall. Also, bicycles can be used during the warmer months instead of motor vehicles.

The Heating Plant recently converted from No. 2 fuel oil to full-time uninterruptible natural gas, which also contributes to VOC emission reductions. In an effort to reduce emissions further, the POL installed a vapor burner for their MOGAS fuel pump about a year ago. The burner requires the use of 30-40,000 gallons of gasoline per year to accumulate enough vapor to burn. Unfortunately, the base uses less than 20,000 gallons of gasoline each year and, therefore, has never used the burner.

The base has two older-model vinyl lettering machines that are not used very often. Although shop personnel are accustomed to using stencils and spray paints, efforts need to be made to use vinyl stenciling where applicable. Furthermore, CE uses oil-based paints for outdoor painting because of the concern for durability and because water-based latex paints require more coats. Still, base personnel need to reassess their concerns and test the use of water-based paints. Other northern bases are using these paints successfully. With continued enthusiasm, personnel education, and product and equipment substitution efforts, General Mitchell can continue to reduce VOC emissions from the base.

5.3 GRISSOM ARB (GRI)

5.3.1 Municipal Solid Waste (GRI)

Grissom ARB has been successful in meeting and exceeding the USAF pollution prevention goals for MSW for both the interim goals (10 percent in 1993 and 30 percent in 1996) and final goal (50 percent in 1997). The solid waste generation reduction and recycling figures are excellent and the recycling program is one of the best in AFRC.

As can be seen in Table 3-2, Grissom ARB achieved an 18 percent reduction in 1993; a 70 percent reduction in 1996; and an 84 percent reduction in 1997. Much of these reductions are attributable to the high rate of recycling at the base. Table 3-5 shows that the recycle rate for the base is 38 percent.

Grissom ARB had the highest reductions of any AFRC base and one of the highest recycling rates. These figures indicate a positive anomaly attributable primarily to the efforts of base personnel and the base commander.

Grissom ARB maintains an excellent recycling center with baling and crushing equipment. The center has adequate storage for recyclable materials until a cost efficient quantity has been collected for shipping.

The base has a good recycling program as a result of the efforts of the solid waste coordinator to promote the program. Another essential facet of this program is this person's efforts to alert supervisors about recyclable materials that have been put in solid waste dumpsters.

The base also has an innovative program for recycling wood, asphalt, and concrete. On an annual basis, an industrial grinder is brought on base to shred accumulated waste wood, asphalt, and concrete. The shredded wood is used for soil stabilization and mulch. The shredded concrete is used for gravel on unpaved roads and parking lots. These shredded materials are stockpiled for use on the base as needed. For more details on the industrial grinder, see PPO MSW-5.

Despite the efforts mentioned above, some dumpsters still were found to have recyclables in them. It is important that the base continue to promote recycling and also inspect dumpsters for recyclables and follow through with education of organizations which put recyclables in dumpsters.

5.3.2 Hazardous Waste and Industrial Waste (GRI)

Grissom ARB successfully met its 1996 USAF pollution prevention goal that called for a 25 percent reduction in HW disposal by 1996. As shown in Table 3-6, Grissom ARB exceeded its goal by reducing HW disposal by 43 percent. In 1997, HW disposal had been reduced even further to 65 percent below the baseline. The established baseline for Grissom ARB was 21,155 pounds. These are above average reductions when compared with reductions achieved throughout the Command.

Table 3-7 shows the top five HW streams that were generated at the base in 1997. As indicated in the table, spent solvent was the largest waste stream generated. At over 19,000 pounds,

Grissom ARB was the largest generator of solvent waste in the Command; nearly twice as much as the next closest base. This waste stream consists almost entirely of parts cleaning solvents that are used in solvent tanks. The tanks are serviced on a bi-weekly or monthly basis, and the used solvent is sent off base for recycling. They are in the process of replacing some of these tanks with aqueous parts washers in order to reduce the amount of spent solvent waste generated. It is highly recommended that the service intervals for the remaining solvent tanks be extended, which would reduce the amount of spent solvent generated. Additional information on aqueous parts washers and solvent tank reduction can be obtained from the PPOA (see PPOs VOC-7 and VOC-8).

Paint waste was the next largest waste stream generated. The base generated the second highest quantity of paint waste in the Command, and can be attributed to the high number of planes serviced at the base. The base maintains 22 KC-135 refueling aircraft, which is one of the highest totals in AFRC.

Spill debris was another notable HW stream generated in 1997. Grissom ARB manages its fuel spill debris as HW due to possible contamination from benzene which can be present at very low concentrations in JP-8 fuel. The base is having this waste stream analyzed to determine if there is sufficient benzene contamination in the spill debris for it to be considered HW. If it is determined that there is no benzene in the spill debris, then it will be managed as a non-hazardous industrial waste, which will significantly reduce HW disposal for the base. (Note: Homestead ARS performed a TCLP analysis on their JP-8 spill debris and it was found to be non-hazardous.) If deemed hazardous, the base could use encapsulating absorbents like MoorDri-100 to clean up fuel spills. Tests performed by personnel at Robins AFB, GA have shown that MoorDri-100 used to clean up solvent and fuel spills will pass TCLP testing (see PPO HW-1 for more information).

Although non-hazardous industrial wastes (IW) are not specifically addressed in the USAF pollution prevention program, these wastes are prevalent and there are often opportunities for reduction. The more common IW streams generated at Grissom ARB include used oil, excess materials, and water contaminated with fuel. The base generated nearly 14,000 pounds of waste oil in 1997, which is a low number when considering how many planes the base maintains. This anomaly is mostly attributable to the "R" model KC-135 aircraft flown by the base, which is a newer aircraft and requires less servicing than older models.

5.3.3 EPA-17 Chemicals (GRI)

The base has been successful in achieving and exceeding USAF goals of 50 percent reduction in EPA-17 chemical purchases by the end of 1996. For 1996 and 1997, the base achieved the same reductions in EPA-17 chemical purchases (78 percent) from the baseline year of 1992. Like most bases, this reduction has occurred primarily through implementation of the Hazmart and substitution of EPA-17 chemicals with other chemicals. Another reason for this reduction is the large baseline figure. The high baseline probably reflects the fact that Grissom was an active base until October 1994, which made it difficult to accurately estimate Reserve metrics.

There were no anomalies identified for the metrics for this program area. Although the base's reductions were excellent for EPA-17 chemical purchases, other bases had comparable reductions. However, the base's reductions in EPA-17 chemical purchases appear to have leveled off in 1996 and 1997.

Numerous existing PPOs that contributed to the reductions in EPA-17 chemical purchases at the base included the following:

- Use of a vinyl stencil machine for marking and labeling instead of spray painting
- Use of water-based paints for painting buildings and the airfield
- Substitutions of EPA-17 chemical containing solvents with non-EPA-17 solvents or aqueous parts washers
- Use of mechanical paint stripping instead of methylene chloride or MEK
- Use of nonhazardous biodegradable brake cleaner to eliminate EPA-17 usage in the Vehicle Maintenance Shop.

The following paragraphs discuss EPA-17 chemical usage and recommended PPOs that could help to increase reductions in future years. The Fuel Cell Maintenance Shop uses about 6 gallons/year of MEK. There are approved substitutes for MEK usage on KC-135 fuel cells. Fuel Cell Maintenance personnel at the ANG unit at Niagara Falls ARS reported the successful use of Citra-Safe, a nonhazardous substitute approved for KC-135 aircraft.

The Refurbishing Shop uses about 12 gallons/year of aircraft thinner with MEK and toluene to wipe and clean parts. There are numerous substitute cleaners for this application (e.g., isopropyl alcohol or naphtha) and no apparent Technical Order requires MEK be used for these operations.

The Support Shop in Dock 3 uses numerous spray paint cans that contain EPA-17 chemicals (e.g., toluene and chromium). Substitute paints with low or no EPA-17 chemicals that meet the same MILSPECs should be identified and evaluated for use in this shop (see PPO EPA-1 for more information).

5.3.4 Ozone Depleting Substances (GRI)

The base's program for its Class I ODS purchases is excellent. The base reduced purchases of Class I ODS in 1997 by about 100 percent from the 1992 baseline (see Table 3-11).

The base does not have fire suppression systems that contain halons, consequently the base does not need an HMP. They do have halon fire extinguishers that are inventoried by the Fire Department and CEV.

The base does not have a Refrigerant Management Plan (RMP) and does not need one. The final Freon 12 chiller unit is broken and was to be shut down and removed by the end of CY 1997. There are no other Class I ODS chilling units.

5.3.5 Pesticides (GRI)

The base has a full-time pesticide operator who applies a lot of pesticides to buildings and facilities. Also, the applicator sprays around the flightline for mosquitoes to keep birds away

from the aircraft. On a positive note, the base does not apply fertilizers or herbicides to their landscaped areas.

Although the current Grissom ARB PMP may be sufficient within current AFRC guidelines, it does not adequately address IPM. IPM is required by the guidance found in the USAF Pollution Prevention Program Guide and in DoD Instruction 4150.7; therefore, the base must prepare a more comprehensive plan that addresses IPM. Additionally, the plan does not address all of the insects that are sprayed at the base. For example, pesticides applications for mosquitoes around the runway are not mentioned in the plan, yet this is one of the largest uses of pesticide at the base.

5.3.6 Volatile Air Emissions (GRI)

Grissom ARB has done an excellent job in reducing VOC emissions from the base by taking many cost-effective steps. Vehicle Maintenance personnel assessed vehicle conversion packages and decided to use CNG vehicles to reduce VOC emissions from vehicles at the base, primarily because CNG vehicle conversions were cost-effective. Furthermore, transportation personnel worked closely with the local gas company to have a CNG filling station installed. Prior to the HQ AFRC ban on alternative fuel vehicle conversions, Grissom ARB had been extremely active in vehicle CNG conversion efforts; 17 vehicles were converted and 5 eligible vehicles were awaiting conversion.

To reduce VOC emissions from painting operations, the base uses HVLP paint guns and latex road paints. Spray-painted stencils and traffic and other sign painting has mostly been replaced through the extensive use of the vinyl-lettering machine. Further VOC emission reductions are expected when Roads and Grounds personnel replace solvent-based airfield paints with aqueous-based paints for the runway. Several shops at the base, however, continue to use traditional spray paints and the Corrosion Control Shop uses numerous solvent-based paints. Low VOC paints should be considered in these cases.

Although Grissom ARB personnel have made commendable efforts to reduce VOC emissions throughout the base, solvent tanks are used in approximately a dozen shops throughout the base. Solvent tank usage needs to be reassessed; tanks should be replaced with aqueous parts washers, or relocated to a central area for multi-shop sharing. The AGE and Vehicle Maintenance Shops have ordered aqueous parts washers to replace their solvent tanks. In addition, the Hydraulic Shop has a 165-gallon solvent tank with a ventilation fan under the hood that runs 24 hours a day. This situation should be corrected. Some potential corrective actions include purchasing a new tank and hood with better ventilation or putting a layer of floating balls over the surface of the tank to act as a fume blanket.

5.4 HOMESTEAD ARS (HOM)

5.4.1 Municipal Solid Waste (HOM)

Homestead ARS has met the 1996 (30 percent) and 1997 (50 percent) goals for reduction of MSW disposed. As shown in Table 3-2, HARS achieved a 77 percent reduction in 1996 and an 83 percent reduction in 1997.

One of the reasons the base was able to meet these goals was the high baseline figure that was developed for the base. The baseline figure was based on estimates for dumpster weights which may have been high. The baseline was also prepared using 1994 estimates of how much solid waste would have been generated in 1992. The difficulty in finding an accurate baseline is evidenced in the fact that the first baseline computed for MSW (163 tons) had to be more than tripled (540 tons) in an attempt to get an accurate figure. The final baseline figure is probably high as evidenced by the very large reductions in MSW disposed starting as early as 1994.

Although the MSW goals were easily met, apparently because of the high baseline, the base has done a very good job of continuing to reduce MSW disposed in succeeding years since 1995, despite the growth of activities at the base. The base does include all tenants in the MSW disposal figures that are reported to HQ AFRC.

The potential anomalies cited in the metrics for solid waste that were not addressed in Section 3.2.1 can be explained as follows:

- The high recycling figures for batteries, toner cartridges, and disks results from the good promotion of recycling in conjunction with the existence of a recycle center where these materials are accumulated until there is an adequate quantity for shipment.

- The high cardboard figures are due to the commendable efforts of the base to collect, bale, and sell cardboard. Once again, the recycle center figures prominently in this success. Note, the figures would be even higher if the cardboard recycled by the BX were tracked and added to the figures for the base.

- The lack of glass and plastic recycling figures is because the base did not collect and recycle these materials in past years; however, the base has since begun to recycle glass and plastic.

- The relatively low metal recycling figure is not attributable to nonrecycling of metal. The base recycles a lot of scrap metal through DRMO. These figures apparently are not reported to HQ AFRC. The base intends to begin scrap metal collection and accumulation at the recycle center after a planned wall is constructed to hide the scrap metal storage area.

- The lack of a tire recycling figure results from the lack of tracking by the base of the tires sent to DRMO for retreading. In fact the base, in particular the vehicle maintenance shop, has done a great job of using recapped tires whenever possible (over 75 percent of tires are recapped and no tires are disposed). They have found that recapped tires generally last longer and are much cheaper than new tires.

- The high aluminum can recycling is directly attributable to the efforts of the base to promote can recycling and to collect and sell the cans.

- Wood recycling was big in 1996, but dropped in 1997. The base is trying to get approval to acquire a wood chipper so that wood wastes can be recycled on the base.

Homestead ARS has a good recycling program. A converted gas station is used as a recycle center to segregate and accumulate enough recyclables for cost-effective shipment to recycling facilities. Inmates from the nearby low security prison are used to pickup recyclables from containers within buildings as well as in larger containers outside buildings. The base tries to include all tenants in the recycling program, but the inmates are not allowed into the U.S. Customs facility or outside of the Cantonment area.

The base has done a good job of providing recycling containers throughout the base and has offered to purchase any recycling containers that individual organizations might want. However, some areas (including the dining hall and U.S. Customs facility) need new recycling containers that are clearly labeled.

The base is trying to get approval for a machine to chip landscape and wood waste into mulch. This would help to reduce this waste from entering the MSW stream. Also, the base has proposed a project to put up a wall around the yard outside the recycle center to block the unsightly view of scrap metal and other recyclables stored outside. Both of these proposed efforts should be approved and implemented in 1998.

The participation of base personnel (including tenants) in the recycling program could be improved. A survey of the MSW dumpsters on the base indicated some recyclables, in particular cans, wood, and paper, were still put in these dumpsters. The problem appears to relate more to culture than awareness. The solid waste coordinator has tried to educate base personnel and commanders and has placed recycling containers in visible and convenient locations. It will take continuing promotion by CEV in conjunction with effective "Top Down" direction and emphasis from commanders and supervisors to improve the recycling program.

The best example of noncompliance with the recycling program is UTA personnel who train on weekends at the base. These people participate least in the recycling program and regularly discard recyclables into MSW containers. The UTA commanders and supervisors need to educate and direct their personnel to put recyclables in the many containers available to them throughout the base.

Another good idea would be to designate a recycling coordinator for each dumpster (preferably a volunteer). This person would encourage recycling of materials whenever possible by educating personnel using the dumpster and ensuring appropriate containers are available.

There appears to be far more dumpster capacity than is needed on the base. Furthermore, the present MSW contractor does not weigh the dumpsters, because the scale at the base is broken. The solid waste coordinator is considering reducing the number and size of dumpsters and is advocating repair of the scale to allow for weighing of the dumpsters. These efforts would significantly reduce MSW disposal costs and allow for better measurement of MSW disposal.

Many of the covers on the solid waste dumpsters were not closed. This causes rain to wet the trash and increase the weight of MSW disposed. The MSW contractor should be required to close the covers after emptying the dumpsters. Also, the designated recycling coordinator for each dumpster could ensure the dumpster covers are kept closed.

5.4.2 Hazardous Waste and Industrial Waste (HOM)

Homestead ARS has had good success in meeting and exceeding the USAF pollution prevention goals for HW. As can be seen in Table 3-6, Homestead ARS met its 1996 goal by reducing HW disposal by over 37 percent from the 1992 baseline. In 1997, the base further reduced HW disposal by over 55 percent from the baseline. The baseline established for Homestead ARS was 5,205 pounds. These are typical reductions when compared with reductions achieved throughout the Command.

Table 3-7 shows the top five HW streams that were generated by the base in 1997. The base generated 1,345 pounds of paint waste in 1997. This amount was one of the lowest quantities of paint waste reported throughout the Command, and is indicative of the amount of painting done on base. However, the base is in the process of constructing a large paint booth capable of housing an F-16. Once the booth is complete, Homestead ARS will be performing depot-level painting for their aircraft, as well as aircraft from other USAF bases, which will significantly increase the amount of paint waste generated in the future.

In addition, Homestead ARS generated 2,922 pounds of nickel-cadmium batteries that were disposed of as HW. Typically, these batteries are not reported by other bases as HW disposed, but up until the end of 1997 the base had no recycling outlet for them. The batteries are now recycled through the DRMO contract and will not show up in future HW disposal metrics.

Homestead ARS generated over 67,000 pounds of IW in 1997, which is a high number when compared with bases of similar size. The base (including tenants) maintains 18 F-16, 3 F-15, and 10 commuter aircraft. Homestead ARS generated more than 36,000 pounds of waste fuel, more than any other base in the Command. This waste was contaminated fuel generated on the flightline and in the industrial shops that could not be reclaimed at the POL facility. Most bases are able to reclaim much of their waste fuel on-site by reusing it at the POL, but Homestead ARS is unable to do so because the fuel contains too much water and oil. Instead, the base has the waste fuel collected by a contractor, and it is then burned in a cement kiln for energy recovery. The generation of waste fuel does not affect the base's HW disposal metrics reported to HQ AFRC/CEV because it is recycled.

However, the base could do a much better job of reusing this waste fuel on-site, which would save money because less virgin JP-8 would need to be purchased. The flightline shops should do a better job of segregating contaminated POLs from those POLs that can be reused. POL personnel feel that the base could reuse most of the fuel that is currently being sent off-base if the shops did a better job of segregating. Additionally, off-spec fuel can be used in AGE equipment. See PPO HW-3 for more information.

Waste oil is the second largest IW generated at the base, but at 10,715 pounds, is the lowest amount of waste oil generated in the Command. The fighter aircraft do not generate as much oil waste as other larger aircraft. The next largest IW generated was a water/fuel mixture totaling 6,900 pounds. This waste stream consists of the water that collects at the bottom of POL tanks. The amount of this waste is slightly high when compared to other bases. One possible explanation for this is that the POL has a high daily fuel throughput.

Spill debris was the next most prevalent IW stream generated at the base. The base generated over 5,500 pounds in 1997, which was one of the largest generation amounts of this waste

stream within the Command. The base would be well served by using an absorbent reconditioning program, which could reduce this waste stream by as much as 75 percent. Additional information regarding absorbent reconditioning can be found in the PPOA (see PPO IW-2). Additional reductions in spill debris can be achieved by using smaller absorbent pads. The AGE Shop is already doing this and has been able to significantly reduce the volume of waste they generate.

5.4.3 EPA-17 Chemicals (HOM)

According to the metrics in Table 3-9, Homestead ARS achieved 52 and 51 percent reductions in EPA-17 chemical purchases in 1996 and 1997, respectively. Although the base has met the pollution prevention goals for 1996, they had the lowest percentage reductions of EPA-17 chemical purchases in the Command.

The primary reason that Homestead ARS has had difficulty meeting the goals for EPA-17 chemical purchases is that its 1992 baseline figure is possibly too low. In fact, Homestead ARS's baseline is more than 60 percent lower than the baseline figure for an average AFRC base. Homestead ARS did not even exist in its current capacity until 1995. This baseline figure should be reviewed and potentially changed to be more consistent with the other bases in the Command.

Besides the problems with the baseline, there are several other areas of concern. The accuracy of the EPA-17 chemical data reported by the base is highly questionable since the base's EMIS system is not being used to generate the usage numbers. The base needs to fully utilize the EMIS system so it can get a better grasp on the uses of hazardous chemicals in specific shops. In order for the base to continue to meet and exceed its EPA-17 reduction goals, it needs to do a better job of tracking chemical usage.

In addition, the base can do a better job identifying environmentally friendly substitute products. Better communication and cooperation between the Hazmart, Bioenvironmental, and CEV would help these efforts. These organizations should work together to identify quality substitutes for products that contain EPA-17 chemicals.

Another problem is that the tenants at the base, FANG and U.S. Customs (the base has taken responsibility for both environmental programs), are not included in the base Hazmart program. Since these tenants are not included in the Hazmart, they are required to purchase their own chemicals which has led to large inventories of EPA-17 chemicals. The base should try to include tenants in the Hazmart program.

The base has two Corrosion Control Shops (including the FANG) that use lacquer thinner to clean paint guns. The lacquer thinner is predominantly toluene, xylene, MEK, and MIBK, and is typically replaced each month. This usage is not being tracked by the pharmacy, and therefore, has not shown up in EPA-17 purchase metrics. It is recommended that an alternative paint gun cleaner like Safe-Strip be used to eliminate EPA-17 chemicals used in this process (see PPO EPA-4 for more information). On a positive note, the Corrosion Control Shop is using a chromate-free primer for 90 percent of painting operations.

Another area of concern is that Safety Kleen Solvent 105, which contains EPA-17 chemicals, is still being used in several locations (including the FANG). The base should replace

Solvent 105 with Safety Kleen Solvent 150, which does not contain EPA-17 chemicals. Also, the CE Paint Shop is using solvent-based paints and should be using latex paints.

5.4.4 Ozone Depleting Substances (HOM)

The base has been successful in reducing Class I ODS purchases. As shown in Table 3-11, the base reported a 94 percent reduction in ODS purchases for 1997. The base's ODS purchase metrics do not include ODS purchases made by the tenant organizations such as U.S. Customs and FANG. These tenants do not purchase their chemicals through the Hazmart and essentially have their own stockpile of products. The amount of ODS purchases would have been higher if tenants were included.

An HMP is required because Halon 1301 is present in the fire suppression systems at the Hush Houses. Base personnel need to develop an HMP that will identify all the halon fire suppression systems and document a strategy for their removal and replacement.

The base does not have AC/R equipment that uses Class I ODSs; therefore, they do not need an RMP.

5.4.5 Pesticides (HOM)

Homestead ARS has a PMP; however, the plan is inadequate. The plan does not address pesticide applications on the installation, nor does it include the Dade County malathion fogging around the flightline that occurs twice daily during the summer for mosquitoes. Also, the PMP does not address Base Closure Agency (BCA) canal herbicide usage or other contractor herbicide usage. The plan does not address daily application or include contractor pest management records. In addition, the plan does not include IPM practices, or adequately address threatened and endangered species or wetlands on the installation.

Homestead ARS personnel do not use the WIMS system to calculate the amount of active ingredient in the pesticides applied. Instead, personnel manually calculate the pounds of active ingredient applied, using information on the pesticide container. In the past, Homestead ARS had an installation entomologist to track the use of pesticide and herbicide applications. The installation entomologist also calculated the amount of active ingredient manually. Currently, there is no installation entomologist, a shop foreman oversees pesticide applications.

It should be noted that pesticide application amounts and active ingredient totals reported to HQ AFRC do not exactly coincide with the FY 1997 quarterly totals calculated while on-site. It was determined that the data reported to HQ AFRC was the best data available and was used to compute the pesticide metrics in Table 3-15.

There are no fertilizer applications at Homestead ARS.

5.4.6 Volatile Air Emissions (HOM)

Homestead ARS personnel have done a commendable job in working with individual shops and personnel to make VOC reductions possible. Many solvent parts washers have been

eliminated and replaced with aqueous parts washers ,and additional aqueous parts washers are being considered at the Pneudraulics Shop, FANG AGE, and Wheel and Tire Shop. Additionally, the base has been proactive in using alternative fuel vehicles. The base has numerous electric golf carts and 18 dual-fueled propane/gasoline vehicles. The base, however, does not have a propane filling station nearby. It is important for the base to get funding for a propane tank so they can benefit by using all their propane vehicles.

Current VOC emissions from aircraft painting operations at Homestead ARS are substantial. Aircraft at Homestead ARS require more frequent painting than at other bases because of the effects of UV radiation and saltwater. Also, the magnitude of painting operations is expected to increase in the future because the base is installing a new paint booth that is large enough for an F-15 aircraft. The base expects this paint booth to be used as a sort of depot-level paint booth for on and off-base aircraft. To reduce VOC emissions, the new enclosed paint booth is going to be equipped with an activated carbon filtration unit. Although the filtration unit is considered a treatment technology rather than a pollution prevention technique, it does a superb job of removing VOCs from the air. In fact, the use of carbon filters and other treatment technologies is the only proven method that can drastically reduce VOC emissions from painting operations. Activated carbon treatment technology is also being employed successfully by the Fuel Cell Shop to reuse fuel contaminated absorbent. Contaminated absorbent is put in a dryer unit that draws air through the absorbent to remove the VOCs and water. The air drawn through the absorbent is treated through an activated carbon filter before being emitted to the air. Other bases should consider using activated carbon at their fuel cells.

The FANG also has a paint booth that it uses very infrequently for aircraft parts. If possible, this paint booth should be closed, and future FANG painting operations, should occur at the new corrosion control paint booth described above. If this is not possible, the FANG paint booth needs to acquire an HVLP paint gun to improve painting efficiency and lower VOC emissions.

The base has been able to reduce VOC emissions from its other painting operations. Three vinyl stenciling machines are used to letter equipment with vinyl stencils rather than spray paint. The painting of vehicles on base has been dramatically reduced because all large-scale painting is done by an off-base commercial contractor.

5.5 MARCH ARB (MAR)

5.5.1 Municipal Solid Waste (MAR)

According to the MSW metrics supplied by HQ AFRC/CEV, March ARB met the pollution prevention goals for reduction in MSW disposed for 1993 (10 percent), 1996 (30 percent) and 1997 (50 percent). As can be seen in Table 3-2, March ARB achieved a 22 percent reduction in 1993; a 49 percent reduction in 1996; and a 60 percent reduction in 1997.

Some of the MSW disposed reductions are attributable to a moderate rate of recycling at the base. Table 3-5 shows the recycle rate for the base to be 21 percent. However, the high reductions appear to be mostly attributable to the apparently generous baseline figure for the base. This anomaly probably resulted from the difficulty in apportioning out the AFRC component of solid waste disposed from the entire active base.

The MSW disposal figures for March ARB are the highest in the AFRC, which is primarily due to the large size of the base. The base has about 2,300 full-time personnel and 4,900 UTA personnel. These figures are about twice as large as any other base in the Command.

March ARB does not have a contractor that manages/collects recyclable materials on base. The base currently utilizes civil engineering personnel to manage the collection of paper products, cardboard, and scrap metal. Paper product collection bins are placed throughout the base and are collected regularly.

Scrap metal and cardboard are collected in containers at the civil engineering recycling yard. The shops that generate scrap metal do an excellent job of collecting the scrap metal and taking it to the recycling yard. However, recycling of cardboard is inadequate, due to the lack of containers located in the vicinity of base shops. More efforts should be directed at increasing cardboard recycling, because cardboard has economic value and is a large waste stream.

Aluminum can recycling is done by the individual shop organizations. Shop organizations are responsible for placing aluminum can collection containers in the appropriate locations. Shop personnel are then designated to collect the cans and recycle the cans on their own. Funds generated from the cans are then used to purchase various items for the shop organization, including food, beverages, etc. This method of aluminum can recycling appears effective, due to the cash incentive for the individual shop areas. The disadvantage of this method is that the base does not measure the quantity of cans being recycled, and therefore does not report a number for aluminum can recycling metrics.

Due to the poor recycling market in California and the limited number and time of civil engineering personnel assigned to recycling, items including glass, plastic, and wood are not recycled because they are not economically feasible. Items that are recycled, but are not reported in the solid waste metrics are pallets, tires, automotive batteries, and antifreeze. These items are not reported because currently there is no system for quantifying these items. Pallets are turned in to the local DRMO; vehicle maintenance shops and aircraft wheel and tire shops use retread tires wherever practicable; automotive batteries are turned in for one-for-one exchange; and antifreeze is recycled in the vehicle maintenance shop. The base should consider adding glass and plastic to its recycling program.

5.5.2 Hazardous Waste and Industrial Waste (MAR)

March ARB has made the largest reductions in HW disposal when compared to other bases in the Command. As can be seen in Table 3-6, the base met the 1996 USAF pollution prevention goal by reducing HW disposal by 67 percent. In 1997, the base made an even bigger decrease in HW disposal by achieving a 91 percent reduction from the 1992 baseline figure. The baseline for March ARB was set at 342,945 pounds by prorating CY 92 HW disposal between active and reserve units. This high baseline reflects the fact that March was a full-service base up until April 1996. The base's conversion to Reserve-status has reduced industrial activity by a considerable amount, thereby dramatically reducing the generation of HW and IW. The huge reduction in 1997 marked the first full year that the base operated solely as a Reserve base.

Table 3-7 shows the top five HW streams that were generated by March ARB in 1997. The base generated 176,515 pounds of oil/water separator waste in 1997, considerably more than any other base in the Command. A recent survey of separator clean-out procedures at the base indicate that the base thoroughly cleans out many of their separators on a routine basis. The base needs to implement PPO HW-2, Efficient Oil/Water Separator Management, to reduce this waste stream.

The base generated over 84,000 pounds of used oil that was reported as HW because the base is required by state regulation to manage its used oil as HW. However, since the used oil was recycled instead of disposed, it did not contribute to HW disposal metrics reported to HQ AFRC/CEV. The base generated the largest quantity of waste oil within the Command, but they are also the largest base servicing more aircraft, vehicles, and powered-AGE equipment than any base in the Command. The base (including tenants) currently services 20 C-141, 19 KC-135, and 4 F-16 aircraft, as well as 450 vehicles and 350 powered-AGE equipment.

Waste fuel (27,059 pounds generated in 1997) is the third largest HW generated by the base. More than 22,000 pounds of this waste came from the water/fuel mixture that comes from condensation in the POL tanks. The reason for such a high quantity of this waste is the high volume of fuel pumped by the base daily. At more than 55,000 gallons of fuel a day, March ARB pumps significantly more fuel than other bases in the Command. For example, daily fuel throughput for some of the other bases is 9,500 gallons at Youngstown ARS, 24,000 gallons at Grissom ARB, and 25,000 gallons at Homestead ARS.

The base generated over 14,000 pounds of paint waste in 1997, which was the largest amount of paint waste reported within the Command. This usage can be partially attributed to the number and type of aircraft that are maintained at the base. However, a lot of the paint waste originated not from aircraft painting operations, but from painting operations during construction and renovation projects. Due to the base realignment, many buildings were renovated and painted during the past few years. Latex paint was used to paint the inside of the buildings, and as a result, waste paint related material was generated. Latex paint is a regulated state waste in California, and therefore it must be managed as a hazardous waste. In addition, several hundred gallons of expired latex paint were disposed of last year due to an oversight in the amount of paint ordered. These factors all contributed to the large quantity of paint waste generated by the base. Reductions in paint waste should be realized this year because most of the non-aircraft related painting operations have been completed.

March ARB also generated a large amount of spill debris and absorbent waste. Due to the number of aircraft serviced at the base, there is tremendous absorbent usage. Unfortunately, lightweight absorbents, such as absorbent pads, are ineffective due to strong winds. Therefore, the base is forced to use much heavier absorbents that are not easily blown around. This greatly adds to the weight of this waste stream. Oil spill debris is considered HW by California regulations, and must be disposed of accordingly.

March ARB reported only 1,278 pounds of industrial waste generation in 1997. This number is extremely low, especially when considering the size of the base. One of the reasons this number is so low is that, unlike other bases, used oil, oily debris, and various other materials, including latex paint and antifreeze, are reported as state regulated wastes and show up in the HW metrics. As mentioned above, the base generated over 84,000 pounds of used oil last year which

was reported as HW recycled and over 6,500 pounds of oil spill debris that was reported as HW disposed.

5.5.3 EPA-17 Chemicals (MAR)

According to the metrics reported to HQ AFRC/CEV on EPA-17 chemical purchases (see Table 3-9), March generated 1,767 pounds of EPA-17 chemicals in 1996, but only 279 pounds in 1997. This translates to 56 and 93 percent reductions from the 1992 baseline year. It seems highly unlikely that a base as large as March ARB purchased only 279 pounds of EPA-17 chemicals in 1997. Upon closer inspection, it became apparent that the base is not tracking its chemical purchases and is not using the EMIS system; therefore, the 1997 EPA-17 metrics have probably been underestimated significantly.

A contractor developed the 1996 EPA-17 chemical purchase number based on the use of the base's M-15 report, which was meshed with the MSDSs that the BEE maintains for HAZMATs used on base. This tracking process is very labor intensive and should be streamlined with the full implementation of the Pharmacy's EMIS system. However, the EMIS system on base has not been populated with MSDS information about which products contain either EPA-17 chemicals or ODSs. Therefore, it is difficult to determine which shops are the big users of HAZMATs. One drawback to using the M-15 report to generate a listing of EPA-17 usage is that it does not account for local purchase items.

According to the 1997 March ARB PPMAP, most of the EPA-17 chemical usage comes from painting and paint stripping operations, solvent tanks, and cleaning and lubricating compounds. Major users of EPA-17 compounds include Corrosion Control, Aircraft Maintenance, and Vehicle Maintenance. It is difficult, however to identify specific compounds that contain EPA-17 chemicals without an effective EMIS system.

The Hazmart is an area of great concern and needs to be improved. It is recommended that the Hazmart system be completely overhauled, because in its current form it does not work. Although the Hazmart does track what products are issued to the end user, the system has not been programmed to know whether the products contain EPA-17 chemicals or not. Many of the shops voiced a lack of confidence in the Hazmart because they did not have an adequate inventory of HAZMATs; consequently, most of the shops have large stockpiles of material. Some individuals also stated that for some products, they couldn't just buy a can, but they had to buy the whole case of a product. Many times the leftover product is turned in as hazardous waste. Furthermore, the Hazmart currently has no free issue system.

Some of the EPA-17 chemical substitutes that should be implemented at the base include the following: paint substitutes, paint gun cleaner substitutes, non-EPA-17 chemicals at NDI, and MEK substitutes at Fuel Cell Maintenance. Also, the Metals Technology Shop should stop using blue layout dye, which has EPA-17 chemicals, and switch to the red layout dye, which has fewer EPA-17 chemicals. Finally, the Pesticide Shop uses Dursban pesticide in an aerosol form that contains 1,1,1-trichloroethane. The base should use a different formulation of Dursban pesticide that does not contain 1,1,1-trichloroethane.

The tenants on the base are not included in the metrics for EPA-17 chemicals and do not participate in the Hazmart program. The ANG shops have been doing a decent job in reducing EPA-

17 chemicals through product substitution. The ANG is using vinyl lettering machines, less-hazardous water-based paints in some shops, and aqueous parts washers. The Fuel Cell is using MEK in its operations, but is currently evaluating substitute products such as Safe-Strip and 4-Part Cleaner.

5.5.4 Ozone Depleting Substances (MAR)

According to the 1997 ODS metrics, March ARB reduced purchases of ODSs in 1997 by about 100 percent. Some of this success could be attributable to a high baseline developed for the transition from an active-duty base to a Reserve base. But, according to the base's 1997 PPMAP, the reductions were attributable to the base-wide ban on the purchase of ODSs unless there is a waiver.

The ANG shops on the base have done an excellent job in reducing ODS usage through chemical substitution. Virtually all items that contained ODSs have been replaced with non-ODS containing items. The shops should continue chemical substitution for the remaining ODS items through attrition.

March ARB has numerous AC/R units containing Class I ODSs. The base has an RMP and is currently updating it.

The base is required to have an HMP, but does not currently have one. However, all areas with halon systems have been identified. The three buildings with halon suppression systems have all been switched over to manual activation. The building systems are checked for leaks monthly.

5.5.5 Pesticides (MAR)

March ARB has a PMP. Pesticides are applied in buildings and facilities by CE personnel on an as needed basis, but in limited quantities. The PMP does not specifically identify approved pesticides and herbicides with their EPA identification numbers, although it does list some pesticides that are used for several specific pests. The plan describes health and safety measures for personnel, but not for the general public. In addition, endangered species are discussed and their location on base is identified, but there is no guidance on how to handle any pesticide or herbicide applications in these sensitive areas.

The base contracts landscaping activities to an outside contractor, and there is some associated weed control in the contract work. The amount of herbicides applied by the contractor is not currently being reported. On a positive note, the base does not apply fertilizers to their landscaped areas.

5.5.6 Volatile Air Emissions (MAR)

March ARB has done an outstanding job in reducing VOC emissions. Stringent California air regulations have been a catalyst in the initiation of product and equipment substitution throughout March ARB. In fact, California law has banned the use of solvent parts cleaning tanks starting in 1999. Shop and CEV personnel are aware of the activities at the base that contribute to

all types of air pollution, which has made the location of workable basewide product substitutions possible.

Aqueous parts washers have replaced solvent tanks on the base due to a regulatory requirement that becomes effective January 1, 1999. Although other AFRC bases have claimed to experience corrosion problems when using aqueous parts washers, shop personnel utilize a corrosion preventative additive and the T.O. managers have indicated that aqueous parts washers can be used if followed by a heat drying cycle. This is being implemented at March.

Shop personnel have made significant reductions in painting operations. Vehicle Maintenance personnel have reduced the use of aerosol paints, through the use of vinyl lettering. Where painting is required, March ARB personnel use low-VOC spray paints, latex-based traffic paints, and acrylic latex paints (for interior paint jobs). Painting on the planes has also been significantly reduced because the base uses vinyl lettering on the tails of the airplanes. Many of these substitutions to low VOC paints were a direct result of working with GSA.

March ARB has done a superb job acquiring alternative fueled vehicles. The base has a CNG filling station, 20 CNG vehicles, 7 electric pickup trucks, 7 electric vans, 50 electric utility vehicles, numerous electric utility carts with additional purchases planned.

Additionally, March ARB is in the process of installing an emission control device on the corrosion control paint booth.

5.6 MINNEAPOLIS-ST. PAUL IAP ARS (MSP)

5.6.1 Municipal Solid Waste (MSP)

MSW metrics are kept separately for the Reserve and ANG units at Minneapolis-St. Paul IAP-ARS . The ANG unit has done a good job of reducing MSW disposal and should be able to meet USAF goals. Their recycling program is very good and has produced savings in solid waste disposal costs. The total contractor cost reported by the ANG unit for solid waste recycling and disposal was $13,000 per year. The following discussion applies only to the Reserve unit.

The Reserve unit has not been successful in meeting USAF goals for reducing MSW. Initially, there were reductions in solid waste from the baseline year. However, recently the generation rate has stabilized. As can be seen in Table 3-2, Minneapolis-St. Paul IAP-ARS achieved a 33 percent reduction in 1993; a 7 percent reduction in 1996; and a 18 percent reduction in 1997.

Minneapolis-St. Paul IAP-ARS had the lowest reductions of any AFRC base. These figures indicate a negative anomaly potentially attributable to numerous factors including increased military operations, expansion of the Base Exchange, and a very busy Officer's Club.

The Reserve unit has a recycling program that has had some success. The unit's recycling rate is 27 percent. However, some problems were noted including the following:

- Inconsistent and complex labeling of containers

- Lack of enough recycling containers in some locations (e.g., Base Exchange, CE, Officers Club, etc.).

In addition to addressing these problems, the base should increase the education and awareness of base personnel with regard to recycling and MSW disposal reductions. Promotion of recycling should be a continuous effort to be effective.

The Officers Club at the base is by far the busiest dining facility in the Command. The Club should consider getting an industrial food grinder to dispose of food scraps in the sanitary sewer, much like a household sink disposal unit (see PPO MSW-7 for more information).

One of the interesting PPOs the base has implemented is recycling the sand that is applied on the base in the winter. In the spring, the material is collected from the roads and sidewalks and taken to the local municipal authority's facility for screening and reuse. Unfortunately, the base was unhappy with the quality of the screened sand that was returned because it clogged their spreaders. Therefore, the base has currently discontinued the program and is looking for another sand recycling facility (see PPO MSW-5 for more information).

5.6.2 Hazardous Waste and Industrial Waste (MSP)

Minneapolis-St. Paul IAP-ARS has done a good job in meeting and exceeding the USAF pollution prevention goals for HW disposal. As shown in Table 3-6, Minneapolis-St. Paul IAP-ARS was able to exceed its 1996 goal by reducing HW disposal by more than 52 percent. In 1997, HW disposal was further reduced, achieving a total reduction of 56 percent from the baseline. The baseline set for Minneapolis-St. Paul IAP-ARS was 12,937 pounds. The base has shown typical waste reductions when compared to reductions achieved throughout the Command. (Note: The ANG [133 AW] HW disposal data is not included in the base's HW metrics. The ANG operates as a separate HW generator with its own EPA ID number.)

Table 3-7 shows the top five HW streams generated by the base in 1997. Contaminated rags are currently the largest waste stream generated. These rags are used to wipe down oily and greasy aircraft parts in many of the shops. Rags are also used in the corrosion control shop, at the POL facility, at the base heating plant, and by civilian and reserve security police for weapons cleaning. The reason that some of these rags are being called hazardous is that they are failing TCLP tests for cadmium and chromium, or because they are used with F-listed solvents. In addition, weapons cleaning rags may prove to fail the TCLP test for lead. The cadmium is being wiped off C-130 engine parts in the Propulsion Shop. It is highly recommended that the base begin to contract an off-base rag laundering service to launder the rags. Every other base in the Command is using an off-base rag laundering service, including the ANG unit at Minneapolis-St. Paul IAP-ARS.

Another notable waste stream generated by the base was spent plastic bead media (PBM). This blast media is used to remove paint from the surface of aircraft and motor vehicle parts, and is often contaminated with heavy metals from the paint. Several bases in the Command are leasing their PBM, thereby avoiding the disposal requirements associated with this waste stream. Minneapolis-St. Paul IAP-ARS should look further into PBM leasing as a viable disposal alternative; however, the State of Minnesota does not currently approve of the PBM leasing program. Additional information regarding PBM leasing can be obtained from PPO HW-5.

The base also generated several hundred pounds of alkaline batteries that were disposed of as hazardous waste. Alkaline batteries are given a 'lethal' state code and must be managed as an HW. Minneapolis-St. Paul IAP-ARS generated quantities of paint waste and spent solvent that are consistent with the size of the base and the number of aircraft serviced. The base maintains 8 C-130 aircraft and they are host to a tenant, the ANG, that also maintains 8 C-130 aircraft.

In 1997, Minneapolis-St. Paul IAP-ARS generated approximately 19,700 pounds of industrial waste. Nearly 13,000 pounds can be attributed to the generation of used oil from aircraft and motor vehicle maintenance. The base reported 3,300 pounds of recycled lead-acid batteries under this category as well. These numbers are considered normal.

5.6.3 EPA-17 Chemicals (MSP)

Minneapolis-St. Paul IAP-ARS has done an excellent job of reducing EPA-17 chemical usage. The base reported 93 and 96 percent reductions in EPA-17 chemical purchases for 1996 and 1997, respectively; one of the best in the Command. This reduction has occurred primarily through elimination of processes using large quantities of materials containing EPA-17 chemicals and through manufacturer's reformulations of their products.

Some of the existing PPOs that contributed to the reductions in EPA-17 chemical purchases included the following:

- Use of a vinyl stencil machine for marking and labeling instead of spray painting
- Substitution of EPA-17 chemical containing solvents with non-EPA-17 solvents or aqueous parts washers
- Replacement of MEK used for paint gun cleaning with a nonhazardous cleaner in the Corrosion Control Shop.
- Use of physical paint stripping instead of methylene chloride or MEK.

MEK is still being used in the Fuel Cell Maintenance and Propulsion Shops, reportedly per Technical Order requirements. However, other bases flying the same aircraft are using 4-Part Cleaner and other substitutes that are approved by the Technical Orders. The base should review the Technical Orders carefully to determine just what substitute products are allowed. Consultations with shop personnel at other bases with the same aircraft should help this process.

The ANG unit at the base (the 133 AW) is not included in the metrics for EPA-17 chemicals. The ANG also has decreased EPA-17 chemical purchases, but the Corrosion Control Shop still had numerous EPA-17 containing paints and solvents, including MEK, methylene chloride, and toluene. Also, the Corrosion Control Shop uses a lacquer thinner gun cleaner that contains more than 50 percent EPA-17 chemicals. Recommended EPA-17 substitutes include replacing the paints and solvents used with low or non-EPA-17 containing paints and solvents and using the same nonhazardous paint gun cleaner (Safe-Strip) used by the 934 AW Corrosion Control Shop.

5.6.4 Ozone Depleting Substances (MSP)

The base has been successful in reducing Class I ODS purchases. As shown in Table 3-11, the Reserve unit (934 AW) reported a 99 percent reduction in ODS purchases for 1997. ODS usage for the Guard unit (133 AW) is not included in the ODS metrics.

The base has no halon fire suppression systems, consequently an HMP is not needed. The 934 AW Fire Department has developed an inventory of all halon fire extinguishers.

Although there are relatively few AC/R units using Class I ODS refrigerants, the base is still required to have an RMP. At the time of the site visit, the refrigerant shop technician had started to input some data into a refrigerant management software program. Once this effort is completed, the software program should meet the requirements for an RMP.

5.6.5 Pesticides (MSP)

Minneapolis-St. Paul ARS has a contract for minor spraying to reduce pests in and around buildings, and utilizes only a very small amount of pesticides (less than five pounds) for these purposes. The installation does, however, apply a significant amount of chemicals to their lawn areas. In fact, 99 percent of pesticide usage on the base comes from herbicides applied to 42 acres of lawn area.

A virtually unsupervised contractor applies fertilizers and herbicides to the grassy areas, and then simply invoices the installation. This contract is renewed yearly without consideration of improved oversight or reduction in fertilizer and herbicide applications. These applications are an anomaly when compared to many of the other bases that use little, if any, lawn chemicals.

5.6.6 Volatile Air Emissions (MSP)

Minneapolis-St. Paul IAP-ARS has done a fair job in reducing VOC emissions. 934 AW corrosion control personnel are knowledgeable of environmental regulations and have been active in reducing VOC emissions. Corrosion control personnel use HVLP paint guns and an electrostatic paint application system. The electrostatic paint sprayer can dramatically increase paint application efficiency and reduce paint overspray. It cannot, however, be used on small parts or on parts containing fuels (explosion hazard); therefore, only about 10 percent of the painting can be done with the electrostatic system. Shop personnel also use a low VOC paint gun cleaner.

The 133 AW Vehicle Maintenance shop has done an excellent job in reducing VOCs by eliminating all solvent tanks and replacing them with aqueous parts washers and aqueous brake washers. The 934 AW has also been able to replace several solvent tanks with aqueous parts washers.

The 133 AW and the 934 AW can reduce VOC emissions in several areas:

- The 133 AW Corrosion Control Shop and the 133 AW Vehicle Maintenance Paint Shop should order high-solids, low-VOC paints and should acquire HVLP paint guns. The 133 AW should consider consolidating its Vehicle Maintenance paint shop with the Corrosion Control Shop or painting its vehicles off-base.

- The 934 AW CE paint shop is still using solvent-based paints in many instances. The CE paint shop should be using latex paints exclusively.

- The stencil machine, located in the NDI Shop, is intended for use by the entire 934 AW, but it does not get used very often. The 934 AW needs to use this machine more often to eliminate spray paint usage.

- The 133 AW and the 934 AW need to do a better job in converting to alternative-fueled vehicles and electric utility carts. The base is still using gasoline powered utility carts and vehicles for routine trips on base.

5.7 NIAGARA FALLS ARS (NFS)

5.7.1 Municipal Solid Waste (NFS)

Niagara Falls ARS (NFARS) met the 1993 (10 percent) and 1996 (30 percent) goals for reduction of MSW disposed. For 1997, the MSW disposal reduction figure for the base was 49 percent, just under the 50 percent goal.

The base has reduced MSW disposed significantly from the 1992 baseline. However, the base has the lowest recycling rate in the AFRC at 17 percent. Part of the reason for this low recycling rate is that the return of beverage containers is covered under the state's bottle bill. As a result, beverage containers (including glass, plastic and aluminum cans) are recycled by individuals or organizations on the base and are not tracked.

Mixed paper is collected by the base for recycling. Estimates of the proportion of newspaper and high grade paper in the mixed paper recycling stream are used to report metrics to AFRC/CEV.

The base does recycle many of the categories of recyclables tracked by AFRC/CEV (e.g., toner cartridges, fluorescent light bulbs), but does not track or report them. Also, the base does not have a formal program for recycling wood wastes.

In order to improve the recycling program, the base should begin performing quarterly MSW dumpster surveys. At those shops found to be putting recyclables in the MSW containers, supervisors should be alerted and encouraged to recycle.

5.7.2 Hazardous Waste and Industrial Waste (NFS)

Niagara Falls ARS successfully met its 1996 USAF pollution prevention goal for HW disposal. As can be seen in Table 3-6, Niagara Falls ARS met that goal by reducing HW disposal by 62 percent. In 1997, the base achieved an even greater reduction of 73 percent below the existing baseline. These reductions are among the highest in the Command for 1996 and 1997. The 1992 baseline figure for Niagara Falls ARS was set at 52,730 pounds.

Table 3-7 shows the top five HW streams generated by the base in 1997. The base disposed of over 78,000 pounds of oil/water separator waste. The generation of this waste stream can be attributed to the clean-out of the oil/water separator located at the POL facility. Nearly 10,000 gallons of water contaminated with fuel were pumped out of the separator. The waste was considered hazardous due to the presence of small quantities of fuel. The base needs to improve its oil/water separator management procedures to reduce waste generation (see PPO HW-2 for more information).

The next largest HW stream generated at Niagara Falls ARS was expired gas mask filters and chemical decontamination kits. The base disposed of nearly 4,000 pounds of these filters and nearly 1,000 pounds of the decontamination kits. In an effort to reduce the amount of expired gas mask filters generated, the base should consider using these filters for training purposes where there is no risk of chemical exposure. In addition, the base should do its best to ensure that the gas mask filters and chemical decontamination kits that they receive are not nearing the end of their service lives.

Wash water contaminated with cadmium was another prevalent waste stream generated by the base. The wash water that is generated by C-130 engine compressor washes is laden with cadmium. The USAF has been aggressively researching alternatives that would reduce or eliminate this waste stream; however, an acceptable alternative has not yet been identified. Each C-130 base in the Command is managing its compressor wash differently. Some bases are discharging directly to the sewer, others are collecting the wash water and disposing of it as an HW, and others have literally stopped doing compressor washes altogether. If possible, the base should reduce the number of engine washes performed annually, which would reduce the amount of HW disposed by the base.

The remaining quantities of hazardous waste generated by the base are consistent with the size of the base and the number of aircraft serviced. The Reserve facilities maintain 8 C-130 aircraft and the Guard facilities maintain 9 KC-135 aircraft.

Niagara Falls ARS generated over 170,000 pounds of IW in 1997. A majority of the IW generated consisted of contaminated soil and oil/water separator sludge. The oil/water separator sludge was generated during routine cleaning operations of the base's oil/water separators. The contaminated soil was generated as a result of a single POL spill that required the excavation of several tons of soil. Because the spill was a one-time event, that waste stream is not included in the metrics shown in Table 3-7, which shows only recurring waste streams.

The base generated over 2,300 pounds of NDI waste in 1997 (reported as "miscellaneous" in Table 3-7). This waste stream is consistently generated at Niagara Falls ARS, but is seldom generated at the other AFRC bases. The base was having problems with bacteria growing in their NDI chemical baths. The bacteria were causing some of the drains connected to the baths to back up, causing the emulsifier and dye penetrant solutions to become contaminated. The base has since resolved the problem with the bacteria, but still claim that they will generate NDI waste on a fairly consistent basis. The base should try to minimize this waste in the future by reducing the change-out frequency.

The base also generated over 24,000 pounds of used oil and 5,400 pounds of a water/fuel mixture. The water/fuel mixture waste stream consists of the water that collects at the bottom of POL tanks. The water is contaminated with trace amounts of JP-8 and is generally treated as an IW

by the base instead of being discharged to the sanitary sewer. The quantities of used oil and water/fuel waste generated by the base are considered normal.

5.7.3 EPA-17 Chemicals (NFS)

According to the metrics in Table 3-9, Niagara Falls ARS achieved 86 and 55 percent reductions in EPA-17 chemical purchases in 1996 and 1997, respectively. Although the base met the pollution prevention goal for 1996, there was a significant increase in purchases reported in 1997. According to the base, the reason for this increase is double counting of chemicals at the Hazmart and improved EPA-17 chemical tracking procedures.

Numerous substitutions have been implemented to reduce EPA-17 chemical purchases. Implementation of the Hazmart has also contributed significantly to these reductions. Other EPA-17 chemical PPOs that have been implemented include use of HVLP paint spray guns, bead blasters for paint stripping, and vinyl stenciling equipment.

The base's 1997 PPMAP recommends further substitution of EPA-17 chemicals. One example of a suggested substitution is replacing MEK used in the C-130 Fuel Cell Maintenance Shop with a less hazardous substitute like 4-Part Cleaner or Citra-Safe. The KC-135 Fuel Cell Maintenance Shop is already successfully using Citra-Safe in place of MEK. The stock of paints used by the base should also be evaluated to determine where reduced or non-EPA-17 paints can be substituted.

In the Corrosion Control Shop, the EPA-17 containing paint gun cleaner should be substituted with a less hazardous substitute (see PPO EPA-4 for more information). Also a black marking ink roller should be used instead of black spray paint to mark propeller tips (see PPO EPA-5 for more information).

5.7.4 Ozone Depleting Substances (NFS)

According to the ODS metrics, Niagara Falls ARS reduced its purchases of Class I ODSs by approximately 88 percent. Although this reduction was very good, the base showed an increase from 7 pounds to 161 pounds of ODSs in 1997.

Upon examination of the previous years' data and discussions with the base, it appears that this anomaly is primarily attributable to the ANG unit on the base circumventing the Hazmart and purchasing a large unauthorized amount of trichloroethane. Another reason for the increase may be a tracking problem. As indicated in Table 3-11, the ODS purchase reductions steadily increased from 96 percent in 1994 to 99 percent in 1996. During these years, the ODS metrics data was developed by the BEE shop which may have overestimated the reductions slightly. Then in 1997, the Pharmacy's EMIS system was used to develop the ODS metrics data. Reportedly, the EMIS system has two major problems: 1) it tracks issue/usage, not purchases, and 2) in some instances, it is double counting the HAZMATs that are returned to the Hazmart and then reissued. Given these circumstances, it appears the base has been successful in reducing Class I ODS purchases.

The base does not have halon fire suppression systems; therefore, the base is not required to prepare an HMP.

The base does have AC/R equipment containing Class I ODSs. The base has prepared an RMP that meets the USAF requirements for an RMP.

5.7.5 Pesticides (NFS)

Niagara Falls ARS has done an excellent job reducing pesticide usage at the base. They utilize IPM as part of their pesticide management program, and they have an adequate PMP. The base applies less than 10 pounds per year of pesticides, and this usage includes both the 914 AW and the 107 ARW. The 914 AW uses a contractor to spray small amounts of insecticide on an as needed basis.

The 107 ARW up until 1997 did not have a formal pesticide program, and the only pesticides applied were by shop personnel who occasionally sprayed for wasps. In several instances, fly swatters were passed out to kill flies and wasps instead of using insecticides. In 1997, the 107 ARW began using a contractor to apply pesticides at the shops on an as needed basis.

The metrics reported by the base to HQ AFRC/CEV were verified as accurate, but do not include 107 ARW applications. As mentioned above, very small amounts of pesticides were applied by the 107 ARW; therefore, pesticide usage for them was estimated at one pound in 1993 and 1996.

Neither the 914 AW nor the 107 ARW applies fertilizers or herbicides to the grounds at the base. The fence line is maintained by cutting vegetation rather than chemical application.

5.7.6 Volatile Air Emissions (NFS)

Niagara Falls ARS has done a good job reducing VOCs on base. The implementation of the Hazmart, as well as product and equipment substitutions basewide, has contributed to reductions. Base personnel have replaced some solvent tanks with aqueous parts washers, and eliminated the use of No. 2 fuel oil in most boilers by converting to natural gas. Corrosion Control personnel use latex paints, HVLP paint guns, and vinyl stenciling machines.

In order to continue VOC emission reductions at Niagara Falls ARS, personnel should continue with product and equipment substitutions. Base personnel should assess the use of solvent tanks on base and consider centrally-located solvent tanks that several shops can share. The wastewater from the few aqueous parts washers on base are being disposed as hazardous waste rather than in the sanitary sewer. Therefore, the environmental and economic benefits of reducing VOC emissions from solvent tanks is small when compared to the costs of disposing of the wastewater as hazardous waste. The base should discontinue purchasing new aqueous washers until an adequate disposal alternative is found.

Some gasoline-powered vehicles have been replaced with electric vehicles for short trips around the base and maintenance vehicles, such as fork lifts, have been converted to CNG; however, the base should expand its use of electric vehicles.

5.8 PITTSBURGH ARS (PIT)

5.8.1 Municipal Solid Waste (PIT)

Pittsburgh IAP-ARS has met the 1996 (30 percent) and 1997 (50 percent) goals for reduction of MSW disposed. As shown in Table 3-2, Pittsburgh IAP-ARS achieved a 62 percent reduction in 1996 and a 69 percent reduction in 1997.

Overall, the base is doing an excellent job in meeting their MSW goals and recycling MSW items. Every shop and office area has bins for collecting newspapers, cans, bottles, and mixed and high grade office paper. Throughout the base, there are dumpsters for paper and cardboard only (next to regular dumpsters). Segregation of the MSW streams is quite good.

There are three central locations on base where glass and plastic are collected (Building 300, Building 418, and the Consolidated Mess). The fact that these locations are so convenient to base personnel seems to be one of the reasons for the success of the program. There is also a "recycle monitor" program on base. Each building/area has a recycle monitor who is responsible for taking the recyclables to one of the three central areas.

The solid waste contract is done under a "lump sum" and is not calculated based on weight. Fees are based on the size and number of dumpsters and the frequency of disposal. There is a truck scale located near the base service station that has been in place since the end of 1994; therefore, CY 1995 and 1996 MSW data are accurate.

One notable area for improvement would be the level of recycling that goes on at the Visiting Officers Quarters (VOQ). These quarters seem to be quite busy, but the level of recycling is minimal. There is only one bin for recycling aluminum cans, but this is located in the basement of the building. In looking at the dumpster behind the VOQ, there were a lot of potential recyclables in it. CE should put some bins for recycling behind this building and possibly have some bins in the rooms for placement of recyclables. The base should urge the manager to implement a recycling program in the VOQ.

The base should also increase the education and awareness of base personnel with regard to recycling and MSW disposal reductions. Promotion of recycling should be a continuous effort to be effective.

The potential anomalies cited in the metrics for solid waste that were not addressed in Section 3.2.1 can be explained as follows:

- The base reported a high lead acid battery recycling figure because a stockpile of auto batteries at vehicle maintenance was sent out for recycling.

- The high newspaper recycling is because it is a combined newspaper, high-grade mixed paper, and cardboard figure, which also affects the high-grade paper and cardboard recycling figure.

- The high figure for antifreeze recycling is because this figure includes the off-site treatment of deicing fluid collected from aircraft deicing operations. A contractor takes the deicing fluid (considered antifreeze) and recycles it.

- The high number for aluminum can recycling is because this figure represents a commingled beverage container figure for all glass, plastic, and cans.

- The figures for pallet, wood, and tree recycling were high because last year they had many pallets go out (one-time occurrence). They also chip bushes, trees, etc. for use as mulch, and they use mulching mowers to eliminate grass clippings and leaf wastes.

- There was very little scrap metal recycling in the past, but the base just started scrap metal recycling in the CE yard. CE and LG will be using the scrap metal bin and will begin tracking the recycling numbers.

5.8.2 Hazardous Waste and Industrial Waste (PIT)

Pittsburgh IAP-ARS has achieved great success in meeting and exceeding the USAF pollution prevention goals. As can be seen in Table 3-6, Pittsburgh IAP-ARS met its 1996 goal by achieving a 61 percent reduction in HW disposal. In 1997, the base decreased HW disposal even further achieving a 75 percent reduction from the existing baseline. The baseline figure for Pittsburgh IAP-ARS was set at 7,202 pounds. These reduction percentages are some of the largest in the Command.

Table 3-7 identifies the top five HW streams generated by the base in 1997. Pittsburgh IAP-ARS disposed of very little HW during the year. The base generated a number of decontamination kits (reported under "Field Items" in Table 3-7) that required disposal as HW. These were expired field kits that are normally reported in the "excess material" category. Future decontamination kits turned in for disposal will be broken down to separate the hazardous and non-hazardous components to reduce hazardous waste generation

Also, the base had to dispose of a number of excess materials that were generated due to the large quantity of chemicals being stored in the shops. The base Hazmart is not working as it was intended and needs to be improved. The storage of chemicals in the industrial shops should be limited, and more emphasis should be placed on the centralized storage of chemicals at the Hazmart. See Section 5.8.3 for more discussion on the Pittsburgh IAP-ARS Hazmart.

The remainder of the waste disposal metrics for Pittsburgh IAP-ARS are consistent with the size of the base and the number of aircraft serviced. The base currently maintains 9 C-130 aircraft. Pittsburgh IAP-ARS reported the lowest numbers for HW disposal within the Command in 1997.

The base is awaiting approval from PADEP so that it may use the plastic bead media (PBM) leasing program in order to further reduce the amount of HW disposed. Additional information about PBM leasing can be obtained from PPOHW-5.

Pittsburgh IAP-ARS generated approximately 70,600 pounds of industrial waste in 1997. The largest IW stream generated at the base was deicing fluid (reported in the

"miscellaneous" category of Table 3-7). The used deicing fluid is currently collected and sent off base for recycle. The base is considering using the Pittsburgh International Airport deicing fluid recycling contract.

The base also generated 11,800 pounds of used oil and 3,000 pounds of spent solvents used for parts cleaning. These numbers are consistent with the size of the base.

5.8.3 EPA-17 Chemicals (PIT)

Pittsburgh IAP-ARS has been successful in achieving and exceeding USAF goals of 50 percent reduction in EPA-17 chemical purchases by the end of 1996. For 1996 and 1997, the base achieved 73 and 76 percent reductions in EPA-17 chemical purchases, respectively, from the baseline year of 1992. These reductions occurred primarily through substitution of EPA-17 chemicals with less-hazardous chemicals.

The base does not include the EPA-17 chemicals that are in the Safety Kleen paint gun cleaner in its EPA-17 metrics. This usage is estimated to be about 150 pounds per year. Substitution of this cleaner with an alternative paint gun cleaner (Safe-Strip) would eliminate this EPA-17 chemical usage (see PPO EPA-4 for more information). Also a black marking ink roller should be used instead of black spray paint to mark propeller tips (see PPO EPA-5 for more information).

The Hazmart at Pittsburgh IAP-ARS needs to be improved to reduce the amount of material that is being stored in each shop. Some of the shops have something called a "satellite pharmacy," which essentially means keeping large quantities of hazardous materials on hand in the shops. Therefore, the EMIS usage data and thus EPA-17 chemical purchase data for a particular year may not be accurate due to the large quantities of materials stored in these "satellite" locations. Material is only tracked when it leaves the main Pharmacy to one of the satellite locations, which may explain the reported usage of chemicals in the shops (by shop personnel) without a corresponding accounting of it in the EMIS system.

In addition, there are purchases made using the IMPAC card system that are not reported through the Hazmart. Chemicals may be stored for a number of years before they are actually used, which may cause some of the material to expire prior to use.

The base has been successful in implementing product substitutions at various locations; however, there are several shops that continue to use EPA-17 chemicals. For example, traffic paints containing EPA-17 chemicals are used by Civil Engineering. There are numerous water-based paints available that can be used instead. The Entomology Shop uses Dursban, which contains 1,1,1-trichlorethane, to spray for insects. This usage accounted for more than 100 pounds of EPA-17 chemical usage in 1997. A formulation of Dursban is available that does not contain EPA-17 chemicals, and it is recommended. Finally, the Corrosion Control Shop uses thinners with EPA-17 chemicals. With appropriate substitutions, the EPA-17 chemical reductions that could be achieved include the following: white traffic paint – 28 percent, pesticide – 15 percent, and aircraft thinner – 12 percent.

5.8.4 Ozone Depleting Substances (PIT)

As shown in Table 3-11, Pittsburgh IAP-ARS reported an 88 percent reduction in Class I ODS purchases for 1997. Although these reductions are very good, they are low when compared to other AFRC bases.

The ODS usage at Pittsburgh IAP-ARS can be primarily attributed to one chemical: 1,1,1-trichloroethane. The 1997 usage of methyl chloroform was about 120 lbs. The majority of this is coming from the insecticide Dursban, which is applied in an aerosol can by the Entomology Shop. The shop uses about 100 pounds per year to control wasps (see EPA-17 discussion). Dursban is available in a non-ODS formula.

The base has no building or fire suppression systems on base that utilize halons; therefore, an HMP is not required. According to the base fire inspector, the installation follows the relevant directives with respect to halon management for the halon fire extinguishers.

Pittsburgh IAP-ARS has seven pieces of AC/R equipment utilizing CFC refrigerants. The base has an RMP dated November 1995 that contains a brief discussion of the base's refrigerant management program, an inventory of CFC stocks, an inventory of CFC refrigeration equipment, and generic plans to replace or retrofit CFC equipment on an as-needed basis. Although the RMP does not contain a formal refrigerant management timeline, implementation schedule, or conservation measures; these topics are adequately addressed within the text of the document. Since the RMP is more than two years old, it should be updated in the near future.

5.8.5 Pesticides (PIT)

Pittsburgh IAP-ARS has a current PMP. This plan is short, but adequately addresses the pest management requirements, IPM procedures, and health and safety measures that are required of a PMP. Based on the small size of Pittsburgh IAP-ARS and the nature of the pests the installation encounters, its current PMP is sufficient.

A review of the pesticide usage data shows a solid down trend since the 1993 baseline year. In 1995, application equipment problems contributed to artificially low metrics for broadleaf herbicides, but this does not affect the overall down trend. Pittsburgh IAP-ARS is on track to meet the goal of a 50 percent reduction in pesticide use by the year 2000, and if current trends continue, the base will meet this goal in 1998.

The pesticide shop currently uses an aerosol pesticide containing Dursban to control wasps. While this product does not significantly contribute to the quantity of active ingredient used, one of the inactive ingredients, trichloroethane, significantly impacts the metrics for EPA-17 chemicals and ODS usage. Other suitable pesticides are available to control wasps (including a non-ODS formulation for Dursban) and should be considered as a substitute for this product. This issue is addressed in more detail under the EPA-17 program area.

A review of WIMS data available at the Pesticide Shop did not identify any problems with the calculation of the active ingredient metrics. However, Pesticide Shop personnel seemed uncomfortable with the WIMS software, indicating that refresher training in this area may be warranted.

5.8.6 Volatile Air Emissions (PIT)

Pittsburgh IAP-ARS has done a fair job in reducing VOC emissions from the base. Some VOC reductions at the base are the result of paint substitutions. For example, CE personnel use water-based latex paints, water-based primers, and low-VOC aerosol paints. The base has been able to reduce emissions from other painting operations as well. The Corrosion Control Shop has HVLP paint guns and uses vinyl stenciling on the tails and, where possible, inside the aircraft. Vinyl lettering is also used successfully by AGE Shop personnel who have been able to eliminate black spray paint usage.

The base has six electric utility carts for use on the flightline. They do not use these carts elsewhere on the base because of the steep slopes. The carts would crawl up the steep inclines and become a hazard to other traffic.

The base has replaced several solvent tanks with aqueous jet washers. In the Repair and Reclamation (R&R) Shop, personnel use natural orange soap, a biodegradable soap, to clean bearings and smaller parts and use an aqueous parts washer for brakes. The Vehicle Maintenance Shop still uses a solvent tank, but is considering its replacement with an aqueous parts washer. The base has three other aqueous jet washers, located in aircraft inspection, AGE, and the engine shop, that have been on-base for several years but not installed because of electrical incompatibilities. The electrical issues with the aqueous jet washers should be rectified and the units installed, as soon as possible.

5.9 WESTOVER ARB (WST)

5.9.1 Municipal Solid Waste (WST)

Westover ARB met the 1996 (30 percent) goal for reduction of MSW disposed; however, they did not meet the 1997 (50 percent) reduction goal. In fact, the MSW disposed in 1997 was actually an increase over the 1996 figure and represented only a 23 percent reduction from the 1992 baseline year. Westover ARB has the second highest MSW disposal metrics in the Command, primarily because it has many full-time and UTA personnel (1,050 and 3,380, respectively).

The base attributed the increase in 1997 MSW disposed to the following factors:

- The base was host to numerous military exercises in 1997 that increased the base population.
- Hours of operation for the dining hall increased to serve the increased base population and visiting ROTC cadets.
- Approximately 100 marines now reside at the base.

The 1992 baseline figure was based on pretty good estimates prepared during a survey in 1992. The actual weights of dumpsters were not measured for an entire year until 1996. Because weights were not taken in 1993, the same estimate for 1992 was used for 1993. The solid waste contractor will be required by the new contract in April 1998 to weigh his truck at a nearby industrial scale to ensure better accountability of the base's MSW disposed.

The potential anomalies cited in the metrics for MSW that were not addressed in Section 3.2.1 can be explained as follows:

- The lack of plastic recycling figures is due to the difficulty in separating this figure from the glass, metal, and plastic combined figures.
- Computer diskettes are not recycled.
- The figures for pallet/wood/tree recycling are high because the base encourages this recycling. The figure would be higher if all of the wood and tree waste that is recycled in the compost pile were also included.
- The lack of recycling figures for NiCd batteries is probably because the hazardous waste coordinator handles these batteries and does not report these figures with the MSW figures. These batteries are being collected and recycled.

Westover ARB has a good recycling program. A recycle center was recently established at the base and is operated by the custodial contractor. The center is used to segregate and accumulate recyclables for shipment to recycling facilities. The recycle center contractor picks up recycling containers from buildings as well as receives wastes and recyclables.

Generally, the base has done a good job of providing recycling containers for glass, metal and plastic (GMP); mixed paper; cardboard; and scrap metal throughout the base. However, larger containers are needed at the Club; a paper recycling container is needed at the BX; and paper and GMP recycling containers are need at the VOQ.

The base recently expanded their recycling program to include GMP pickups basewide and to include the dining hall, bowling alley, and the Club in the recycling program. These efforts should allow the base to significantly decrease MSW disposal and help the base to meet pollution prevention goals.

The participation of base personnel (including tenants) in the recycling program appears to be pretty good. A survey of the MSW dumpsters on the base indicated some recyclables, in particular cardboard, were still put in the dumpsters. The solid waste coordinator should conduct quarterly inspections of the dumpsters to note recyclables present and advise personnel using the dumpsters of the need to recycle.

The base operates a compost pile for yard wastes. The base chips branches to make wood chips to mix into the compost pile. Large stumps and telephone poles are put in the wood recycle dumpster.

An important PPO implemented at Westover ARB that could be applied to other bases is the industrial food grinder used at the Club dining facilities. The food grinder is used to grind food wastes cleared from dishes and separated from paper and plastic. The ground food is washed to the sanitary sewer with copious amounts of water in a stainless steel tray. The only problem with the system is it can cause blockages in the sewer. Preventive maintenance is required to prevent the blockages. For more information about the industrial grinder, see PPO MSW-7.

5.9.2 Hazardous Waste and Industrial Waste (WST)

Westover ARB successfully met its 1996 USAF pollution prevention goal for HW. As seen in Table 3-6, the base met that goal by reducing HW disposal by 47 percent in 1996. In 1997, the base achieved an even further reduction of 51 percent below the baseline. The baseline for Westover ARB was set at 73,354 pounds. These are typical reductions when compared with reductions achieved throughout the Command. The base disposed of just over 36,000 pounds of HW in 1997, the highest reported by any of the bases.

Table 3-7 shows the top five HW streams generated by the base in 1997. Spill debris contaminated with oil was one of the larger waste streams generated. In most states, oil spill debris is reported as non-hazardous industrial waste; however, the State of Massachusetts regulates used oil and oily debris as a state waste, so Westover ARB is required to manage oil spill debris as HW. The base would benefit greatly by participating in an absorbent reconditioning program. By doing so, Westover ARB will substantially reduce the quantity of spill debris being disposed of as HW. The Massachusetts Department of Environmental Quality has advised that this is an acceptable form of treatment as long as no free liquid can flow from the used absorbent pad when squeezed or compressed. Additional information regarding the absorbent reconditioning program can be found in PPO IW-2.

The reason Westover ARB generates so much spill debris is primarily attributed to the C-5 aircraft, which according to base personnel "leak like a sieve." However, the base could do a better job reducing this waste stream. Observations during the site survey identified many "clean" absorbent pads being discarded after one use. The base should try to use smaller absorbent pads for leaks and reuse the pads as much as possible. See PPO IW-1 for more information on improved absorbent management.

As mentioned above, used oil is a regulated waste in Massachusetts, so Westover ARB is required to manage its used oil as HW. The base reported almost 50,000 pounds of used oil that was recycled in 1997. This figure is consistent with the number and type of aircraft (16 C-5 aircraft) maintained by the base, as well as the large number of vehicles (350) and powered-AGE equipment (104) serviced by the base.

The next largest HW stream generated by the base in 1997 was Citrikleen solvent (reported under miscellaneous). This solvent is used in degreasing tanks to remove oil, grease, and dirt from aircraft and motor vehicle parts. The solvent has a low flashpoint and is therefore considered a HW. The base has since eliminated the use of Citrikleen, and will no longer be generating this waste. However, because Westover ARB has switched almost entirely to aqueous parts washers for their parts cleaning operations the base will be generating a new hazardous or industrial waste when it begins to dispose of the wash water.

Westover ARB generated approximately 105,000 pounds of IW in 1997. Over 77,000 pounds of this (reported in Table 3-7 in the "water/fuel mix" category) can be attributed to waste generated during sandblasting and maintenance operations performed on underground fuel lines. The base also recycled over 10,000 pounds of lead-acid batteries and over 5,500 pounds of oil/fuel filters. The high amount of used oil/fuel filters is attributable to the high fuel throughput at the POL complex. The 4,061 pounds of miscellaneous waste is waste antifreeze which is recycled on-site by an off-base contractor.

5.9.3 EPA-17 Chemicals (WST)

Westover ARB has done a great job of reducing EPA-17 chemical purchases from the baseline year 1992. The base reported 71 and 85 percent reductions in EPA-17 chemical purchases for 1996 and 1997, respectively. These reductions have occurred primarily through implementation of the Hazmart and substitution of EPA-17 chemicals with other chemicals. Also certain PPOs have helped reduce EPA-17 usage, in particular using bead blasters to strip paint instead of methylene chloride.

Although the Hazmart has been successfully implemented, it appears that there are still numerous HAZMATs and EPA-17 chemicals in individual shops. The Hazmart, with assistance from the BEE, should reassess the HAZMAT needs for all shops to reduce or eliminate quantities of stock issued, in particular those that contain EPA-17 chemicals. It would also be worthwhile to include the Massachusetts Army Guard unit in the Hazmart system to reduce EPA-17 chemicals present in their shops.

Another recommendation is to replace the methylene chloride and the paint gun cleaner (containing EPA-17 chemicals) in the Corrosion Control shop with a nonhazardous chemical such as Safe-Strip (see PPO EPA-4 for more information). Also in the Corrosion Control Shop, MEK is used to strip paint from the radar domes on the nose of the C-5 aircraft. The Technical Order requires MEK be used because of the sensitive equipment and 17 layers of paint that have to be stripped. About one gallon is needed per plane, and they strip four to six planes per year.

5.9.4 Ozone Depleting Substances (WST)

The base has been successful in reducing Class I ODS purchases. As shown in Table 3-11, the base reported a 97 percent reduction in ODS purchases for 1997.

The base does not have an HMP, but is required to have one. Westover ARB has one halon fire suppression system in Building 1501. The system has been programmed for removal since FY 1994. Upon completion of renovations to Building 1501, the halon system will be replaced with a sprinkler or spray/mist fire suppression system. The base has numerous halon fire extinguishers for use on the flightline. Currently, there is no approved substitute for these extinguishers.

Westover ARB has numerous AC/R units that use Class I ODSs. The base manages their AC/R units by tracking servicing and unit relocation through their recurring maintenance system. Major leaks, if and when they occur, are reported to the 439 SPTG/CEV. The base does not have an RMP; however, a memorandum was obtained from the 439 SPTG/CEV that reportedly satisfies the requirement for an RMP. Whether this memorandum does satisfy the RMP requirements should be determined by HQ AFRC/CEV.

5.9.5 Pesticides (WST)

The Westover ARB PMP does not incorporate the IPM strategies identified in DoD Instruction 4150.7. Specifically, pesticides are applied to base buildings on a routine schedule with limited monitoring. However, there have been no pesticide, herbicide, or fertilizer applications performed on base grounds for the past two years. Pesticide data for FY 1993 and FY 1996 were

not available from base personnel; therefore, the pesticide data reported to HQ AFRC/CEV was determined to be the best data available and was used to compute the pesticide metrics in Table 3-15. In addition, no information was available on the historic use of herbicides on base.

Currently, pesticide applications in buildings and facilities are performed under contract. The base QAE overseeing the pesticide contract receives monthly invoices from the pesticide contractor from which pesticide application amounts are derived. Westover ARB personnel do not use the WIMS system to calculate the amount of active ingredient in the pesticides applied. Instead, base personnel manually calculate the pounds per active ingredient applied, using information obtained from the pesticide contractor receipts.

5.9.6 Volatile Air Emissions (WST)

Westover ARB has done a good job reducing VOC emissions. Painting operations have been reduced through the extensive use of vinyl lettering machines. The AGE Shop uses vinyl lettering almost exclusively, and the Corrosion Control Shop uses vinyl lettering on aircraft tails. Shop personnel estimate that 60-70 percent of the painting has been reduced due to use of the vinyl lettering machine. The base also has a vapor recovery system on their gasoline pump.

Westover ARB is a leader in solvent reductions. In fact, there are only three solvent vats on the entire installation. The Wheel and Tire, Vehicle Maintenance, and AGE Shops have all eliminated the use of solvents through the use of aqueous parts washers and solvent-free cleaners. Although other bases in the Command have feared possible corrosion problems with some parts in the aqueous parts washers, Westover ARB uses corrosion preventative additives in their aqueous parts washers and have had no corrosion problems.

There are no alternative fuel vehicles at the base. The base needs to reduce its fleet of gasoline and diesel powered vehicles and replace them with alternative fuel vehicles, especially electric carts and trucks. Furthermore, the base should acquire more bicycles for personnel to use on the base. The only bicycles seen were at the Welding Shop.

Westover ARB personnel need to actively reduce and substitute for HAZMATs in the shops. For example, several shops had upwards of 30 to 40 cans of spray paint in their flammable lockers, even though shop personnel assessed their spray paint usage as minimal. Also, low-VOC and water-based paint substitutions need to be considered.

5.10 WILLOW GROVE ARS (WIL)

5.10.1 Municipal Solid Waste (WIL)

All of the MSW disposal and recycling activities at Willow Grove ARS are handled through the Naval Air Station (NAS). The NAS does not quantify the amount of MSW that they collect from Willow Grove ARS, and therefore, the base does not have or report any MSW metric data to HQ AFRC/CEV. The status of the Willow Grove ARS MSW program was determined through interviews with key personnel and visual inspection.

The types of material that Willow Grove ARS recycles are limited to the scope of the NAS recycling program, which includes the following items:

- Aluminum cans
- Paper (three types)
- Cardboard
- Yard waste
- Scrap metal
- Pallets and wood.

The base also recycles fluorescent lamps through DRMO.

Once per week NAS recycling personnel pick-up aluminum cans, paper, and cardboard from a central location at each building. It is up to building personnel to take their recyclables to their buildings central location. Aluminum cans and the three types of paper each have a separate bin and are not commingled. The cardboard is placed on the ground next to the MSW dumpsters.

If the base wants to recycle yard waste, scrap metal, or pallets and wood, it must transport these items to the appropriate location on NAS property. The money that the NAS recycling program generates with Willow Grove ARS's recyclables is put into the NAS Morale, Welfare, and Recreation (MWR) program and not returned to the base (Willow Grove ARS personnel use the NAS MWR facilities and services).

Willow Grove ARS does not recycle glass, plastic, or toner cartridges because the NAS does not recycle these items. It is recommended that the base look into the costs of recycling some of these items on their own through the use of a local contractor.

Recycling bins for aluminum cans and paper are well located in offices and shops throughout the base. A dumpster survey found some recyclables being thrown in the trash, but overall participation was very good. The base recycling coordinator does an excellent job motivating base personnel to take an active role in recycling. He performs quarterly dumpster surveys and confronts building managers when recyclables are found. He also generates a report of the findings and e-mails it basewide.

5.10.2 Hazardous Waste and Industrial Waste (WIL)

Willow Grove ARS has been unable to meet the USAF pollution prevention goals for HW disposal. These goals call for a 25 percent reduction in HW disposal by 1996 and a 50 percent reduction by 1997 based on the calendar year 1992 baseline.

As shown in Table 3-6, Willow Grove ARS met the 1996 goal by reducing HW disposal by 28 percent. However, in 1997 there was a sharp increase and HW disposal rose to 3 percent above the baseline. The baseline established for Willow Grove ARS was 8,096 pounds. The base has achieved some of the smaller reductions when compared to reductions made throughout the Command. The reason for this increase in HW disposal for 1997 can be explained by the addition of a new hazardous waste stream, aqueous jet washer wastewater.

Table 3-7 shows the top five HW streams that were generated by the base in 1997. The largest waste stream generated was spent solvent waste. There are many solvent tanks in use throughout the industrial shops at Willow Grove ARS. The base has purchased numerous aqueous parts washers, but has not taken the next step of removing its solvent tanks. The base needs to remove unnecessary solvent tanks and centrally locate solvent tanks for sharing among adjacent shops.

Unfortunately, the acquisition of these aqueous parts washers has created a new waste stream. The Naval Air Station (NAS) Willow Grove operates the wastewater treatment facility and will not accept the wastewater from the jet washers. Therefore, the base collects this waste stream in drums and disposes of it as HW because of heavy metal contamination.

The base is currently seeking an alternative disposal or handling method for the aqueous jet washer wastewater. Several recommendations can be made as to the fate of this waste stream, including:

1) Decreasing the frequency of wash water changes to a year or more; this will reduce the overall amount of HW generated and subsequently reduce disposal metrics;

2) Increase the frequency of wash water changes to monthly or bimonthly services. By doing so, the concentration of metals should be below regulatory limits, allowing the wash water to be disposed of as an industrial waste. Disposal costs will increase but HW disposal metrics will show a significant decrease;

3) Pursue negotiations with NAS Willow Grove for permission to discharge the wash water to its FOTW. This will reduce both HW disposal metrics as well as disposal costs. In the meantime, we recommend that no new jet washers be installed on the base until this new waste stream is managed properly.

Willow Grove ARS also generated a lot of paint waste in 1997. The base maintains five individual paint booths. Paint waste is generated at all of the paint booths resulting in redundant and unnecessary waste disposal. The base should consolidate the paint booths, eliminating two or three of the smaller booths, which should effectively reduce the generation of multiple paint waste streams and reduce paint waste disposal.

Another waste stream is wash water contaminated with cadmium from C-130 engine compressor washes. The USAF has been aggressively researching alternatives that would reduce or eliminate this waste stream; however, an acceptable alternative has not yet been identified. Each C-130 base in the Command is managing its compressor wash differently. Some bases are discharging directly to the sewer, other are collecting the wash water and disposing of it as an HW, and others have literally stopped doing compressor washes altogether. Currently, the base is discharging the waste wash water to the Navy's wastewater treatment plant.

The remaining quantities of hazardous waste generated are consistent with the size of the base and the number of aircraft serviced. The base maintains 12 C-130 aircraft on the Reserve side and 16 A-10 aircraft on the ANG side.

Willow Grove ARS generated approximately 180,000 pounds of industrial waste in 1997; this number is among the highest in the Command. However, over 77,000 pounds can be

attributed to maintenance performed on oil/water separators and another 40,000 pounds can be attributed to IRP/UST projects. See PPO HW-2 in the PPOA for information on efficient oil/water separator management techniques that will reduce waste generation.

Additionally, the base generated just over 31,000 pounds of used oil and 7,300 pounds of contaminated spill debris which is typical for a base that has 28 aircraft, 255 vehicles, and 135 powered-AGE equipment to maintain.

5.10.3 EPA-17 Chemicals (WIL)

According to the metrics, Willow Grove has achieved good reductions in EPA-17 chemical purchases since 1992. The reductions for 1996 and 1997 were 81 and 71 percent, respectively; however, the 1997 number is the second highest total in the Command. Even though the base flies and maintains 28 aircraft (12 C-130s and 16 A-10s), the EPA-17 usage numbers seems quite high. It is important to note that the 1992 baseline number of 7,867 pounds is the second highest in the Command.

Upon closer inspection, it appears that the metrics reported by the base are seriously flawed. The Hazmart is using the EMIS system to input MSDS information and to issue chemicals to the shops. Unfortunately, this information is not being used to generate the EPA-17 metrics that are reported to HQ AFRC/CEV. The BEE is still using the M-15 reports and the HMP2 (Hazardous Material Pollution Prevention Module) computer program to come up with the chemical issue data. Also, many of the MSDSs being used by the BEE are old and outdated, and much of the chemical constituent data has changed. To remedy this reporting problem, the BEE's office needs to get on-line with the EMIS system as soon as practicable.

Numerous EPA-17 substitute products were found at the base including:

- Use of a vinyl stencil machine for marking and labeling instead of spray painting
- Substitution of EPA-17 chemical containing solvents with non-EPA-17 solvents or aqueous parts washers
- Use of a non-hazardous black ink-roller to paint propeller tips instead of using spray paint
- Use of one-coat paints at the munitions paint shop to reduce the number of coats needed
- Use of physical paint stripping instead of methylene chloride or MEK.

Despite the successes in reducing EPA-17 chemical usage, there are several areas where the base could improve. The Corrosion Control Shop uses excessive amounts of MEK to wipe down parts prior to painting. This MEK usage should be substituted with an alternative product such as isopropyl alcohol or naphtha. Also, lacquer thinner containing more than 50 percent EPA-17 chemicals is being used to clean paint guns at all five paint shops on base. The base should consider an alternative paint gun cleaner like Safe-Strip.

The fuel cell is using 5 to 10 gallons of MEK per year. This amount could be reduced by substituting MEK with 4-Part Cleaner, which contains a much lower percentage of MEK.

Several aircraft maintenance shops, including Isodock, Electroenvironmental, and Avionics, are using very high quantities of 1,1,1-trichloroethane to clean various surfaces and connections. Minneapolis-St. Paul IAP-ARS, which flies the same model aircraft (C-130E), has been able to use isopropyl alcohol instead of 1,1,1-trichloroethane in its aircraft maintenance shops.

One of the largest uses of EPA-17 chemicals on the base is at the ANG Armament Shop, Building 346, which uses Perma Slik G to spray ammunition. Perma Slik G contains 90 percent EPA-17 chemicals, including about 70 percent methylene chloride. Use of the spray is required by Technical Order. The shop is using about six spray cans per day. A search on PRO-ACT indicated that there is no suitable substitute.

5.10.4 Ozone Depleting Substances (WIL)

According to the Class I ODS purchase data for Willow Grove ARS, the base has virtually eliminated Class I ODS purchases in the past two years. Only six pounds of ODSs were reported purchased in 1997, which is almost a 100 percent reduction in ODS purchases from the 1992 baseline. Unfortunately, the ODS metrics reported by the base appear to be incorrect because of record keeping problems at the base (see the EPA-17 discussion for more information). The ODS metrics for Willow Grove ARS are probably much higher than six pounds.

The base is not required to have an HMP, because there are no halon fire suppression systems on base.

Willow Grove ARS does not need an RMP, because they do not operate AC/R equipment.

The 913 AW aircraft maintenance shops, specifically Isodock, Avionics, and Electroenvironmental, are still using a significant amount of 1,1,1-trichloroethane in their everyday operations. There are numerous substitutes that can be used by these shops to eliminate the use of 1,1,1-trichloroethane. Avionics and Isodock can use isopropyl alcohol to clean electrical connections, and the Electroenvironmental Shop can use any of a variety of ODS-free electrical contact cleaners that are available. The 1,1,1-trichloroethane usage is the predominant ODS still being used at the base.

5.10.5 Pesticides (WIL)

Willow Grove ARS has a short PMP that is probably adequate for the installation. The base uses less than 5 pounds of pesticides per year and does a good job using IPM procedures.

All pesticide application functions are provided under contract. The contractor follows IPM through the application of pesticides once a week in approximately three to four buildings, rotating spot surveys and treating areas only as necessary. The installation QAE for the pesticide contractor performs building and facility inspections with the contractor. It should be noted that even though it is not required under the contract to inspect the areas where contractors apply pesticides, these inspections are performed as part of a QA process. However, the current contract

verbiage is not broad enough to require reporting or treatment for such things as bees and wasps. As a result, if these treatments are performed, they were not necessarily reported.

The current contract does not include provisions for herbicide applications. Installation Roads and Grounds personnel apply the herbicide Roundup™ to the cracks in the pavements and flightline on an as needed basis. They use approximately one pound or less of Roundup™ per year. On a positive note, the base does not apply fertilizers to their landscaped areas.

5.10.6 Volatile Air Emissions (WIL)

Willow Grove ARS has made significant progress in reducing VOC emissions. They have acquired seven aqueous parts washers over the past two years and several more are planned. Unfortunately, wastewater from these machines is being disposed of off-base by a hazardous waste contractor and not in the sanitary sewer. The base has had a difficult time gaining approval from the NAS's treatment works to discharge this wastewater. The base should strongly consider hiring a consultant and formally negotiating with the NAS on this and other discharge issues. In the mean time, the base should discontinue purchasing new aqueous parts washers until a suitable disposal method is identified.

Even though the base has been active in purchasing aqueous parts washers, they still have numerous solvent tanks. The base should remove unnecessary solvent tanks and initiate more sharing of solvent tanks between adjacent shops. This recommendation is especially important for Building 320, which is home to many of the 111 FW's maintenance shops.

The base has a few electric utility carts and five duel-fueled CNG vehicles. The CNG conversions were accomplished through the AFVSPO. More funding is required to accomplish additional CNG conversions. Electric trucks and utility vehicles should also be strongly considered. Electric utility carts are perfect for a base the size of Willow Grove ARS.

The base needs to do a better job of reducing VOC emissions from painting operations. It is recommended that the base consolidate the operations of the five different paint booths on base. The base has two vehicle maintenance paint booths, two aircraft paint booths, and a paint booth at the munitions facility. The base should shutdown at least two of these paint booths through the consolidation of operations, off-base contractor painting, or the use of NAS painting facilities.

5.11 YOUNGSTOWN ARS (YNG)

5.11.1 Municipal Solid Waste (YNG)

Youngstown ARS has generally been successful in meeting the USAF pollution prevention goals for MSW; however, the base has not reduced MSW disposed since 1993. As can be seen in Table 3-2, Youngstown ARS achieved a 52 percent reduction in 1993; a 40 percent reduction in 1996; and a 48 percent reduction in 1997. The 1997 goal is for a 50 percent reduction in MSW disposed; therefore, the base did not meet its 1997 goal.

When comparing Youngstown ARS's progress in meeting USAF MSW goals to other bases, it is important to note that the number of planes at the base has increased from 8 to 16 planes in the past few years. Also, there have been increases in the number of employees at the base.

Another reason Youngstown ARS has not been able to meet USAF MSW goals is attributable to the solid waste disposal contract and contractor. The previous contractor did not pick up for recycling anything more than high-grade paper and cardboard. The new contractor will be required to pick up for recycling high-grade paper, plastic, glass, newspaper, and cardboard. Currently, aluminum cans are also collected on base. These cans are picked up weekly by an individual from off-base who takes them to a recycling facility for his own personal gain.

Youngstown ARS has a recycling rate of 27 percent; however, there is room for improvement. The potential for improvement in the recycling program was confirmed by inspecting solid waste dumpsters throughout the base. This survey of dumpsters indicated that a lot of recyclable materials are being disposed as municipal solid waste.

There does not appear to be enough recycling receptacles at the base. There are only nine cardboard dumpsters at the base. At many buildings cardboard is collected on office and shop floors until someone from the shop puts it in their car and drives it to the nearest cardboard dumpster on base, which makes it inconvenient to recycle. There are only four newspaper recycling cans on base; these consist of small (2'x3'x1') blue recycling bins. These bins are picked up by CEV personnel who drive them to an off-site recycling collection center. Even with the new contract, plastic and glass recycling is only going to occur in a few locations.

Other problems noted at the base include the following:

- An overall lack of awareness about the recycling program is pervasive at the base. A lot of recyclable material is placed in dumpsters instead of the recycling bins that are available.

- The base recycles pallets but does not recycle its other wood scraps or sawdust.

Some recommendations for improving the base's recycling program include the following:

- Providing more cardboard only dumpsters throughout the base. Cardboard was found in a lot of refuse dumpsters especially where cardboard dumpsters were not available.

- Expanding the scope of the recycling program to include plastic bottles, glass, magazines (glossy), newspapers, and scrap wood. A waste disposal company should be used to pick up all of these materials. Recycling containers for aluminum cans, plastic bottles, newspapers, magazines, and glass should be provided in all administrative and industrial buildings. Scrap wood recycling should be provided only for those shops that generate wood (e.g., Base Supply and Carpentry). A successful recycling program could reduce MSW generation by 25-50 percent and allow for less frequent pick-ups of waste by the contractor, which may offset some of the increased costs of recycling. Glass recycling should also be included at billeting and the Club, where bags of beer bottles are thrown out daily.

- An intensive recycling awareness program should be implemented. This program should focus on teaching all base personnel about the importance of recycling and should be reemphasized every quarter.

On a positive note, the base does collect all of its tree limbs and leaves that collect along fence lines and chips them into mulch. Also, the base uses mulching lawn mowers to eliminate the need to bag grass clippings and leaves.

5.11.2 Hazardous Waste and Industrial Waste (YNG)

Youngstown ARS has successfully met the 1996 USAF pollution prevention goal for HW disposal. As shown in Table 3-6, the base was able to meet its goal in 1996 by reducing HW disposal by 68 percent. However, in 1997, HW disposal increased, resulting in an overall reduction of 53 percent below the existing baseline. These reductions are typical when compared with reductions made throughout the Command. It should be noted that over the past several years the number of aircraft increased from 8 to 16, which may be the cause of the increase in HW disposal that occurred in 1997. The baseline for Youngstown ARS was set at 11,790 pounds.

Table 3-7 shows the top five HW streams that were generated by the base in 1997. Spent solvent waste was the largest waste stream generated. These solvents were used in degreasing tanks to clean aircraft and vehicle parts. The solvent usage is a little high compared to other C-130 bases. The base should consider reducing solvent usage by sharing solvent tanks among adjacent shops and by reducing change-out frequencies by increasing the time between service intervals.

The next largest waste stream disposed of by the base was waste fuel. This fuel is derived from several locations throughout the base and cannot be reclaimed at the POL facility due to contamination from water and dirt. The reason for the large amount of fuel was a one-time "fluke" and should not occur again in the future.

Another prevalent waste stream generated at Youngstown ARS is glass blast media. This material is used to strip rust and paint from various pieces of equipment. The blast media is often contaminated with heavy metals from the paint and rust being removed. Currently, there is no other way to manage this waste stream other than disposal. Youngstown ARS has looked into using plastic bead media (PBM) in place of glass during this process, but it is not acceptable for this use.

The remainder of the HW generated at Youngstown ARS is consistent with the size of the base and the number of aircraft serviced. The base maintains 16 C-130 aircraft.

The base generated over 40,000 pounds of industrial waste in 1997. This was one of the lowest amounts reported in the Command. Youngstown ARS generated just over 20,000 pounds of waste oil last year. The base also generated 2,400 pounds of spill debris and 2,000 of used oil/fuel filters. These rates are typical of a base with 16 C-130 aircraft.

5.11.3 EPA-17 Chemicals (YNG)

Youngstown has experienced excellent reductions in their purchases of EPA-17 chemicals since the baseline year 1992. These reductions are especially impressive given the

increase from 8 to 16 aircraft since 1993. The reductions for 1996 and 1997 were 87 and 86 percent, respectively.

During the site survey, the shops at the base that were identified as using the most EPA-17 chemicals were the Corrosion Control Shop, the CE Paint Shop, and the Navy/Marine Motor Pool. The following paragraphs discuss areas where EPA-17 chemical usage is of concern and provide recommended PPOs to address these concerns.

Large quantities of EPA-17 chemicals are used at the Corrosion Control Shop. Many of the paints and solvents contain MEK, MIBK, toluene, xylene, and methylene chloride. Additionally, lead and chromium paints are present. The recommended PPO is to perform an EPA-17 chemical survey and inventory of all paints and solvents that contain EPA-17 solvents and metals. The survey should identify why these chemicals are needed and if they can be eliminated and/or replaced with substitutes. See PPO EPA-1 in the PPOA for more information about identifying substitute products.

The Safety Kleen Paint Gun Cleaner at the Corrosion Control Shop is predominantly toluene, xylene, MEK, and MIBK. Five gallons of this solvent are changed out by Safety Kleen every month. This usage is not being tracked by the Hazmart, and therefore, has not showed up in EPA-17 purchase metrics. It is recommended that an alternative paint gun cleaner, like Safe-Strip, be used.

The Navy/Marine Motor Pool has more than 15 one gallon cans of paint and 80 aerosol spray paint cans, many of which contain EPA-17 chemicals. These were ordered recently and the shop supervisor stated that this paint should last about one year. Currently, the Navy/Marine Motor Pool is not participating in the Hazmart program. Consequently, they order chemicals in large quantities and then inform the Hazmart. The recommended PPO for this organization is to process all chemical purchases through the Hazmart and require approval of the purchases by the BEE. Additionally, a survey and inventory of all hazardous materials that contain EPA-17 chemicals should be performed to identify why these chemicals are needed and if they can be eliminated and/or replaced with less hazardous substitutes.

Methylene chloride is contained in PGR aerosol spray cans used at the Fabrication Shop. This product is a local purchase item and about four cans are used annually. It is used to remove adhesive from a fitting on the C-130 aircraft. Use of this product is not a requirement of a Technical Order and a substitute should be easy to find.

The Propulsion Shop uses a lot of black aerosol paint that contains toluene to paint the tips of the propellers. This accounted for 26 pounds of EPA-17 chemicals for the first 10 months of 1997. Instead of using black spray paint for the propeller tips, the base should consider using a black marking ink-roller similar to the one being used at Willow Grove ARS's Propulsion Shop (see PPO EPA-5 for more information). Also, the Propulsion Shop is using MEK on the C-130 propeller boots that protect the heating element. This usage is Technical Order driven. This repair occurred very frequently in 1997 for reasons unknown to shop personnel.

5.11.4 Ozone Depleting Substances (YNG)

The base has been successful in reducing Class I ODS usage. The base reported a 99 percent reduction in ODS purchases for 1997 (see Table 3-11)

The base does not need an HMP, because it does not have any fire suppression systems containing halons. The base does have halon fire extinguishers.

The base has a short, but adequate RMP. This plan outlines procedures and locations for Class I and II CFCs on base. The base has seven pieces of equipment containing R-12 and two pieces of equipment containing R-502. None of this equipment is on fixed schedules for removal. Instead, all pieces of equipment will be replaced at the end of their service lives.

Class I ODS product use has been decreasing due to product substitution. Isopropyl alcohol is being used to replace 1,1,1-trichloroethane at NDI. The concern with this substitution is time (the new method takes all day).

5.11.5 Pesticides (YNG)

The Installation has an adequate PMP that addresses several IPM techniques, pests to be controlled, a schedule for control, and pesticides to be used. The installation provides pesticide/herbicide use information to HQ AFRC/CEV in terms of pounds of active ingredient applied; however, the data was flawed. Under further investigation, an error was identified in the WIMS Pesticide Module. Due to the extent of this error, accurate pesticide/herbicide usage was not obtained; therefore, pesticide metrics data for the base are based on estimates. Currently, the installation is investigating different methods to determine usage accurately.

On a positive note, the base does not apply fertilizers to their landscaped areas.

5.11.6 Volatile Air Emissions (YNG)

Youngstown ARS has implemented several pollution prevention opportunities that have been successful in reducing VOC emissions. Youngstown ARS has approximately 10 electric utility carts. Base personnel prefer these carts over traditional pick-up trucks because they are quick to start, fun to drive, and easy to park. Also, the cold winter temperatures do not noticeably decrease the battery performance of the carts.

Several shops have been proactive in reducing their usage of solvent tanks. The Propulsion Shop has an aqueous jet washer and really likes it. Also, the AGE Shop has eliminated the need for a solvent tank. AGE personnel realize that AGE parts do not need to be cleaned as thoroughly as aircraft parts; therefore, solvents are not necessary. For example, AGE personnel clean greasy wheel bearings by squeezing new grease in one end which pushes the old grease out the other. It is not necessary to thoroughly clean the wheel bearings, because AGE parts do not need to be spotless; they are not high performance pieces of equipment. Other AGE shops should follow this example. When necessary, the AGE Shop uses the aqueous parts washer in the Propulsion Shop located next door.

The Corrosion Control Shop uses HVLP paint guns and some low-VOC paints; however, an extensive survey of paint and solvent substitutes is needed to achieve further VOC reductions. The CE paint shop has done an excellent job reducing VOC emissions by making exclusive use of water-based paints for interior and exterior paint jobs, as well as for road and traffic marking. The CE Paint Shop also uses a vinyl lettering machine, although it could be used more frequently. Another painting recommendation is to get the Navy/Marine Motor Pool on-line with the Hazmart. They purchase all their paints and chemicals for the year at one time. Current inventory includes 80 cans of spray paint, 18 one-gallon paint cans, etc. None of this paint is low-VOC paint.

6. CURRENT STATUS OF AFRC AFFIRMATIVE PROCUREMENT PROGRAMS

6.1 GENERAL OBSERVATIONS

A review of the affirmative procurement programs for ten AFRC installations was conducted between September 1997 and March 1998. (A review of the Niagara Falls ARS affirmative procurement program was conducted in October 1996). The status of the affirmative procurement programs was determined based on interviews with personnel from the following organizations:

- Civil Engineering-Environmental
- Civil Engineering-Construction
- Civil Engineering-Operations
- Base Supply
- Contracting
- Vehicle Maintenance
- Tenant organizations with affirmative procurement responsibilities
- Other maintenance organizations that could affect the affirmative procurement program.

During the interview process, each organization was asked to review its implementation of the affirmative procurement program on base. Records of affirmative procurement purchases or contracts, if kept, were reviewed to determine implementation status. Specific affirmative procurement opportunities were discussed to determine if the bases were implementing them.

The quality of the affirmative procurement programs at AFRC facilities ranged from one installation that had a well-developed affirmative procurement program in place to another installation –in at which a number of critical affirmative procurement officials did not know what affirmative procurement meant.

There were a number of reoccurring issues that came up during the site visits. These issues included:

1. Fully understanding the requirements of affirmative procurement and whose responsibility it was for implementing the program (i.e., Base Supply, Contracting, Civil Engineering)

2. The de-centralization of purchases using government purchase cards

3. The discontinuation of the base office supply store and allowing individuals to purchase their own office supplies using government purchase cards

4. The lack of confidence in the use of retread tires for passenger car and bus tires.

6.1.1 Understanding the Requirements of the Affirmative Procurement Program

Many bases knew that they needed to implement an affirmative procurement program at their base, however many did not have a system in place to track its implementation. There were a number of bases where the base supply was stocking many varieties of paper that complied with the RMAN requirements. About half of the vehicle maintenance shops were using re-refined oil. Some of the civil engineering construction shops were including affirmative procurement requirements in their construction bids and specifications. All of these efforts were done under the initiative of one or two proactive individuals on base, but there was no concerted effort to establish a defined affirmative procurement program, with the exception of Youngstown ARS. With the use of this plan, it is hoped that each AFRC base will be able to implement a fully-functional affirmative procurement program.

6.1.2 Decentralization of Purchasing Using the Government Purchase Card

As with all other federal facilities, AFRC installations are decentralizing the purchasing of products and services by allowing selected individuals at the facilities to use the Government purchase card. The Government purchase card is a credit card that has a number of restrictions on what can and cannot be bought with it. The USAF has a set of procedures for the use of the Government purchase card that are listed in the document: *United States Air Force Internal Procedure for Using the International Merchant Purchase Authorization Card (IMPAC)* (USAF, 1997b). Section 3.8 of this document mentions purchases must conform to the EPA Guideline Items. However, it has been found that in practice most purchasers using Government purchase card. Government purchase cards are not aware of the requirements to purchase products locally that contain recycled-content products. In many cases, Government purchase card users are purchasing paper, office supplies, and other materials that do not conform to the RMAN. Many of these products could easily be purchased from the same sources and conform to the RMAN requirements if the Government purchase card user knew the requirements.

Another issue associated with the use of the Government purchase card purchases is the tracking of purchases that may meet the affirmative procurement RMAN guidelines. Current reporting does not require the user to determine if the product that they bought meets or exceeds the RMAN requirements. Therefore, there is no tracking of a significant portion of the purchases that could be applied to affirmative procurement initiatives.

Only a few of the bases provide Government purchase card users with training in the purchasing of products that meet affirmative procurement requirements. Only one base, Youngstown ARS, actually does an audit of the Government purchase card users to ensure that they are purchasing products that meet the recycled-content goals of the RMAN.

6.1.3 The Demise of the Base Supply Store

The increased use of the Government purchase card has meant the demise of the base supply store. This store was normally located adjacent or associated with Base Supply, where staff from the installation could purchase items including office paper, folders office supplies, and other items that are listed in the Guideline Items. Most of the base supply stores would stock recycled-content products and would prominently display the fact that these products contained recycled content. As was mentioned above, AFRC facilities, like many other federal facilities, are decentralizing the purchase of products and services through the use of the Government purchase card. Many of the users of Government purchase card are going off-base to stores such as Staples, Office Depot, or OfficeMax to purchase many of the items that they formerly bought in the base supply store. Since the base supply store restricted the stock to only those items that met the EPA RMAN, affirmative procurement was assured. Purchases made at these off-base locations may or may not meet affirmative procurement requirements, and if they do, they are more difficult to track than the purchases made at the base supply store.

6.1.4 Reluctance in Using Retread Tires For All Applications

The use of retread tires on the rear wheels of heavy trucks and vehicles with wheels greater than 16 inches is ubiquitous throughout the AFRC. For other applications, there is a reluctance for some to use retread tires because of the myth that these tires are unsafe. Many stated that there are USAF technical orders that do not permit retread tires to be placed on buses or on the front wheels of all vehicles. A number of studies have been conducted that conclude that retread tires are as safe in all situations as a comparable virgin tire. The Tire Retread Information Bureau [(408) 372-1917] has a lot of information that they can provide to dispel this myth. Most aircraft tires, including C-130 and KC-135 tires, are retread tires which have been utilized for many years. Each base will need to strongly encourage their vehicle maintenance personnel to stop buying virgin tires and emphasize the use of retread tires.

6.2 BASE-SPECIFIC AFFIRMATIVE PROCUREMENT STATUS

The following sections provide summaries of the current status of affirmative procurement programs at the AFRC bases that were visited. Table 6-1 provides an overview of the current status of each base's compliance with meeting affirmative procurement requirements in each of the eight CPG categories. Since all bases do not currently have a formal process in place to track compliance with affirmative procurement requirements, a subjective analysis was conducted of each base's program. The results shown in Table 6-1 are based on observations made during the site visit and conversations with key affirmative procurement base personnel. The correlation between Table 6-1 and Table 3-12 (Affirmative Procurement Opportunities at Bases) shows that bases who have already implemented affirmative procurement opportunities are at a higher compliance level than those bases who have not implemented opportunities.

Table 6-1. AFRC Base Estimated Affirmative Procurement Compliance Status by CPG Category (percentage of compliance)

Base	CPG CATEGORY							
	Paper and Paper Products	Vehicular Products	Construction Products	Transportation Products	Park and Rec. Products	Landscaping Products	Non-paper Office Products	Miscellaneous Products (Pallets)
Dobbins ARB	50	50	60	10	N/A	10	10	N/A
Gen. Mitchell IAP-ARS	90	60	30	10	N/A	40	70	N/A
Grissom ARB	30	70	10	10	N/A	50	50	N/A
Homestead ARS	30	70	10	10	10	10	30	N/A
March ARB	40	60	10	10	N/A	10	10	N/A
Minn. St. Paul IAP-ARS	40	60	30	10	N/A	30	20	N/A
Niagara Falls ARS	80	40	30	10	N/A	40	70	N/A
Pittsburgh IAP-ARS	40	40	40	30	N/A	30	40	N/A
Westover ARB	90	40	80	20	50	80	80	N/A
Willow Grove ARS	50	60	10	10	N/A	10	10	N/A
Youngstown ARS	90	70	50	30	N/A	30	70	N/A

N/A-Category not applicable to base

6.2.1 Dobbins ARB

Program Summary

The affirmative procurement program at Dobbins has not been formalized. Base contracting is knowledgeable about affirmative procurement and wants to implement an affirmative procurement program; however, they are unsure about how to go about doing it. Their major concern about implementing the program is the perceived level of manpower required to do it. They want someone to tell them what vendors in the area can provide recycled products and what those products are.

Specific Issues/Progress

- CE has already begun to write Affirmative Procurement products/requirements into their new construction specifications. They already have an inspector who surveys construction sites to ensure that various requirements are being met. Affirmative Procurement is now included in these surveys.
- There is no formalized tracking procedure in place for affirmative procurement purchases.
- Both the Guard and AFRC reclaim engine coolant.
- AFRC is currently using 100 percent re-refined oil in 15W-40 weight.
- Retread tires are used for large trucks. Cost differential is substantial (e.g., $370 for virgin tire; $100 for retread).
- Retread police car tires are installed on base pickup trucks.
- Can't put retreads on the front of buses, ambulances, and police cars. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

The main problem with both Base contracting and CE is that there is no good way to track Affirmative Procurement purchases and the associated level of recycled materials.

6.2.2 General Mitchell IAP-ARS

Program Summary

Overall, the base has implemented a number of affirmative procurement opportunities, however, there is no formal program in place, nor is there a tracking system implemented to demonstrate compliance.

Specific Issues/Progress

- Recycled goods are purchased through the use of the GSA *Environmental Products Guide.*

- Government purchase card holders can make purchases of up to $1,000 for goods. Each Government purchase card holder receives training in the use of the card, which includes understanding affirmative procurement requirements.

- Government purchase card holder purchases are audited for the first three months of use and annually thereafter. This audit includes checking affirmative procurement compliance.

- The use of construction materials meeting the CPG has not been implemented at the base. CE construction personnel are not aware of the requirement and, therefore, need training.

- Vehicle maintenance uses reclaimed engine coolant, but does not use re-refined oil.

- Retread tires are only used on the rear wheels of large trucks. No retread tires are used on passenger cars. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

6.2.3 Grissom ARB

Program Summary

There is no formally-established affirmative procurement program in place at Grissom. Individual organizations on base are making progress towards affirmative procurement compliance, but there is no tracking system in place to validate this progress.

Specific Issues/Progress

- The base supply store buys recycled products whenever the GSA catalog shows a recycled symbol. (Unfortunately, there is nothing in the stock number that would indicate recycled content).

- The base's current paper contract does not include recycled content paper. A new contract was to be put into place soon, but CEV was unsure if it included recycled paper. When they've tried recycled paper in the past, it has caused their copiers to jam.

- Vehicle maintenance does buy some retread tires; however, they have many restrictions on what vehicles they can put retreads on. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

- No re-refined oil is purchased at this time.
- Base supply stocks a number of items that could be replaced with items that contain recycled-content stocks.
- Base supply stocks re-manufactured toner cartridges, but is very unhappy with their performance. They either do not work or they leak.

6.2.4 Homestead ARS

Program Summary

Affirmative procurement at Homestead ARS parallels the findings at other bases within the Command. The installation does not have an affirmative procurement program; however, they are implementing some initiatives.

Specific Issues/Progress

- Recycled paper in copiers is jamming high speed copiers, but the printers work fine with the recycled paper. Recycled toner cartridges do not work at times, and some leak in the machine.
- The affirmative procurement manager has attended a Greening Conference, but has not received official training in affirmative procurement.
- For new Government purchase card users, three audits are performed in the first three months of card usage, and then they are done once a year. A question in the audit checklist addresses the purchase of recycled materials or recycled content materials, but has only a yes/no response.
- Vehicle Maintenance is active in the use of retread tires and recycling.
- Construction contracts currently do not contain language in the specifications that require affirmative procurement products. The CE site inspector indicated the need for a list of companies that use recycled materials in their building materials. Currently, he is one of the Homestead ARS employees that writes specifications, and he maintains that the requirement for recycled content in building materials cannot be satisfied if the products are non-existent.
- According to the carpet contract QAE, recycled-content carpets need to have a 15-20 year durability rating in order for the carpet to be cost effective. Carpet Policy Regulation ETL 94-3 (AF Policy) sets requirements that recycled materials be used in moderation (see Section 4.4.1 of that regulation). Also, many of the recycled content carpets do not have the Class A material (best) fire rating.

6.2.5 March ARB

Program Summary

There is basically no affirmative procurement program at this base. Purchases are so de-centralized through the use of the Government purchase card, it is almost impossible to determine the affirmative procurement status of the base.

Specific Issues/Progress

- CE construction felt that they could not force contractors to use recycled products because they are not listed in the Means Manual.

- Vehicle maintenance uses retread tires on their large vehicles. They are considering using re-refined motor oil as well. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

- There is no formal training of Government purchase card holders in adhering to affirmative procurement requirements.

6.2.6 Minneapolis St. Paul IAP-ARS

The base is doing a good job in most areas of affirmative procurement, although there is no formal program in place to structure the program or track its progress. Specific organizations have taken it upon themselves to implement affirmative procurement.

Specific Issues/Progress

- All of the paper products that are used on-base have recycled content. This includes primarily bathroom tissue, hand towels and other paper products. Some paper for copiers on base comes through the base supply system and has recycled content. Some copiers on base are leased and the paper is provided by the vendor and it is unknown if the paper contains recycled content.

- The Base Supply Service Store was closing at the time of the visit and all office supply purchases would be made through the use of the Government purchase card. The service store had purchased products for a number of years that contained recycled content.

- There did not seem to be a process in place to review purchases made through the use of the Government purchase card to determine if they meet the affirmative procurement guidelines.

- Contracting had mentioned that they only specify recycled-content products for local purchases over $10,000 because that is the threshold for the requirement. They were informed that the threshold of $10,000 was for the entire Air Force and

that any purchase of a EPA Guideline Item would have to be specified to contain recycled content that meets the EPA RMAN.

- Civil Engineering Construction has a requirement in the specifications that requires the use of recycled-content materials that conforms to the EPA RMAN guidelines. However, since the specifications have been changed, they have not had a construction project to demonstrate its effectiveness. They were not sure how they were planning on confirming that the contractor doing the construction is using materials with recycled-content (such as concrete).

- Civil Engineering Operations was not aware of the requirements for affirmative procurement and was not purchasing items that would meet the affirmative procurement guidelines. Replacement tile, carpeting, ceiling tiles, etc. were purchased from local vendors that the base has been using for a number of years. In addition, many of these items are being purchased using the Government purchase card. They did not know if other items such as picnic tables, sprinkler hoses, traffic cones or other items were made of recycled materials.

- Vehicle maintenance conducts anti-freeze recycling on base and puts that anti-freeze back into base vehicles. They are just beginning to use re-refined oil. Retread tires are only used on the rear wheels of large trucks. Virgin tires are used on passenger vehicles and on buses. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

6.2.7 Niagara Falls ARS

Program Summary

Based on discussions with the four main organizations that have responsibility for the success of a base's Affirmative Procurement process: Contracting, Base Supply, Civil Engineering and Transportation, some affirmative procurement activities are currently underway at the base. Organizations, however, do not keep records on purchases of products made that contain recycled content.

Specific Issues/Progress

- Construction contracts have affirmative procurement clauses, but the base is unsure if they are being enforced.

- All paper products including hand towels, computer paper and bond paper have recycled content.

- Toner cartridges purchased are recycled.

- All desktop recycling bins are made from recycled products.

- The base service store has labels on products that are made from recycled material.

- Retread tires are used on the non-steering axles of trucks and buses. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

6.2.8 Pittsburgh IAP-ARS

Program Summary

Pittsburgh IAP-ARS does not have a formal affirmative procurement program, but a high level of awareness regarding affirmative procurement issues was evident among base personnel. Contracting, Civil Engineering, Vehicle Maintenance, AGE and Base Supply personnel are all making efforts to comply with the affirmative procurement guidelines, but no one is trying to track the purchase of guideline items, since no guidance exists on metrics for tracking.

Specific Issues/Progress

- The base supply service store stocks recycled toner cartridges and copier paper. Supply personnel pointed out several items that were recyclable; however, these items did not show any recycled content.

- The vehicle maintenance shop purchases retread tires if they are less expensive than new tires. Personnel at vehicle maintenance were concerned that retread tires may be mandatory regardless of economic considerations. This point needs to be clarified for Pittsburgh and possibly other AFRC bases.

- Vehicle maintenance has used re-refined oils in the past and will continue to do so in the future, if the products meet manufacturer's warranties. There is some confusion among shop personnel regarding manufacturers' warranties and the use of re-refined oils. Currently, re-refined oils are not being used by vehicle maintenance due to concerns over warranty issues.

- The AGE shop does not use retread tires due to the unusual size of the tires for their equipment. AGE personnel are not using re-refined oils at the present time, but are willing to use them if available.

- CE includes affirmative procurement requirements in their A&E contracts, but the QAE is not checking submittals or the work in place for compliance with affirmative procurement guidelines.

- Contracting is including affirmative procurement requirements in contract documents, but does not track materials to ensure compliance with these requirements. Contracting also includes training on affirmative procurement for Government purchase card users. (Note that both supply and contracting expressed concern over enforcement of affirmative procurement requirements with respect to the use of Government purchase card Government purchase cards).

6.2.9 Willow Grove ARS

Program Summary

There is no formal affirmative procurement program at the base, but the base contracting office is taking a very active role in ensuring that Government purchase card purchases meet affirmative procurement requirements.

Specific Issues/Progress

- Government purchase card holders are trained in affirmative procurement requirements, however, most do not adhere to them. The Government purchase card manager believes that further education and training is necessary for the program to be successful.

- Government purchase card holders use Staples, OfficeMax, and other large office supply stores for their purchases. Contracting would like to get a list of products at these stores that meet the guidelines. They would also like the stores to track their purchases for them.

- Contracting does Government purchase card audits to ensure the user is meeting the affirmative procurement requirements.

- All large vehicles use retread tires. Passenger cars do not. (Note: According to the Tire Retread Information Bureau, the only restriction on retread tires is found in Section 393.75 of the Federal Motor Carrier Safety Regulations, which states that retreads cannot be used on the front of buses [Brodsky 1998].)

- Vehicle maintenance plans to switch to re-refined oil.

6.2.10 Westover ARB

Program Summary

The base is making progress toward the implementation of a fully-integrated affirmative procurement program. The base is not currently tracking purchases made using the Government purchase card.

Specific Issues/Progress

- All employees issued an Government purchase card are provided initial training for its appropriate use, which includes affirmative procurement protocols. In addition, each card holder's purchases are audited annually. However, the contracting office audits does not ensure that purchases follow affirmative procurement guidelines.

- The Base is currently investigating and preparing to contract the services of the National Institute for the Blind to open and run an on-base supply store, to stock and re-sell mainly office supplies. Advantages include: the supply store would

only stock GSA-scheduled mandatory recycled materials, and base personnel would not have to travel off-base to purchase office supplies.

- The use of recycled construction-related materials is included in new building and/or refurbished building plans and contracts. However, CEC personnel are unaware of the affirmative procurement process and are in need of training.

6.2.11 Youngstown ARS

Program Summary

Youngstown has the best developed affirmative procurement program within the command. The base has developed an Affirmative Procurement Management Plan that establishes procedures at the base to comply with affirmative procurement regulations. In addition, Youngstown has one of the few tracking systems within the Command.

Specific Issues/Progress

- Base supply purchases materials using the GSA Environmental Products Guide, which sends a summary to base supply identifying how many products they purchased contained recycled materials. The base contracting office specifies the use or preferred use of recycled content products in all possible contracts, and provides a list of vendors that sell recycled products to purchasers.

- CEV personnel update the Plan and track affirmative procurement purchases for reporting to HQ AFRC, and review statements of work for Civil Engineering projects to ensure that recycled products are used whenever feasible.

- The base contracting office and CEV have established a training program to ensure that Government purchase card users are aware of affirmative procurement requirements. In addition, all Government purchase card users are required to fill out a form for their purchases that identifies the product they purchased, if the product contains recycled materials, and a justification if the product does not contain recycled materials. The base contracting office makes available numerous catalogs identifying products containing recycled materials for Government purchase card users.

- The AGE shop is using re-refined lubricating oil that is purchased from the Defense Logistics Agency. The vehicle maintenance shop is not using re-refined motor oil, and expressed some concern about its quality. Motor oil is currently purchased at a reduced rate through a contractor that performs oil analysis services for the base. This service identifies if the motor oil needs replacement. The shop has not purchased and has been unable to find a vendor for recycled antifreeze. In addition, the base generates very little waste antifreeze by using a litmus test to determine if it needs replacement.

- The base extensively uses retread tires on all possible vehicles, with the exception of vehicle tires 16 inch or smaller, due to the fact that they wear too quickly.

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WIL 1995 — *Pollution Prevention Management Action Plan and Opportunity Assessment.* Willow Grove Air Reserve Station, PA. April 1995.

WST 1996 — *Pollution Prevention Management Action Plan and Opportunity Assessment.* Westover Air Reserve Base, MA. May 1996.

YNG 1995 *Pollution Prevention Management Action Plan and Opportunity Assessment.* Youngstown Air Reserve Station, OH. April 1995.

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APPENDIX A

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

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APPENDIX B

AFFIRMATIVE PROCUREMENT PLAN

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The Affirmative Procurement Plan is in its own separately bound document.

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APPENDIX C

POLLUTION PREVENTION DATABASE

A computer diskette will be provided in the final document.

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APPENDIX D

PESTICIDE DATA COLLECTION FORM

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Pesticide Data Collection Form

Installation Name: _____

Report Preparer: _____

Report Period Dates: _____

Date Report Prepared: _____

Date of Application	Targeted Pest	Pesticide Name	EPA Registration No.	Total Amount of Pesticide Mixture Applied (lbs.)	Percentage of Active Ingredient in Mixture	Number of Applications	Total Amount of Active Ingredient Applied (lbs.)

NOTE: See back of form for useful conversion factors.

Convenient Conversion Factors

Multiply	***By***	***To Get***
acres	43,560	square feet
acres	4,840	square yards
centimeters	0.3937	inches
centimeters	0.01	meters
cubic feet	0.03382	ounces (liquid)
cubic feet	1,728	cubic inches
cubic feet	0.03704	cubic yards
cubic feet	7.4805	gallons
cubic feet	29.92	quarts (liquid)
gallons	0.1137	cubic feet
gallons	4	quarts (liquid)
gallons of water	8.3453	pounds of water
grams per liter	1,000	parts per million
hectares	2.471	acres
kilograms	2.205	pounds
kilometers	3,281	feet
kilometers	0.6214	miles
liters	0.2642	gallons
liters	1.057	quarts (liquid)
miles	5,280	feet
pints (liquid)	16	ounces (liquid)
pounds	453.5924	grams
square feet	.000023	acres

APPENDIX E

AIR FORCE POLLUTION PREVENTION STRATEGY

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APPENDIX F

EXECUTIVE ORDERS APPLICABLE TO POLLUTION PREVENTION

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