USAG BAUMHOLDER

Pollution Prevention (P2) Plan

September 2010

SUMMARY: The U.S. Army Garrison (USAG) Baumholder is actively engaged in pollution prevention (P2) as part of its overall environmental management strategy. The P2 approach is an important tool for the Environmental Management System (EMS). Pollution prevention (P2) is any mechanism that successfully and cost-effectively prevents, reduces, and/or avoids the sources of pollutant discharges or emissions.

This P2 Management Plan provides the USAG Baumholder with a strategy for meeting reduction goals established by the Installation Management Command - Europe Region (IMCOM-E) Office as well as by the Under Secretary of Defense Measures of Merit (MoM). It defines the goals and structure of the P2 Program and describes its critical elements, including the P2 policy statement and the management of the P2 Program. Pollution prevention opportunity assessments (PPOAs), which were developed by evaluating baseline inventories using environmental, technical, and economic feasibility studies, suggest measures to be implemented in the near future.

The ultimate goals of the P2 Program are to reduce or eliminate pollution at the source and to recycle or reuse materials where possible.

PROPONENT: The proponent for this document is the Directorate of Public Works, Environmental Division, Unit #23746, Box #16, APO AE 09034, DSN 485-6621.

APPLICABILITY: The P2 approach is an important tool in the overall environmental management strategy of the USAG Baumholder. Consequently, this P2 Management Plan is necessary for the successful implementation of the U.S. Army P2 Program at the USAG Baumholder.

REVIEW: This P2 Plan is intended to be a living document and will require periodic review and updating, especially when conditions change, new goals are established, new data is developed or becomes available, EMS targets and objectives are established, P2 opportunities are evaluated, and P2 projects are initiated or completed.

FORMS: No forms are prescribed or discussed throughout the document.

SUGGESTED IMPROVEMENT: Users of this document are encouraged to submit comments or changes to the proponent using DA Form 2028.

Summary of Change

Pollution Prevention (P2) Plan

This document has been revised as a whole and requires the reader to become familiar with the entire document, dated September 2010

- This plan satisfies the requirement to develop and maintain a Pollution Prevention Management Plan contained in the Memorandum, “Revised Pollution Prevention and Compliance Metrics,” Assistant Deputy Undersecretary of Defence for Environment, Safety, and Occupational Health, 12 October 2004.

- Specific large-scale changes will be suggested as part of future improvements for the installation; however, several smaller-scale changes that can be implemented in the short term will result in significant reductions in the generation of hazardous waste and in improved conservation of critical resources needed for mission sustainability.

APPROVALS

This Pollution Prevention Plan addresses management requirements specific to current and planned pollution prevention activities at the USAG Baumholder.

The Pollution Prevention Management Plan must be reviewed and updated on a regular basis after initial commander's approval of September 2005 (see September 2005 P2 Plan). The P2 plan should be updated when a change in function or process occurs.

Approved By:

_____ _____

SAM R. McADOO
LTC, SC
Commanding
USAG Baumholder

Date

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EXECUTIVE SUMMARY

The U.S. Army Garrison (USAG) Baumholder is actively engaged in pollution prevention (P2) as part of its overall environmental management strategy. The P2 approach is an important tool for the Environmental Management System (EMS).

Pollution prevention (P2) is any mechanism that successfully and cost-effectively prevents, reduces, and/or avoids the sources of pollutant discharges or emissions. The P2 approach is an important tool in the overall environmental management strategy of the USAG Baumholder. Consequently, this P2 Management Plan is necessary for the successful implementation of the U.S. Army P2 Program at the USAG Baumholder.

This P2 Management Plan provides the USAG Baumholder with a strategy for meeting reduction goals established by the Installation Management Command - Europe Region (IMCOM-E) Office as well as by the Under Secretary of Defense Measures of Merit (MoM). It defines the goals and structure of the P2 Program and describes its critical elements, including the P2 policy statement and the management of the P2 Program. Baseline inventories are presented in the hazardous material (HM), hazardous waste (HW), solid waste (SW), energy conservation, water use, air emissions, ozone-depleting substances (ODS), vehicle fuel, and affirmative procurement sections, all of which serve as the foundation of the P2 Management Plan. Pollution prevention opportunity assessments (PPOAs), which were developed by evaluating baseline inventories using environmental, technical, and economic feasibility studies, suggest measures to be implemented in the near future. This P2 Management Plan also contains information obtained from vendors and industry representatives with regard to the alternatives discussed in the PPOA section.

Pollution prevention has been and will continue to be actively pursued at the USAG Baumholder. Some of the proposed P2 management initiatives and projects soon to be implemented include:

- establish the Reuse Center at Building 8468;
- implement aqueous-based parts washer (bioremediation principle) at tactical units with ground vehicle motor pools throughout the USAG Baumholder;
- provide awareness training on absorbent reuse and implementation of segregation systems at vehicle motor pools throughout the USAG Baumholder;
- provide awareness training on recycling methods of empty toner cartridges;
- provide awareness training about disposal methods of household chemicals;
- improve tire recycling practices at the DPW recycling center by removing the rims from the tires for metal recycling;
- install energy efficient heating pumps throughout the USAG Baumholder
- install water-efficient fixtures throughout the USAG Baumholder

A P2 project applies source reduction, reuse, recycling, or waste minimization techniques in order to reduce the installation's operating costs, improve worker safety, and increase process efficiency. The USAG Baumholder has many opportunities for improvement in the area of P2 in the upcoming years. Specific large-scale changes will be suggested as part of future improvements for the installation;

however, several smaller changes implemented on a day-to-day basis can reduce the generation of hazardous waste and conserve critical resources needed for mission sustainability.

Table 1 P2 Project Summary

Project Name	Targeted Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implementation Date
Implementing a Reuse Center	Material Procurement (HM, HW)	June 2005	*Project turned over to DOL*	*Project turned over to DOL*
Implementing Aqueous-based Parts Washer for Units with Motor Pools	Used Solvents (HM, HW, Air Emissions)	N/A	*Project financed by units*	TBD
Optimizing Absorbent Management Practices	OCS (HM, HW)	No funding required Awareness Training		Continuous
Implementing Absorbent Segregation System for Units with Motor Pools	OCS (HM, HW)	TBD	TBD	TBD
Awareness training for Recycling Empty Toner Cartridges	Printing Products (HW)	No funding required Awareness Training		Continuous
Awareness training for Proper disposal of household chemicals	Household chemicals (HM, HW)	No funding required Awareness Training		Continuous
Promoting Tire Recycling separation practices	Tires with rims (HW)	TBD	TBD	TBD
Reuse of Packaging Material	Packaging Material (Solid Waste)	TBD	TBD	TBD
Special Events Recycling	Recyclables (Solid Waste)	TBD	TBD	TBD
Information Policy regarding Recycling	Recyclables (Solid Waste)	TBD	TBD	TBD
Removal of all Class II ODSs until 1 January 2015	ODS	TBD	DPW ED, DPW utilities, AAFES, DECA, DODDS, Housing	Continuous
Installing water-efficient fixtures	Water, Energy	TBD	DPW	Continuous
Reduction of TMP vehicles	Vehicle Fuel Conservation	TBD	DOL	Continuous

Project Name	Targeted Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implementation Date
Installing energy efficient heating pumps	Energy	TBD	DPW Utilities	Continuous
Installation of energy saving bulbs	Energy	TBD	DPW Utilities	Continuous
Insulation of heating distribution lines and the heating system	Energy	TBD	DPW Utilities	TBD
Installation/ replacement of heat exchanger	Energy	TBD	DPW Utilities	TBD
Capturing of building envelope and systems engineering with energy consultant software and analyzing of various options for remediation	Energy	TBD	DPW Utilities	TBD

The ultimate goals of the P2 Program are to reduce or eliminate pollution at the source and to recycle or reuse materials where possible.

Specific large-scale changes will be suggested as part of future improvements for the installation; however, several smaller-scale changes that can be implemented in the short term will result in significant reductions in the generation of hazardous waste and in improved conservation of critical resources needed for mission sustainability.

This P2 Plan is intended to be a living document and will require periodic review and updating, especially when conditions change, new goals are established, new data is developed or becomes available, EMS targets and objectives are established, P2 opportunities are evaluated, and P2 projects are initiated or completed.

1. INTRODUCTION

Environmental liabilities increase directly with the volume of hazardous materials used and the volume of hazardous wastes (HW) generated. Environmental liabilities also increase to a lesser extent with the volume of other materials used and the amount of solid waste (SW) generated. Reducing these long-term liabilities requires a positive commitment, a sound plan, and an aggressive program to modify past attitudes toward the conservation of materials.

This Pollution Prevention Plan is based on current Army guidance and will be used to comply with the German Final Governing Standard for (GFGS), Presidential Executive Orders (EOs), and DoD and Army policy and regulations. It incorporates the "Compliance Through Pollution Prevention" requirements set forth in the "Guidance for Developing Army Pollution Prevention Plans (June 2001)".

1.1. Statement of Purpose

Pollution prevention aims to find ways to meet the mission of combat readiness while maintaining environmental stewardship. Pollution prevention is one of the top environmental priorities for the U.S. Army Garrison (USAG) Baumholder. The current emphasis on pollution prevention (P2) is necessary to achieve conformance with Department of Defense (DoD) pollution prevention policy and goals, to reduce the long-term liabilities associated with waste disposal, to reduce the purchase of raw materials across the installation, to reduce the cost of waste treatment and disposal, and to protect public health and the environment.

Pollution prevention, as defined in **section 1.3**, is a cost-effective means to meet environmental objectives in an era when Army installations are simultaneously subject to stricter standards for pollution control, public criticism of their environmental records, and declining budgets. The costs of failing to prevent pollution are dramatically evident; at some installations, cleanup costs are estimated in the hundreds of millions of dollars. Pollution prevention seeks to reduce the time and cost soldiers spend on compliance issues.

1.2. Background and Mission

The USAG Baumholder is located in the German State of Rheinland Pfalz. The P2 Plan includes all installations of the USAG Baumholder, which are currently as follows:

- Baumholder Airfield (GE07J)
- Hoppstaedten Water Works (GE37L)
- Hospital Area (GE07L)
- Pfeffelbach Water Works (GE66P)
- Quarter Master (QM) Area (GE07N)
- Smith Barracks (GE79D)
- Smith Family Housing (GE07K)
- Wetzel Family Housing (GE94D)

- Wetzel Kaserne (GE94E)

The USAG Baumholder is home to approximately*:

- 5,500 soldiers,
- 4,500 dependents/family members, and
- 1,950 civilian employees.

* The population data was provided by the public affairs office on 17 June 2009

The mission of the USAG Baumholder is to conduct garrison operations daily, providing installation management programs and services for soldiers, their family members, and civilians. The USAG Baumholder is dedicated to continued improvement of the processes and to reduce environmental impacts through pollution prevention, waste reduction, restoration activities, and efficient resource use to ensure environmental compliance (see also **Appendix D -USAG Baumholder Environmental Policy Statement**).

1.3. Definition of Pollution Prevention

Pollution prevention means "**source reduction**," as defined in the Pollution Prevention Act. This also includes other practices that reduce or eliminate the creation of pollutants **through increased efficiency** in the use of **raw materials, energy, water, or other resources**; or **protection of natural resources by conservation**.

The Pollution Prevention Act of 1990 defines SOURCE REDUCTION as any practice that

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) before recycling, treatment, or disposal; and,
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

Pollution prevention includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, and inventory control.

Techniques for pollution prevention fall into six categories:

- Source Reduction
- In-process Recycling
- Process Modification
- Improved Plant Operations
- Input Substitutions
- Changes in End Product

Before pollution prevention techniques can be used, a waste assessment must be conducted to show where reduction methods implemented by a facility can be most effective. Potential pollution prevention methods are then pinpointed. Pollution prevention requires a multimedia assessment. Transferring pollution from one medium to another does not constitute pollution prevention.

1.4. Benefits of Pollution Prevention

As concern for the environment has risen in our society, increased environmental regulation and public awareness have raised the standards, costs, and potential liabilities of waste management practices. Waste and resource management programs that adopt P2 principles can realize benefits on many fronts, for example:

- Reduced costs associated with the procurement and storage of hazardous materials;
- Reduced costs associated with the management, treatment, and disposal of hazardous wastes;
- Decreased use of energy and water resources;
- Enhanced relations with the public, neighboring communities, and regulators;
- Reduced costs of complying with environmental and hazardous materials regulations, and diminished risk of non-compliance;
- Reduced future compliance liability; and
- Improved long-term environmental quality and prevention of environmental degradation.

2. POLLUTION PREVENTION REGULATORY BACKGROUND

The Army's pollution prevention policies originate in legislation enacted by the U.S. Congress. Executive Orders direct Federal agencies, including DoD, to conform to Federal legislation and may impose additional, non-legislated requirements. The DoD issues directives and instructions in response to EOs. These DoD policy statements are interpreted and published in Army regulations, pamphlets, and other policy documents. In addition, Major Army Commands, Major Subordinate Commands, and individual installations may adopt supplemental policies. The GFGS is a comprehensive set of criteria combining Host Nation environmental laws with the applicable DoD policies pertaining to environmental management at overseas installations. This section summarizes the major laws, regulations, EOs and DoD policy statements pertaining to pollution prevention. Due to the wide-reaching nature of P2 issues and frequent changes in laws and regulations, the list is not intended to be all-inclusive.

2.1. Final Governing Standards for Germany

The GFGS represents a convergence of Host Nation environmental legislation and the Overseas Environmental Baseline Guidance Document. The GFGS provide the basis for implementation of P2 practices by requiring hazardous materials minimization, in purchase and usage, as well as recycling and reuse of hazardous substances to the maximum extent practical.

2.2. Pollution Prevention Act - 1990

The Pollution Prevention Act of 1990 (PPA) first established pollution prevention as a comprehensive national policy. The PPA outlined the following pollution prevention hierarchy.

- Pollution should be prevented or reduced at the source whenever feasible.
- Pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible.
- Pollution 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 conducted in an environmentally safe manner.

The scope of the PPA encompasses all hazardous substances, pollutants, and contaminants. The intent of the PPA is to reduce or prevent pollution at the source. In addition to source reduction, it also emphasizes reuse and closed-loop recycling whenever possible, which represents a fundamental change from off-site recycling, treatment, and disposal as primary ways to handle waste. The so-called "end-of-pipe-solutions" should be eliminated or reduced to the absolute minimum.

2.3. Presidential Executive Orders

2.3.1. Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management, January 2007

EO 13423 establishes goals in the areas of energy efficiency, acquisition, renewable energy, toxics reductions, recycling, renewable energy, sustainable buildings, electronics stewardship, fleets, and

water conservation. In addition the order requires more widespread use of Environmental Management Systems.

Before EO 13423 and EO 13101, EO 12873 was the order that mandated the AP program. It emphasized to buy recycled-content products. These products were originally singled out for AP because they help reduce solid waste disposal, minimize natural resource use, and often use less energy to produce than comparable "virgin" material products. These are good environmental performance characteristics, but there are other considerations that recycled-content products generally do not address, such as reducing toxicity, preventing air or water pollution, or reducing negative effects like global warming or ozone depletion.

EO 13423 has now superseded EO 13148, EO 12873 and EO 13101.

On 5 October 2009 a new Executive Order, “Federal Leadership in Environmental, Energy, and Economic Performance“, was issued by President Obama extending the goals of the EO 13423.

Note that EO 13514 builds upon and, in some cases, adds to or amends EO 13423. The goals, objectives, and sustainable practices outlined in both EOs must be met. The EO 13514 requires federal agencies to measure, manage, and reduce greenhouse gas emissions towards agency-defined targets for 2020. The EO also requires federal agencies to meet a number of energy, water, and waste reduction targets as follows:

- 30% reduction in vehicle fleet petroleum use by 2020;
- 26% improvement in potable water efficiency by 2020 and/ or reducing water consumption intensity by 2% annually relative to the baseline of FY 2007;
- 20% improvement in industrial, landscaping, and agricultural water consumption efficiency by 2020 and/ or reducing water consumption intensity by 2% annually relative to the baseline of FY 2010;
- 50% recycling and solid waste diversion, excluding construction and demolition debris by FY 2015;
- Implementation of the 2030 net-zero –energy building requirement for all agency buildings that enter the planning process after 2020;
- 95% of all applicable contracts will meet sustainability requirements;
- Implementation of stormwater provisions of the Energy Independence and Security Act of 2007, section 438;
- And development of guidance for sustainable Federal building locations in alignment with the Livability Principles put forward by the Department of Housing and Urban Development, the Department of Transportation, and the Environmental Protection Agency.

These goals can also be found in **Table 3-4**

2.4. Department of Defense Instructions and Memoranda

2.4.1. DoD Instruction 4715.4, *Pollution Prevention*, June 1996

This document provides guidance on P2 activities and the P2 hierarchy principle. This instruction established DoD P2 Measures of Merit (MoMs) for toxic release reduction, hazardous waste reduction, non-hazardous solid waste diversion, and alternatively-fueled vehicles. The toxic release and hazardous waste reduction goals became obsolete on 31 December 1999. The non-hazardous solid waste disposal and recycling measures were canceled effective the end of FY1998, and were replaced by the "New DoD P2 Measure of Merit" (see next section).

2.4.2. DoD Memorandum, New DoD P2 Measure of Merit, May 1998

This memorandum establishes a new solid waste MoM to replace the non-hazardous solid waste disposal and recycling measures in DoD Instruction 4715.4 (above). The new MoM is to "ensure that the diversion rate for non-hazardous solid waste is greater than 40 percent while ensuring integrated non-hazardous solid waste management programs provide an economic benefit when compared with disposal using landfilling and incineration alone." This goal is to be attained by the end of FY2005.

2.5. Department of the Army Regulations

2.5.1. Army Regulation 200-1, Environmental Protection and Enhancement, February 2007

AR 200-1 establishes Army policies, procedures, and responsibilities for environmental program areas. This regulation covers environmental protection and enhancement and provides the framework for the Army Environmental Management System.

2.5.2. Army in Europe Regulation 200-1, Army in Europe Environmental Quality Program, October 2007

AER 200-1 establishes policies and procedures to protect the environment in Europe.

2.5.3. Army Regulation 420-1, Army Facilities Management, March 2009

AR 420-1 establishes policies and responsibilities for the operation, maintenance, repair, and construction of facilities and systems for the efficient and economical management of utility services such as water supply, wastewater, solid waste (non-hazardous), electric, heating and cooling, refrigeration, and food service equipment at Army installations.

AR 420-1, addresses the management of Army facilities. Specifically, it describes the management of public works activities, housing, and other facilities operations and management, military construction program development and execution, master planning, utilities services and energy management, and fire and emergency services. Also, it identifies and synopsizes other regulations that provide detailed facilities management policy.

Policy and guidance formerly found in AR 420-49, Utility Services, is now found in Chapter 22 of AR 420-1, Army Facilities Management.

3. POLLUTION PREVENTION PROGRAM

3.1. USAG Baumholder Pollution Prevention Policy

The USAG Baumholder is committed to an active policy to protect the environment through the following efforts:

- Providing a clean and safe environment in our community;
- Ensuring a safe and healthy workplace for our staff;
- Complying with all applicable laws and regulations;
- Efficiently accomplishing our mission;
- Reducing Waste Generation;
- Reducing future liability for waste disposal; and
- Reducing waste management costs.

To accomplish these objectives, we will implement programs to reduce or eliminate the generation of waste through source reduction and other pollution prevention methodologies. These programs extend to air, wastewater, and solid and hazardous wastes.

The USAG Baumholder is committed to reduce the quantity and toxicity of generated wastes, and therefore places a priority on source reduction. Where source reduction is not feasible, other pollution prevention methods, such as recycling, will be implemented. The wastes that cannot be prevented will be converted to useful products or used beneficially. Remaining wastes for which no pollution prevention option is warranted will be effectively treated (to decrease volume or toxicity) and responsibly managed. The USAG Baumholder will select waste management methods that minimize present and future effects on human health and the environment.

The USAG Baumholder is committed to identifying, evaluating, and implementing pollution prevention opportunities through solicitation, encouragement, and involvement of all employees.

Pollution prevention is the responsibility of *ALL* of our staff and members of the garrison community.

In support of this commitment, P2 is addressed in the current USAG Baumholder Environmental Policy Statement as well as the Standard Operating Procedures – Environmental Compliance Policy (see **Appendix D -USAG Baumholder Environmental Policy Statement**).

3.2. Pollution Prevention Program Management

The P2 Program at the USAG Baumholder will be managed in accordance with this plan as well as the USAG Baumholder Environmental Management System (EMS) Implementation Plan, HM and HW Management Plans, Solid Waste Management Plan, Storm Water Pollution Prevention Plan (SWPPP), ODS Reduction Plan, and other existing environmental plans as well as any developed in the future.

This P2 Plan and the policies and procedures established to implement the Plan are developed and approved by the Environmental Division (ED) in cooperation with the Environmental Quality Control Committee (EQCC). The P2 Program is implemented by the ED Media Managers as needed to develop, evaluate, and implement specific P2 initiatives and projects.

3.2.1. Environmental Quality Control Committee

The EQCC, chaired by the garrison Commander, is the policy-setting and decision-making body for pollution prevention at the USAG Baumholder.

The following list summarizes the P2 responsibilities of the EQCC.

- Brief the garrison Commander on all actions necessary to make the P2 Program successful.
- Brief the garrison Commander on P2 initiatives already in progress.
- Establish overall pollution prevention policies and procedures.
- Establish pollution prevention goals.
- Establish priorities for implementation of projects.
- Obtain funding and establish schedule for implementation.
- Monitor or direct implementation progress.

The EQCC includes the organizations or departments that have significant operational or administrative interest in developing and implementing a pollution prevention plan.

3.2.2. Environmental Management Office

The DPW ED is responsible for general oversight of the P2 program.

The ED has the following P2 responsibilities.

- Update the Pollution Prevention Plan as necessary.
- Provide training to units and activities on pollution prevention.
- Seek funding from appropriate sources for pollution prevention projects.
- Closely coordinate the Pollution Prevention Program with the DPW and the DRMO through established Environmental Management System (EMS) procedures.

The ED must coordinate efforts with the EQCC members to ensure that P2 opportunities are identified and evaluated in the future and that the P2 program develops in accordance with the EMS as it is implemented.

3.3. Baseline Development

The USAG Baumholder P2 objectives are derived from the pollution reduction goals (see Section 3.5) established by EO 13423 and DoD MoM. To track whether these goals are met, the first step is to

develop baseline data for the target media areas. The inventory is based on the media shown in **Table 3-1** below, which are quantitatively identified in section 4 of this plan.

Table 3-1 Measurement Criteria for the USAG Baumholder P2 Program

Media		Measurement Criteria	Unit	Source
1	Hazardous Materials	Purchases of individual chemicals and products	kg metric ton percent	SSA, SSSA, DOL, AAFES, MWR, DPW supply warehouses
2	Hazardous Waste	Total quantity disposed	kg metric ton percent	DPW Environmental Division, HWSA DRMO, LRMC, AAFES, MWR
3	Solid Waste	Total quantity generated and percent of total generated diverted into recycling and reuse	kg metric ton percent	DPW Utilities Refuse Collection, DPW Utilities SORT Program Manager AAFES DECA; MWR
4	Energy Conservation	Energy used per total square feet of installation facilities	kWh MBtu	DPW Utilities
5	Water Consumption	Amount consumed	m^3	DPW Utilities
6	Wastewater Generation	Amount generated	m^3	DPW Utilities
7	Air Emissions	Amount emitted	ton	DPW Environmental Division
8	Ozone Depleting Substances	Total inventory	kg	DPW Environmental Division
9	Vehicle Fuel/Alternative Fuelled Vehicles (non-tactical vehicles)	Amount of petroleum consumed Vehicles leased/procured	L number	DOL TMP
10	Affirmative Procurement	Purchases of environmentally preferable products and services	number	varies

A baseline inventory is necessary for three reasons.

- Information on the quantities of waste generated is used to target specific waste streams for reduction opportunities.
- Materials used are evaluated in reference to specific activities to identify opportunities for pollution prevention.
- Annual reports on waste generation and hazardous material use are compared with the baseline inventories to evaluate the effectiveness of P2 projects and to monitor progress in achieving the USAG Baumholder P2 goals.

Table 3-2 shows units of measurement used throughout this report. Host nation laws and the GFGS utilize the International System (SI) whereas the organizations of the USAG Baumholder mainly

operate with American units. Therefore, the conversion from one system to the other is presented for each unit of measurement as well.

Table 3-2 Conversion of SI Units to American Units

Media		Unit of Measurement	Symbol	Conversion to American unit system
1	Hazardous Materials	Kilogram	kg	1 kg = 35.27392 oz 1 kg = 2.20462 lbs
2	Hazardous Waste	Kilogram	kg	1 kg = 35.27392 oz 1 kg = 2.20462 lbs
		US Dollar (2002) US Dollar (2003) US Dollar (2004) US Dollar (2005) US Dollar (2006) US Dollar (2007) US Dollar (2008) US Dollar (2009)	$	1 $ = 1.2803 € 1 $ = 1.2403 € 1 $ = 1.0314 € 1 $ = 1.0314 € 1 $ = 0.8785 € 1 $ = 0.8530 € 1 $ = 0.8259 € 1 $ = 0.7905 €
3	Solid Waste	Metric Ton	t	1 t = 2,204.62 lbs 1 t = 1.102 U.S. tons
4	Energy Conservation	Square Meter	m^2	1 m^2 = 10.76 sq.ft.
		Mega watt hour	MWh	1 MWh = 3,412.142 MBtu
		Million British Thermal Unit	MBtu	1 MBtu = 293.07 kWh
5	Water Consumption	Cubic Meter Liter	m^3 (cbm) L	1 m^3 = 1,000 L = 264.17 gal 1 L = 0.264 gal
6	Wastewater Generation	Cubic Meter Liter	m^3 (cbm) L	1 m^3 = 1,000 L = 264.17 gal 1 L = 0.264 gal
7	Air Emissions	Metric Ton	t	1 t = 2,204.62 lbs 1 t = 1.102 U.S. tons
8	Ozone Depleting Substances	Kilogram	kg	1 kg = 35.27392 oz 1 kg = 2.20462 lbs
9	Vehicle Fuel/Alternative Fuelled Vehicles (non-tactical vehicles)	Cubic Meter Liter	m^3 (cbm) L	1 m^3 = 1,000 L = 264.17 gal 1 L = 0.264 gal
10	Affirmative Procurement	-	-	-

3.4. Population

The population data provided by the public affairs office on 17 June 2009 is as presented in **Table 3-3**.

Table 3-3 Population

Population Type	Quantity
US Military Personnel	5500
US Family Members	4500
DoD Staff	1950

During deployment, i.e. January 06 – December 06 and January 08 – June 09, approximately 4,500 soldiers were absent from the base.

3.5. Pollution Prevention Opportunity Assessments

In order to identify process improvements or options to meet reduction requirements, the installation conducts pollution prevention opportunity assessments (PPOAs). An opportunity assessment involves the examination of input sources, material usage, and waste generation by type and weight, and the determination of practical and economical options for reduction. Typically, each process involving a targeted substance is examined to determine ways to avoid the use or minimize the generation of that substance. Detailed baseline information characterizing material use and waste streams for each process may be gathered concurrently with the assessment process. Opportunity assessments may be performed by trained post-level or Major Command (MACOM) personnel or by contractors and, to be effective, must have the involvement of process-level personnel. **Section 5** of this plan presents the results of the most recent PPOAs conducted at the USAG Baumholder.

3.6. USAG Baumholder Pollution Prevention Goals

This section describes specific pollution prevention goals in each environmental media area. These goals were developed based on environmental laws, EOs, and DoD policies. Section 4.0 of this plan describes the installation's pollution prevention goals with respect to each environmental media area. While complete realization of these goals may not be technically and economically feasible, the following goals listed in **Table 3-4** shall be adopted as interim measures with the ultimate goal of achieving zero discharge.

The goals for the Executive Order 13514 are listed in **Table 3-4** also (grey marked fields), but it must be noted that the implementation status for DoD installations has not been finalized yet.

Table 3-4 USAG Baumholder Pollution Prevention Goals

Media	Goal	Source of Goal	Baseline Year	Target Year	Status 2009
Hazardous Materials	**Continuously reducing in quantity and toxicity of materials procured and used every year**	**EO 13423** **GFGS Chapter 5, C5.3.8**	**N/A**	**N/A**	**ongoing**
Hazardous Materials	Reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of	EO 13514	N/A	N/A	ongoing
Hazardous Materials	Implementing integrated pest management and other appropriate landscape management practices	EO 13514	N/A	N/A	ongoing
Hazardous Waste	**Annual continuous reduction of hazardous waste generated**	**GFGS Chapter 6**	**N/A**	**N/A**	**ongoing**
Hazardous Waste	Reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of	EO 13514	N/A	N/A	ongoing

Media	Goal	Source of Goal	Baseline Year	Target Year	Status 2009
Solid Waste	**By FY 2010 all Defense installations are required to divert no less than 40% of the non-hazardous solid waste (without C&D) and at least 50% of the C&D wastes from disposal on a landfill or by incineration.**	**Army Integrated (Non-Hazardous Waste) Solid Waste Management Policy (2008)**	**N/A**	**by FY2010**	**28 % diverted from solid waste and 100 % diverted C&D wastes from disposal on a landfill**
Solid Waste	Minimizing the generation of waste and pollutants through source reduction.	EO 13514	N/A	N/A	ongoing
Solid Waste	Diverting at least 50 % of non-hazardous solid waste, excluding construction and demolition debris	EO 13514	N/A	2015	N/A
Solid Waste	Diverting at least 50 % of construction and demolition materials and debris	EO 13514	N/A	2015	100 %
Solid Waste	Reducing printing paper use and acquiring uncoated printing and writing paper containing at least 30 % post consumer fiber	EO 13514	N/A	N/A	N/A
Solid Waste	Increasing diversion of compostable and organic material from the waste stream	EO 13514	N/A	N/A	N/A
Air Emissions	**Continuously reducing air pollutant emissions**	**EO 13423 GFGS Chapter 2**	**2002**	**N/A**	**ongoing**
Air Emissions	The head of each agency shall determine a percentage reduction target for greenhouse gas emissions.	EO 13514	2008	2020	N/A

Media	Goal	Source of Goal	Baseline Year	Target Year	Status 2009
Water Consumption	**Reducing water consumption intensity, relative to the baseline of the agency's water consumption in FY 2007, through life-cycle cost-effective measures by 2 % annually through the end of FY 2015 or 16 % by the end of FY 2015.**	**EO 13423**	**FY 2007**	**FY 2015**	**100 %**
Water Consumption	Reducing potable water consumption intensity by 2 % annually, or 26 % by the end of FY 2020	EO 13514	FY 2010	FY 2020	100 %
Water Consumption	Reducing industrial, landscaping, and agricultural water consumption by 2 percent annually or 20 percent by the end of fiscal year 2020	EO 13514	FY 2007	FY 2020	100 %
Wastewater Generation	**Reducing pollutant loadings in wastewater (domestic and industrial) and storm water discharges.**	**----------**	**N/A**	**N/A**	**ongoing**
ODS	**Replacing or retiring all Class I ODS**	**GFGS C2.3.6.6**	**N/A**	**Immediate**	**100 %**
ODS	**Replacing or retiring virgin Class II ODS**	**GFGS C C2.3.6.7.3.8**	**N/A**	**2010**	**ongoing**
ODS	**Replacing or retiring recycled Class II ODS**	**GFGS C2.3.6.7.3.9**	**N/A**	**2015**	**ongoing**
Vehicle Fuel / Alternative Fueled Vehicles	**Reducing vehicle petroleum consumption by 2% annually**	**EO 13423**	**FY 2005**	**2015**	**100 %**
Vehicle Fuel / Alternative Fueled Vehicles	**Increasing alternative fuel consumption at least 10% annually**	**EO 13423**	**FY 2005**	**N/A**	**N/A**

Media	Goal	Source of Goal	Baseline Year	Target Year	Status 2009
Vehicle Fuel / Alternative Fueled Vehicles	**Increasing purchase of alternative fuel, hybrid, and plug-in hybrid electric vehicles when commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles**	**EO 13423**	**FY 2005**	**N/A**	**N/A**
Vehicle Fuel / Alternative Fueled Vehicles	Using low greenhouse gas emitting vehicles, including alternative fuel vehicles	EO 13514	N/A	N/A	ongoing
Vehicle Fuel / Alternative Fueled Vehicles	Optimizing the number of vehicles in the agency fleet	EO 13514	N/A	N/A	ongoing
Vehicle Fuel / Alternative Fueled Vehicles	Reducing vehicle petroleum products consumption by 2 % annually (if the agency operates a fleet of at least 20 motor vehicles)	EO 13514	FY 2005	FY 2020	100 %
Energy	**Reducing energy intensity by 3% annually**	**EO 13423**	**FY 2003**	**2015**	**ongoing**
Energy	**Reducing energy intensity by 30%**	**EO 13423**	**FY 2003**	**2015**	**ongoing**
Energy	**Ensuring that at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources**	**EO 13423**	**N/A**	**N/A**	**ongoing**
Energy	**Ensuring to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use**	**EO 13423**	**N/A**	**N/A**	**ongoing**
Energy	Establishing FY2020 percentage reduction targets of scope 1 and 2 GHG emissions. (Baseline FY2008) §2(a)	EO 13514	FY 2008	FY 2020	N/A
Energy	Beginning in 2020 and thereafter, ensuring that all new Federal buildings that enter the planning process are designed to achieve zero-net-energy by 2030	EO 13514	FY 2020	FY 2030	N/A

Media	Goal	Source of Goal	Baseline Year	Target Year	Status 2009
Energy	Ensuring the procurement of energy-efficient equipment	EO 13514	N/A	N/A	ongoing
Energy	Ensuring that all new construction, major renovation, or repair and alteration of Federal buildings complies with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*, (Guiding Principles);	EO 13514	N/A	N/A	N/A
Energy	Ensuring that at least 15 percent of the existing buildings (above 5,000 gross square feet) and building leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015. Achieving annual progress toward 100-percent conformance with the Guiding Principles for its building inventory	EO 13514	N/A	2015	ongoing
Affirmative Procurement (AP)	**Increasing purchases of environmentally-sound goods and services, including bio based products.**	**EO 13423**	**N/A**	**N/A**	**ongoing**
Affirmative Procurement (AP)	Selecting vendors and contractors which are mindfully reducing greenhouse gas emissions and implementing strategies for transit, travel, training etc. that actively support lower carbon commuting and travel.	EO 13514	N/A	N/A	ongoing
Affirmative Procurement (AP)	Increasing agency use of acceptable alternative chemicals and processes in keeping with the agency's procurement policies.	EO 13514	N/A	N/A	ongoing

3.7. Evaluation and Implementation

Once P2 projects are identified, they must be able to pass careful scrutiny by reviewers at higher headquarters, show cost savings, and have a definite payback period. Currently, guidance from DA indicates that only P2 projects with a 5-year or less return on investment will be considered for funding.

Decreasing budgets require that P2 projects are prioritized so that the higher priority projects are funded first. Projects must also be practical and be acceptable for implementation at the user level. Units and organizations must be willing to use equipment purchased for pollution prevention. The new equipment or process must function at the same level of quality as that which it replaces, and it should

be simple to use, and not be labor intensive. Saving time and working more efficiently are just as important as financial savings.

P2 projects are prioritized using the following criteria.

- Payback period must be less than 5 years, or the useful life of the equipment.
- The new process or equipment must be simple to use.
- The project should decrease labor requirements and result in time savings.
- There must be a demonstrated reduction in the toxicity or quantity of waste generated.
- The selected process or equipment must satisfy regulatory requirements and industry (e.g., DIN) standards.
- The process or equipment must be adaptable to different missions and requirements relative to its cost (due to constantly changing missions).
- The project should not increase labor requirements.

Some pollution prevention projects will be relatively simple to implement. These projects, for the most part, are simple procurement actions to purchase new equipment. Some P2 projects will require construction and facility renovation; therefore, these activities will take relatively longer to implement. The third type of project will require significant organizational and operational changes. Implementation of these projects requires not only funds for initial equipment purchases, but also a long-term commitment by garrison leaders to support the project. An implementation strategy for each type of project is discussed below.

Simple Equipment Purchases:

Pollution prevention implementation funds will be submitted to IMCOM-Europe for these projects. Once funding is obtained, procurement actions will begin in-house through the existing local contracting agencies (e.g., Corps of Engineers-Europe District Office). Equipment will then be purchased for direct distribution to participating units and activities. Training (by the supplying contractor) will be provided to unit personnel upon receipt of the equipment.

Facility Construction/Rehabilitation:

Projects that require significant facility design and construction activities will likely result in multiple year startups. Close coordination with the DPW Engineering Plans and Services (EP&S) staff will be required. Typically, significant funding is also required for these projects.

Organizational and Operational Changes:

Implementation issues involving organizational and operational changes will be presented to the EQCC. Funding for these projects will be resolved as part of the staffing process and, in some cases, detailed in a decision paper.

Traditional methods and tools used by the USAG Baumholder to track and document its environmental efforts, such as pollution prevention projects and initiatives, include the Environmental

Quality Report (EQR), Environmental Requirements Management System (ERMS), and Environmental Performance Assessments, each of which is described below.

3.7.1. Environmental Quality Report and Reporting Requirements

The EQR is part of an automated system used to collect a wide variety of installation environmental information, including compliance, conservation, program management, and pollution prevention programs. The primary goal of the EQR is to provide DoD with the information it requires as well as providing Headquarters DA, MACOM, major subordinate commands, and installations with critical management information while minimizing short suspense action items assigned to installation personnel. The EQR program is a result of the 1996 Defense Environmental Quality Program Annual Report to Congress, RCS DD-A&T (A) 1997. The data elements in the EQR provide users and policy makers with periodic updates on critical data within the Army's environmental program. The EQR serves as the source of data for the annual environmental quality (EQ) reports to Congress, semi-annual EQ reports to the MACOM and DoD, quarterly reports for the Quarterly Army Performance Review, MACOM EQ In Progress Reviews (IPRs), and Installation Management Steering Committee meetings.

The USAG Baumholder has the following P2 reporting requirements:

- Waste Registry (includes solid waste, hazardous waste, and medical waste);
- EQR hazardous waste disposal and recycling roll-ups, from AR 200-1;
- ERMS of programming, budgeting, and execution for all environmental projects, including P2, from AR 200-1;
- ODS procurement approvals and determinations, from Section 326 of the National Defense Authorization Act for FY1993;
- Solid Waste Annual Report (SWAR); and
- Installation Status Report (ISR) Part II (Environment).

3.7.2. Army Environmental Requirements Management System (ERMS)

The USAG Baumholder uses the ERMS database to plan, program, budget, and forecast costs to manage the environmental program; to practice good environmental stewardship; and to attain and maintain compliance with existing and pending GFGS, as well as Host Nation and local (*Länder*) environmental laws and regulations. It is used to show past expenditures, to track project execution and performance, to refine and validate requirements for the budget year, and to plan and program requirements and resources in the out-years. P2 projects that are identified for implementation are programmed in the ERMS.

3.7.3. Environmental Performance Assessment System

The Environmental Performance Assessment System (EPAS) is an Army-wide program that documents an installation's compliance status on a **3-year cycle**. As a component of the EPAS, assessors evaluate the installation's pollution prevention program in terms of its compliance with laws, EOs, and directives. The results of the EPAS evaluation are included in the Environmental Performance Assessment Report (EPAR). The installation then works with the MACOM to develop an

Installation Corrective Action Plan (ICAP). Developing the ICAP serves as an opportunity to consider and plan for P2 projects that can help achieve and maintain compliance.

4. POLLUTION PREVENTION PROGRAM AREAS

The following subsections describe the nine P2 Program Areas (listed as "media" in **Table 3-4** above) for which goals have been established and for which progress toward meeting these goals will be evaluated, monitored, and quantified over time. Where baseline data is missing, the Media Manager should make every effort to obtain the data and to assist the other key managers in evaluating it for trends with respect to garrison population and deployments. At the end of each program area subsection, two tables are included to document and track current and potential P2 initiatives. As the USAG Baumholder P2 Program develops and matures, it will be important for the Environmental Program Managers and the Media Manager to coordinate with the managers of key program elements that are outside their organizational responsibility (e.g., energy conservation, affirmative procurement, transportation efficiency). It is expected that the members of the EMS Cross-Functional Team (CFT) will be instrumental in fostering such coordination and cooperation.

4.1. Hazardous Materials (HM)

Hazardous materials are raw materials, substances, or manufactured products that show signs of at least one of the hazardous characteristics defined in Table C5.T1 of the GFGS. Chapter 5 contains criteria for the storage, handling and disposition of specific HMs and provides compliance requirements for the USAG Baumholder.

The different organizations and units within the USAG Baumholder receive their HMs from a variety of sources, and there is no central receiving warehouse for all requisitioned items. HMs are either ordered through the U.S. Army supply system or from local suppliers.

At the USAG Baumholder, the majority of the military units receive their HMs through the Unit Supply channels directly from the U.S. Some organizations, such as the DPW warehouse or the Morale, Welfare, and Recreation (MWR), are more dependent on local businesses for their HM supplies. Local acquisitions can be paid through the Regional Contracting Office (RCO) or with the International Merchants Purchase Authorization Card (IMPAC). Many military units procure HMs at local businesses when urgently needed items are not readily available at warehouses or other supply channels. Currently, there is no central tracking system for procured HMs in place at the USAG Baumholder.

4.1.1. Prevention Goal

The USAG Baumholder's goal with respect to hazardous materials (HM) is:

- to continuously reduce the quantity of HM procured and used on site during routine operations.
- Reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of

In accordance with GFGS Chapter 5

The reduction in procurement shall, by nature, result in a reduction in costs associated with HM management (i.e., direct cost of purchase, man hours required for inspection of HM storage areas, management or disposal of expired HM, storage buildings/containers purchases).

Personnel responsible for HM management must also strive to realize cost savings.

4.1.2. Hazardous Material Baselines

Each military unit and activity within the USAG Baumholder has to maintain an inventory of all HMs stored and used. The inventories are kept at the Hazardous Material Storage Areas (HMSA) of the units and generally list all HMs by type, manufacturer, National Stock Number (NSN), container size, and on-hand quantity. Inventories must be updated on a regular basis. The management of HM at the Garrison is under the responsibility of DOL. DOL shall ensure the update and record keeping of HM inventories.

Units and organizations storing and handling HMs were surveyed for the HM baseline data collection. Since at the USAG Baumholder no consistent tracking system is in place that can provide useful data for the HM baseline, the inventories can only provide a very rough estimate about HM quantities procured during a year for that particular unit. Information collected during the survey revealed that the task of collecting exact HM procurement baseline data for the entire USAG Baumholder was unfeasible for this P2MP.

Units/activities procure HM through a number of different channels, either through the U.S. Army supply system or through local suppliers. Although some facilities, such as motor pools and clinics, maintain inventories of HM stored and used, there is no single inventory that includes all HM stored and handled within the garrison.

The following sections describe several major activities and facilities on post along with the associated hazardous material and hazardous waste streams. Note that there are other streams that could not be precisely identified. Examples of these streams are the car maintenance materials purchased at AAFES facilities and used in military motor pools, and the expendable items used in the barracks that are purchased at the host nation do-it-yourself (DIY) stores.

HM/HW Mass Flow – 24th BSB

The 24th BSB (Brigade Support Battalion) runs the SSA (Supply Support Activity) facility at Building 8351 at Smith Barracks. Detailed information about the quantities of HM ordered and received by the units at this supply warehouse during the last few years is not available.

The current database system does not allow for material status tracking, making it difficult to track usage. Implementation of new software, either from a vendor or from the Army (e.g., Hazardous Material Management System [HMMS]), would provide several benefits. The HM usage could be tracked, inventories would be real-time and always up-to-date, and stock levels could be controlled. By establishing better ordering practices the units will benefit financially as it will prevent expired materials from being discarded and it will prevent excessive HM ordering.

In general, the supply of HMs is handled by the S4 Logistics Officers of each unit. Unit personnel (e.g., motor pool staff) order the required HMs directly through their supply office. Every U.S. Army Division stationed in Europe maintains a warehouse for their HM supplies, where ordered HM deliveries from the U.S. are stored until they are distributed to the units.

Supply warehouses typically store different class materials. **Table 4-1** identifies U.S. Army classes for supply.

Table 4-1 U.S. Army Classes and Subclasses of Supply

Class	Supplies	Subclass	Supplies
I	Subsistence	A	Nonperishable
		C	Combat Rations
		R	Refrigerated
		S	Other Non-refrigerated
		W	Water
II	Clothing, Individual Equipment, Tools, Admin. Supplies	A	Air
		B	Ground Support Material
		E	General Supplies
		F	Clothing
		G	Electronics
		M	Weapons
		T	Industrial Supplies
III	Petroleum, Oils, Lubricants	A	POL for Aircraft
		W	POL for Surface Vehicles
		P	Packaged POL
IV	Construction Materials	A	Construction
		B	Barrier
V	Ammunition	A	Air Delivery
		W	Ground
VI	Personal Demand Items		
VII	Major End Items: Racks, Pylons, Tracked	A	Air
		B	Ground Support Material
		D	Admin. Vehicles
		G	Electronics
		J	Racks, Adaptors, Pylons
		K	Tactical Vehicles
		L	Missiles
		M	Weapons
		N	Special Weapons
		X	Aircraft Engines
VIII	Medical Materials	A	Medical Material
		B	Blood / Fluids
IX	Repair Parts	A	Air
		B	Ground Support Material
		D	Admin. Vehicles
		G	Electronics
		K	Tactical Vehicles
		L	Missiles
		M	Weapons
		N	Special Weapons
		X	Aircraft Engines
X	Material for Nonmilitary Programs		

The motor pools are the biggest recipients of HM issued by the 24th BSB. The Hazardous Waste/Material management NCOICs are required to provide regularly updated HM inventories for their areas of responsibility; however, this is not being done consistently. A list with the on stock HM of the SSA can be found in **Appendix E -, Table 0-1**

The second major source of hazardous materials for the Baumholder units is Uncle Sam's Club at the Baumholder **SSSC**.

HM/HW Mass Flow – SSSC

The SSSC is supplied by the same material management system as the warehouse of the 24th BSB.

Table 0-2 in **Appendix E -** shows the list of hazardous materials stored and consumed in 2009 at the SSSC.

A comparison of similar products can be done to evaluate the potential for elimination of less environmentally sound products. An example of this is the replacement of methanol-containing windshield washer fluids with isopropanol-containing fluids. The isopropanol is less toxic than the methanol.

HM/HW Mass Flow – DPW Warehouse, Building 8162

The majority of the hazardous materials delivered to the **DPW Warehouse** are construction materials, paints, paint additive solvents, and various materials in aerosol spray cans for HM supply services to DPW shop personnel. The amount of these materials used is tracked in the Army supply system. The yearly amounts were not apparent from this tracking system. The main portion of the HM comes from local purchases.

Table 0-3 in **Appendix E -** shows the list of hazardous materials stored at the DPW Warehouse.

HM/HW Mass Flow – Strip Yard

The lack of consistent recordkeeping at **the Strip Yard** made it difficult to evaluate the flow of hazardous materials through the facility.

HM/HW Mass Flow – AAFES Auto Parts Store (Work Shop)

AAFES was not able to provide a HM mass flow for the HM used in the work shop. Other HM volumes generated by AAFES at the USAG Baumholder were not identified.

Gas Stations

Three gas stations are located at the USAG Baumholder. These are the DPW gas station in Bldg. 8160, the USAG Baumholder Fuel Facility, Building 8458, and the AAFES gas station in Bldg. 8251. The TMP gas station was closed in 2006. Details about the capacities and the fuel consumptions are discussed in **section 4.7 Vehicle Fuel Conservation**.

4.1.3. Hazardous Material – Future

Control and Tracking of HM

To get a realistic accounting of the HM usage of the units and activities based at USAG Baumholder, a tracking mechanism must be put into place. As discussed previously, either a commercial- or Army-developed software system could be set up and used to track the flow of HM on the base. Other U.S. Army garrisons in Europe, such as Grafenwöhr are utilizing software systems to track HM usage and could be used as examples for Baumholder. Until this type of system is in place, the HM information used to evaluate pollution prevention opportunities or to implement a hazardous material minimization program will be of limited value. Inventories, where available, provide only a snapshot-in-time

accounting of materials stored and do not provide information on the amount of material used over a certain span of time. Additionally, a software system would allow for storing and making available material safety data sheets (MSDSs) and *Betriebsanweisungen* for hazardous materials used on post.

A Reuse Center to control and reduce excess and expired HMs is planned to be implemented. For more details see section 5.1 Reuse Center.

Parts Washing without solvents

Parts washing is a process that is practiced daily by the military units. An alternative for eliminating the use of solvents is the use of aqueous-based parts washers. It is recommended that all of the units replace processes that use solvents with environmentally friendly alternatives such as aqueous-based parts washing, and HM procurement for solvent cleaning compounds could be significantly reduced. A detailed P2 project about efficient absorbent use is described in section 5.2 Parts Washing of this P2 plan.

Awareness of Toner Cartridge Recycling

Elimination of empty toner cartridges as HW stream and reduction in HW disposal costs (see section 5.4 Toner Cartridges).

Efficient Absorbent Use

Spills of liquid products such as POL and antifreeze can occur at any time, and not just during vehicle maintenance activities. These spills shall be minimized to the extent possible. A detailed P2 project about efficient absorbent use is described in section 5.3 Absorbents of this P2 plan. The implementation of absorbent segregation systems, the utilization of the most efficient absorbents, and the introduction of changes in management practices are relevant P2 tools. These new techniques would allow for a cleaner and more cost saving absorbent use and a better spill prevention program.

Table 4-2 Current P2 Initiatives – Hazardous Materials

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
W912CM-07-C-4013	Reuse Center	Excess HM / HW generation, stock reduction, proper HM storage and handling	DOL in cooperation with DPW ED	2010	
TBD	Establish and maintain AULs for units/activities that procure HM. Will include conducting site visits to units/activities to document HM inventory and screening inventories for priority chemicals.	Excess HM / HW generation	garrison-wide	TBD	TBD

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
TBD	Develop a Hazardous Materials Management Program (HMMP)	Excess and expired HM; chemicals targeted for reduction in accordance with EO 13423	DOL	TBD	TBD

Table 4-3 Potential P2 Initiatives – Hazardous Materials

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source
Aqueous Parts Washers	Spent solvents from parts cleaning	Motor Pools	TBD
Efficient Absorbent Use	Cleaner and more cost saving absorbent use	Motor Pools	TBD
Toner Cartridge Recycling	Elimination of empty toner cartridges as HW stream	Garrison -wide	TBD

4.2. Hazardous Waste

HWs are all wastes having hazardous properties. Table C6.T1 of the GFGS particularly designates wastes as HWs. Specific HW compliance requirements as well as definitions and requirements of HW accumulation and storage facilities can be found in Chapter 6 of the GFGS.

Activities across the USAG Baumholder generate HW as a result of operations related to support of the mission. These activities include maintenance of ground vehicles (tactical and non-tactical); maintenance of buildings, roads and grounds; and provision of utilities and resources (electricity, water, fuel) to the garrison population and visiting units.

4.2.1. Prevention Goal

The USAG Baumholder's goals with respect to HW are

- to show a continuous annual reduction in the generation of HW and
- to better manage the cost of HW management program.

The metrics are the quantity of HW shipped off site and the annual cost of HW management. The primary means by which the garrison will reduce HW generation is the implementation of HW minimization strategies.

4.2.2. Hazardous Waste Baselines

The HW generated by the units, DPW shops, the Strip Yard, and Auto crafts shop (Bldg. 8438) is currently collected and stored at the HWSA (Bldg. 8468). The waste is stored in this location until it is picked up by a DRMO contractor. The HW from the AAFES Garage, Shoppette, and Gas Station is also disposed by DRMO contractors; however, it is through a separate contract from the other units/activities on base.

The USAG Baumholder provides collection points for waste oil and antifreeze in ASTs and/or USTs, as well as for used batteries from tactical units at the HWAPs. One HWSA is located in Building 8468. The waste streams from the HWAP converge at this location.

Household battery drop-off points are located at different buildings throughout the USAG Baumholder.

The majority of the infectious medical wastes and expired drugs are disposed of at the Landstuhl Regional Medical Center. Medical waste is generated at the health clinic (Bldg. 8740), the dental clinic (Bldg. 8647), and at the veterinary clinic (Bldg. 8758). Medical waste streams from the health clinic and the dental clinic were provided from ED. Neither the health and dental clinic nor the contract manager could provide medical waste generation or disposal data. No data for the medical waste streams from the veterinary clinic were available. One waste container for expired drugs is located at the PX. The waste contract for this container is controlled by AAFES. Non-infectious HW from the clinics is disposed of at the HWSA. The verified HW disposal quantities for USAG Baumholder provided by the ED are presented in **Table 4-3** from 2002 through 2009.

Table 4-3 Annual Hazardous Waste Disposal at USAG Baumholder

Calendar Year	HWSA [kg]	AAFES Garage and Gas Station [kg]	Medical Waste Health Clinic and Dental Clinic [kg]	MWR Auto Craft Shop* [kg]
2002	0	NA	NA	NA
2003	435,034	1,293	1,306	340
2004	206,512	6,997	499	500
2005	351,088	9,787	701	590
2006	210,493	8,602	1090	NA
2007	358,421	4,676	2,328	1,340
2008	260,597	5,042	1,824	530
2009	115,861	4,056	1,882	200

*The Auto Craft Shop has a separate contract for parts washer solvent disposal which is listed here. All other HW is disposed of and managed via the HWSA and/or DRMO.

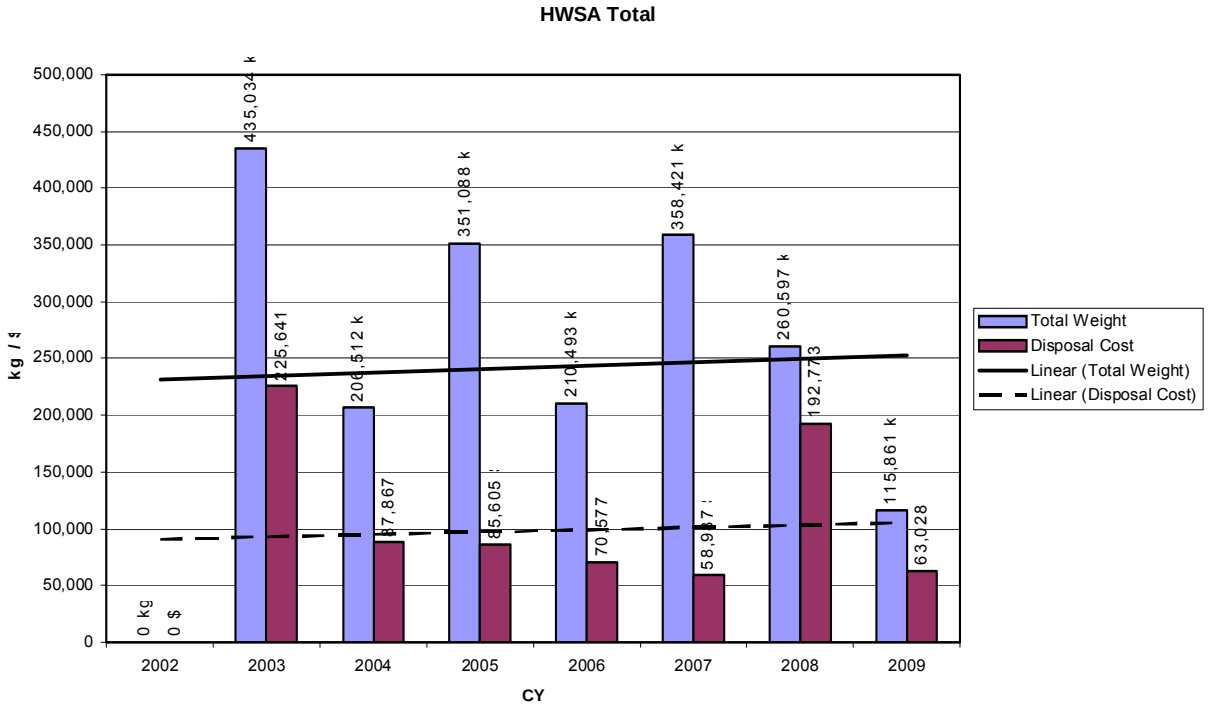
A Hazardous Waste Management Plan (HWMP) for the USAG Baumholder has been developed, but it does not provide detail about the HW streams, their quantities, or their sources. Each unit is provided with blue CONEXs in which to store HW. The list of HW accumulation point locations within the HWMP must always be updated, since this impacts the development of P2 initiatives and approaches at the garrison.

Detailed lists regarding the HW streams from 2003 through 2009 are located in tables **Appendix E -**, **Table 0-4** through **Table 0-10**. The following table **(Table 4-4)** and figure **(Figure 4-A)** summarizes the HW disposal for the HWSA. The tables should be updated as information becomes available in the future. It must be noted that in 2002 no HW was disposed of. All HW was collected during 2002 and disposed of in 2003.

Table 4-4 Annual Hazardous Waste Disposal costs at HWSA

Year	Total Weight [kg]	Disposal Cost [$]
2002	0	0
2003	435,034	225,641
2004	206,512	87,867
2005	351,088	85,605
2006	210,493	70,577
2007	358,421	58,987
2008	260,597	192,773
2009	115,861	63,028

Figure 4-A Annual Hazardous Waste Disposal costs and amounts at HWSA



Top Ten Waste Streams from 2002 through 2009

As PPOAs are conducted for the HW generated at Baumholder, the primary focus will be the waste streams that are the largest in weight and those with the most expensive disposal costs. To determine the "Top 10" waste streams for each year, the percentage of mass and percentage of cost for each waste stream was added and then divided by two. For example, coal tar and tarred products (European Waste Code [EWC] 17 03 03*) accounted for 8.65 percent of the total mass of HW disposed in 2009. They also accounted for 8.58 percent of the total cost of HW disposal in 2009. The percent of the weight (8.65) and the percent of the cost (8.58) were added (17.23), and divided by 2 to get the arithmetic mean of 8.62. The arithmetic mean provides a number by which the waste streams can be ranked. Those waste streams with the highest numbers will be the first ones targeted for pollution prevention opportunities. A list of the "Top Ten" waste streams and the charts from 2003 through 2009 are located in **Table 0-11** - **Table 0-17** and in **Figure 0-A** - **Figure 0-J**, respectively, in **Appendix E -**.

Table 4-5 shows the identified "Top Ten" hazardous waste streams regarding the aforementioned ranking system. The waste streams are listed in the order of the total average ranking system from 2002 through 2009. Since some long term high ranked waste streams were low or zero in some years, the total amount was used for the evaluation. For example, the waste stream for cartridges, which is in the table below, ranks second. But in the 2005 and 2007 the amount was zero (**Appendix E -, Table 0-13 and Table 0-15**). The gray marked waste streams in the "Top Ten" tables in **Appendix E -** are the rejected waste streams which are not relevant for the evaluation. These are not shown in the table below.

Table 4-5 Top Ten Hazardous Waste Streams

EW Code	EWC Description	Totals from the 2002 – 2009 Ranking
13 02 05*	WASTE USED OILS, PETROEUM AND SYNTHETIC	102.95
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	66.91
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	63.94
17 03 03*	TAR/BITUMENT/ASPHALT	61.73
15 01 10*	EMPTY CANS AND DRUMS, CONTAINED OIL, PAINTS, AND ACIDS	50.89
08 01 11*	PAINTS, NON-HALOGENATED	32.10
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	31.47
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	25.28
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	19.55
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	14.12

As part of the hazardous waste generation analysis, the generation rates from different years were compared. For each of the top ten waste streams in **Table 4-5** a diagram showing the weight and the costs per year from 2002 through 2009 was prepared. They can be found in **Appendix E -** in **Figure 0-A** through **Figure 0-J**. Each chart includes a trend line for the weight.

The waste streams out of the Top Ten Hazardous Waste Streams where the yearly disposal amounts rose are listed below:

Table 4-6 Ascending Waste Streams out of the ´´Top Ten´´

EWCode	EWC Description
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS
15 01 10*	EMPTY CANS AND DRUMS, CONTAINED OIL, PAINTS, AND ACIDS
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME

Maintenance activities related waste streams, i.e. waste oil and waste antifreeze, and deployment and non-deployment time frames greatly impact the data. Waste trends are difficult to identify for these waste streams.

The main deployment periods during the last eight years are as follows:

April 2003 - August 2004

October 2005 – October 2006

March 2008 – July 2009

The peaks of the waste stream diagrams during 2003 are primarily due to no waste being disposed of in 2002. Waste collected in 2002 was disposed of in 2003.

4.2.3. Hazardous Waste – Future

The construction of a new HWSA is planned for 2011. The current location of the HWSA will be utilized as a reuse center. This facility will reduce the number of hazardous materials that are disposed of as waste after the expiration dates have expired. The waste stream trends form the basis for future PPOAs. As the P2 program continues, these trends will be further evaluated for the development of additional PPOAs.

A major waste streams is "waste oil and POL contaminated solids". Waste oil results from oil changes, vehicle repair works in general, and from expired POL products. POL contaminated solids consist mainly of empty POL containing metal cans, POL contaminated rags, and absorbents. HM management is not only a tool for the reduction in the quantity of HMs procured, but also for the reduction in HW generated. Therefore, education and training programs provided to the HW generating units are the basis for a comprehensive, efficient, and successful implementation of P2 initiatives. In the fiscal year of 2009 the staff at the DPW Environmental Division initiated quarterly EO

meetings in order to increase awareness of the USAG Baumholder HM management and HW generation. Spill prevention and P2 issues are some of the topics discussed during these meetings.

The disposal of fire extinguishing residues results from fire extinguisher maintenance at the garrison. Yearly inspections of fire extinguishers are required. The extinguishing powder is filtered and dried during this maintenance process and then refilled into the device. If the powder is agglutinated it is then no longer usable, and must be disposed of. According to an interview with the fire department inspector, some fire extinguishers are no longer serviceable due to wrong or prohibited handling (e.g., carbon dioxide cartridges were activated unnecessarily causing an agglutination of the powder). In addition to the associated safety concerns, expensive disposal costs are directly associated with this. Information in the housing areas via placards or in the units could heighten awareness concerning proper handling.

Furthermore, the following P2 opportunities, listed and described in the HM **Section 4.1.3** in detail, also applies to HW management.

- Implementation of a Reuse Center → reduction of excess and expired HMs; and, hence in the generation of HW (see **Section 5.1 Reuse Center**).
- Implementation of aqueous-based parts washer to tactical units motor pools → reduction of waste solvents (see **Section 5.2 Parts Washing**).
- Optimization of absorbent management practices → reduction in POL contaminated solids (see **Section 5.3 Absorbents**).
- Implementation of absorbent segregation systems → reduction in POL contaminated solids. (see **Section 5.3 Absorbents**).
- Awareness of toner cartridge recycling → elimination of empty toner cartridges in the HW stream and reduction in HW disposal costs (see **Section 5.4 Toner Cartridges**).

The antifreeze recycling is not considered as a possible adequate future P2 initiative for the USAG Baumholder for HW reduction. The performance for all vehicles at the garrison depends on the quality of all vehicle fluids, including antifreeze. Besides the investment for an antifreeze recycling equipment, the certification to ensure safe use in all vehicles is not clarified.

Table 4-7 shows the ongoing P2 initiatives listed; **Table 4-8** shows the potential recommended P2 initiatives listed.

Table 4-7 Current P2 Initiatives – Hazardous Waste

Project Number	Project Name	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
W912CM-07-C-4013	Implementation of a Reuse Center	Excess and expired HM / HW generation	DOL	2010	

Project Number	Project Name	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
NA	Quarterly EO meetings	Increasing awareness of the HM management and HW generation.	DPW ED Bldg. 8164	2009	
NA	Training of all EOs	Awareness of the HM and HW management generation	Units/ Shops	2009	

Table 4-8 Potential P2 Initiatives – Hazardous Waste

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source
Awareness training concerning proper handling of fire extinguisher	Increasing awareness HW generation and safety aspects.	DPW ED	TBD
Installation of Aqueous Parts Washers	Spent solvents from parts cleaning	Motor Pools	TBD

4.3. Solid Waste

Solid waste is generated by a variety of sources across the USAG Baumholder, including military family housing, administrative offices, commercial areas, industrial shops, and operational units. The DPW primarily manages the collection and sale of recyclable, recoverable, and reusable materials; however, other organizations (AAFES, DeCA, MWR) manage solid waste or parts of the solid waste stream through contracts. The garrison maintains a number of facilities for the collection and sorting of solid waste, including recyclable materials.

The USAG Baumholder has phased out operations at its on-post solid waste landfill, as required by the Deponieverordnung (DepV), which stipulates that only pre-treated wastes can be disposed in landfills after 01 June 2005. Since this date, garrison residual waste, including bulk items like furniture etc., is transported to a Host Nation solid waste facility at Reibertsbach, operated by Eigenbetrieb Abfallwirtschaft for sorting, storing, and repackaging for transportation for its final disposal.

4.3.1. Prevention Goal

The primary solid waste prevention goal for the USAG Baumholder is to continuously reduce the quantity of solid waste generated. To meet that goal, the garrison has a SORT Center and various recycling containers at the units' locations.

The 2008 goals established by DoD for all Army installations are to continuously reduce the quantity of non-hazardous solid waste generated (excluding C&D debris), to increase the percentage of non-hazardous solid waste diverted from land disposal facilities, and to increase the economic benefit of solid waste diversion. In the memorandum from DoD "Army Integrated (Non-Hazardous) Solid Waste Management Policy" from 15 August 2008 it was issued implementing guidance for the solid waste and recycling requirements of E.O. 13423, "Strengthening Federal Environmental, Energy, and Transportation Management".

By FY2010 all Defense Installations are required to divert no less than 40% of the non-hazardous solid waste (without construction & demolition waste). For construction & demolition waste, at least 50% is required to be diverted from disposal in a landfill or by incineration.

The prevention goals of the USAG Baumholder are:

- Continuously reduce SW generated (excluding Construction and Demolition (C&D) debris).
- Continuously increase SW diversion rate (40% of the non-hazardous solid waste and for construction & demolition waste, at least 50%).
- Increase economic benefit of SW diversion.

In order to measure progress toward and ultimately reach these goals, the following metrics are measured and tracked: the quantity of solid waste diverted from disposal, the quantity of solid waste sent to a disposal facility, the residential and non-residential installation population, the economic benefit of solid waste diversion, and the cost of solid waste management.

4.3.2. Baseline and Progress

The Solid Waste Management Plan was updated in March of 2010. In addition to the plan, the DPW Utilities Refuse Collection Team provided Solid Waste Annual Reports (SWAR). These reports

include all of the SW generation data for the USAG Baumholder's SW disposal. Recyclable C&D is collected separately and is reused as construction material following treatment and preparation. Only contaminated construction debris is disposed of in accordance with applicable host nation laws. Until 2005 the USAG Baumholder operated an on-post solid waste landfill. Currently, contractors collect the USAG Baumholder refuse, and it is then disposed of at the Mainz incineration facility. The refuse collection team transports the residual waste to the disposal contractor near the garrison. The contractor takes care for the shipment to the incinerator. Open burning of waste is prohibited in the state of Rheinland - Pfalz and therefore not a method of disposal for SW.

Table 4-9 Summary of Solid Waste Landfill input at USAG Baumholder

Year	Total Weight [metric tons]	Disposal Cost [€]
2003	5,290	238,245
2004	5,463	250,637
2005[1]	5,136	216,446

[1] *Per German law, landfilling is prohibited after 1 June 2005.*

The USAG Baumholder implements a recycling program and focuses on opportunities to reduce, reuse, and/or recycle SW. Paper and cardboard is collected at the garrison at each facility and housing area.

Further, USAG Baumholder provides a Refuse Sort Center for all solid waste types. The waste is disposed of by certified contractors. Staff from the USAG Baumholder DPW's personnel supports military and civilian personnel with the waste separation according to the different waste types for proper disposal.

The following recycling containers are provided at Bldg. 8461:

- Wood
- Bulky Trash
- Foil/Styrofoam
- Tires
- Construction Debris
- Metal
- Paper & Cardboard
- Residual Waste
- Electronic Scrap
- Cables
- Glass

Table 4-11 provides an overview of the solid waste and the recyclables managed by the DPW Refuse Collection Team. The DPW Refuse Collection Team collects and disposes refuse from the complete garrison. Regarding recyclables, only paper and cardboard is picked up and disposed by the DPW Refuse Collection Team. All other recyclables must be brought to the Refuse Sort Center or to the Recycling Center for disposal.

OMA and housing are the main generators of residual waste. All recyclable material which can not be diverted out of the residual waste stream are subsequently causing high disposal costs, which can be seen in **Table 4-10**, using the current solid waste values under contract at the garrison. Residual waste disposal costs are 93.70 €/ton. All recyclables have lower disposal costs or even credits.

Table 4-10 Overview of the 2009 Waste Disposal Contract, Recyclables vs. Unsorted Residual Waste Disposal

	Unsorted Disposal Cost	Sorted Disposal Cost	Credits	Savings
Scrap Aluminum	**€ 93.70/ton**	**€ 0.00/ton**	**€ 300.00/ton**	**€ 393.70/ton**
Metal	**€ 93.70/ton**	**€ 0.00/ton**	**€ 90.00/ton**	**€ 183.70/ton**
Clean Cardboard	**€ 93.70/ton**	**€ 0.00/ton**	**€ 20.00/ton**	**€ 113.70/ton**
Glass	**€ 93.70/ton**	**€ 0.00/ton**	**€ 10.00/ton**	**€ 103.70/ton**
Wood	**€ 93.70/ton**	**€ 15.00/ton**	**€ 0.00/ton**	**€ 78.70/ton**
Paper & Cardboard	**€ 93.70/ton**	**€ 33.00/ton**	**€ 12.50/ton**	**€ 73.20/ton**
Complete Tires	**€ 93.70/ton**	**€ 75.00/ton**	**€ 0.00/ton**	**€ 18.00/ton**
Foil / Styrofoam	**€ 93.70/ton**	**€ 133.33/ton**	**€ 44.44/ton**	**€ 4.81/ton**
Bulky Trash	**€ 93.70/ton**	**€ 93.70/ton**	**€ 0.00/ton**	**€ 0.00/ton**

Costs<->Revenues

The diversion rate of recyclables out of the residual waste generated out of OMA and Housing managed under the DPW Refuse Collection Team can be found in **Table 4-12**. It can be seen that the diversion rates between 13 % and 19 % from 2006 to 2009 is low. There is a great potential for higher diversion rates. In 2005 the Refuse Collection Team investigated one truck from HSG and OMA to categorize the compounds. The results were as follows:

HSG Residual Waste Sorting Data from 20 September, 2005

1 truckload with 5,700 kg residual waste from the Smith Housing Area was sorted.

Assorted recyclables:

Paper& Cardboard	51 kg	0.9 %
Biodegradable Waste	180 kg	3.2 %
Hazardous Waste	8 kg	0.1 %
Metal	58 kg	1.0 %
Glass	148 kg	2.6 %
Electronic Scrap	65 kg	1.1 %
Total	**510 kg**	**8.9 %**

Remaining residual waste after assorting: 5,190 kg

OMA Residual Waste Sorting Data from 22 September, 2005

1 truckload with 2,020 kg residual waste from the OMA Support was sorted.

Assorted recyclables:

Paper& Cardboard	420 kg	20.8 %
Biodegradable Waste	31 kg	1.5 %
Hazardous Waste	9 kg	0.4 %
Metal	36 kg	1.8 %
Glass	245 kg	12.1 %
Electronic Scrap	128 kg	6.3 %
Total	**869 kg**	**43.0 %**

Remaining residual waste after assorting: 1,160 kg

This was only a snap shot of two truck loads of residual waste. There is a potential to divert recyclables out of the waste stream.

Table 4-11 Overview of the Solid Waste managed by the Refuse Collection Team

	CY2006		CY2007		CY2008		CY2009	
	Weight	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs
Solid Waste managed by the refuse collection team	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Residual Waste	3,799,300	898,117	4,995,750	974,171	4,049,310	698,337	4,051,260	446,606
Recyclables	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Paper and Cardboard mixed with other Fractions	325,440	4,882	387,100	5,807	300,060	5,967	309,320	10,928
Wood, Categories A1, A2 and A3	123,980	5,207	283,440	11,338	348,490	13,940	197,550	4,902
Bulky Trash (Wood, Furniture, etc.)	83,480	18,064	163,710	31,923	212,150	35,672	117,410	13,213
Plastic Foil & Styrofoam in 1 cbm bags including Bags Provision	16,920	5,828	17,820	3,168	24,795	4,920	26,055	4,825
Electronic Waste	0	0	0	0	2,650	186	10,240	915
Car Tires with/without Rims	9,740	2,435	16,080	2,332	37,810	6,808	6,190	891
Electrical Appliances [ea]	0	0	0	0	24	600	35	875
Total recyclables excluding construction debris managed by the refuse collection team	**559,560**	**36,416**	**868,150**	**54,567**	**925,955**	**68,092**	**666,765**	**36,549**
Construction Debris Mixes of Concrete, Roof and other Tiles and/or, Ceramic	0	0	24,050	361	91,490	1,372	34,910	524
Construction Debris pre-sorted/sort clean	0	0	9,980	150	62,950	1,516	26,890	356
Subtotal recyclables including construction debris managed by the refuse collection team	**559,560**	**36,416**	**902,180**	**55,078**	**1,080,395**	**70,980**	**728,565**	**37,428**

Solid Waste refund for recyclables managed by the refuse collection team	**kg**	**Refund €**	**kg**	**Refund €**	**kg**	**Refund €**	**kg**	**Refund €**

Refund Mixed Paper & Cardboard Weight	0	0	530,220	9,279	250,860	6,417	289,720	11,628
Refund Cardboard Only	0	0	0	0	19,940	1,196	41,540	2,149
Scrap Metal	7,110	107	21,420	321	17,210	661	36,470	2,038
Scrap Metal / Sheet Metal	0	0	0	0	0	0	1,660	83
Scrap Aluminum	0	0	0	0	0	0	1,580	632
Refund Plastic Foil & Styrofoam [cbm]	0	0	6,480	216	7,830	261	8,685	386
Subtotal of refund for recyclables managed by the refuse collection team	**7,110**	**107**	**21,420**	**9,816**	**17,210**	**8,536**	**39,710**	**16,916**
Total for all recyclables managed by the refuse collection team (incl. C&D)	**566,670**	**36,309**	**923,600**	**45,261**	**1,097,605**	**62,444**	**768,275**	**20,512**
Total of all recyclables and the residual waste managed by the refuse collection team	***4,365,970***	***934,426***	***5,919,350***	***1,019,433***	***5,146,915***	***760,781***	***4,819,535***	***467,118***

Table 4-12 Overview of the Solid Waste managed by the Refuse Collection Team regarding Residual Waste and Recyclables

	CY2006		CY2007		CY2008		CY2009	
	Weight	**Disposal Costs**	***Weight***	**Disposal Costs**	***Weight***	**Disposal Costs**	***Weight***	**Disposal Costs**
Totals excluding construction debris managed by the refuse collection team	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Residual Waste	3,799,300	898,117	4,995,750	974,171	4,049,310	698,337	4,051,260	446,606
Recycled	566,670	36,309	889,570	44,751	943,165	59,556	706,475	19,633
Solid Waste Total Amounts	4,365,970	934,426	5,885,320	1,018,922	4,992,475	757,893	4,757,735	466,239
% *Recyclables*	13%	4%	15%	4%	19%	8%	15%	4%

Figure 4-B Weights of Residual Waste and diverted Waste

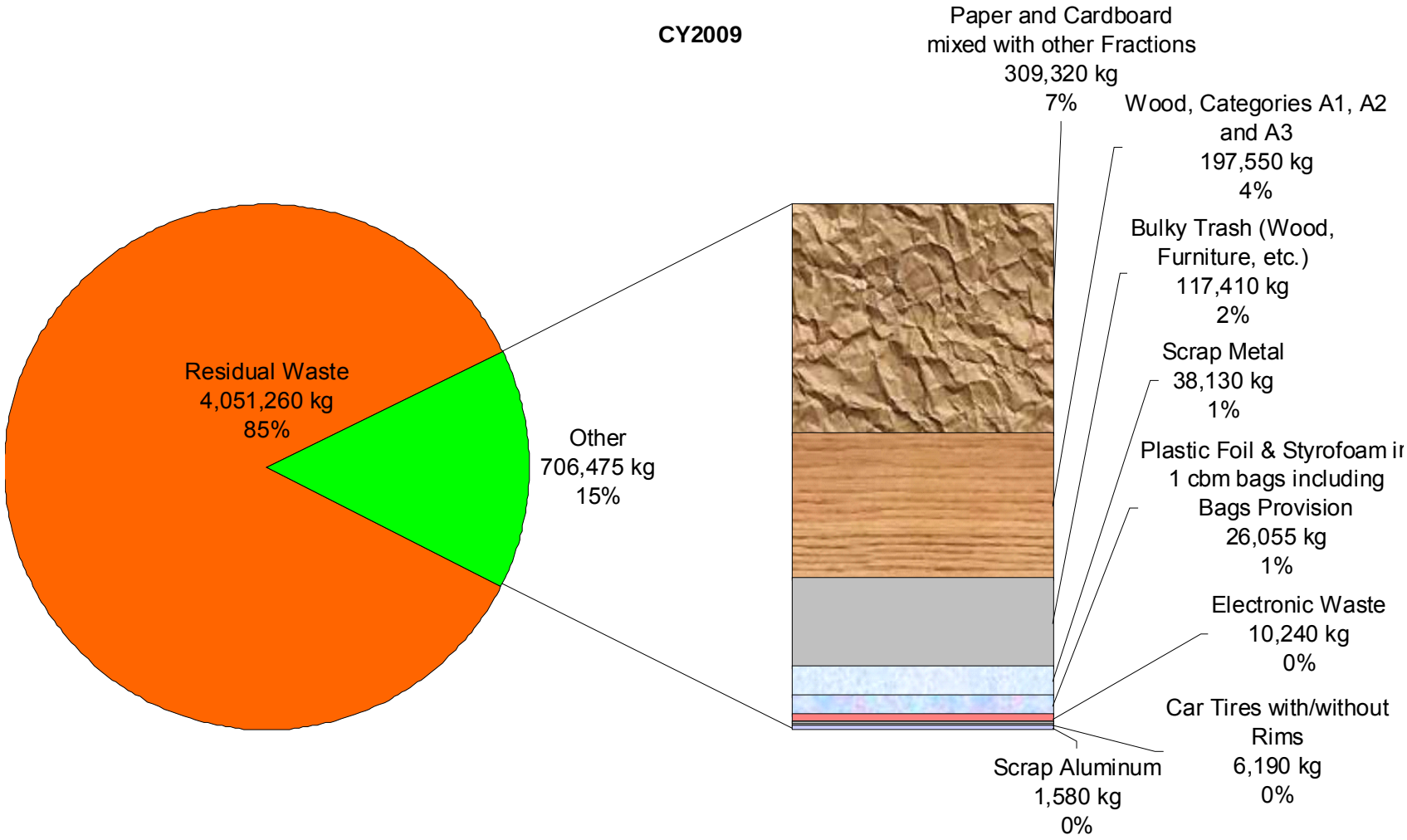
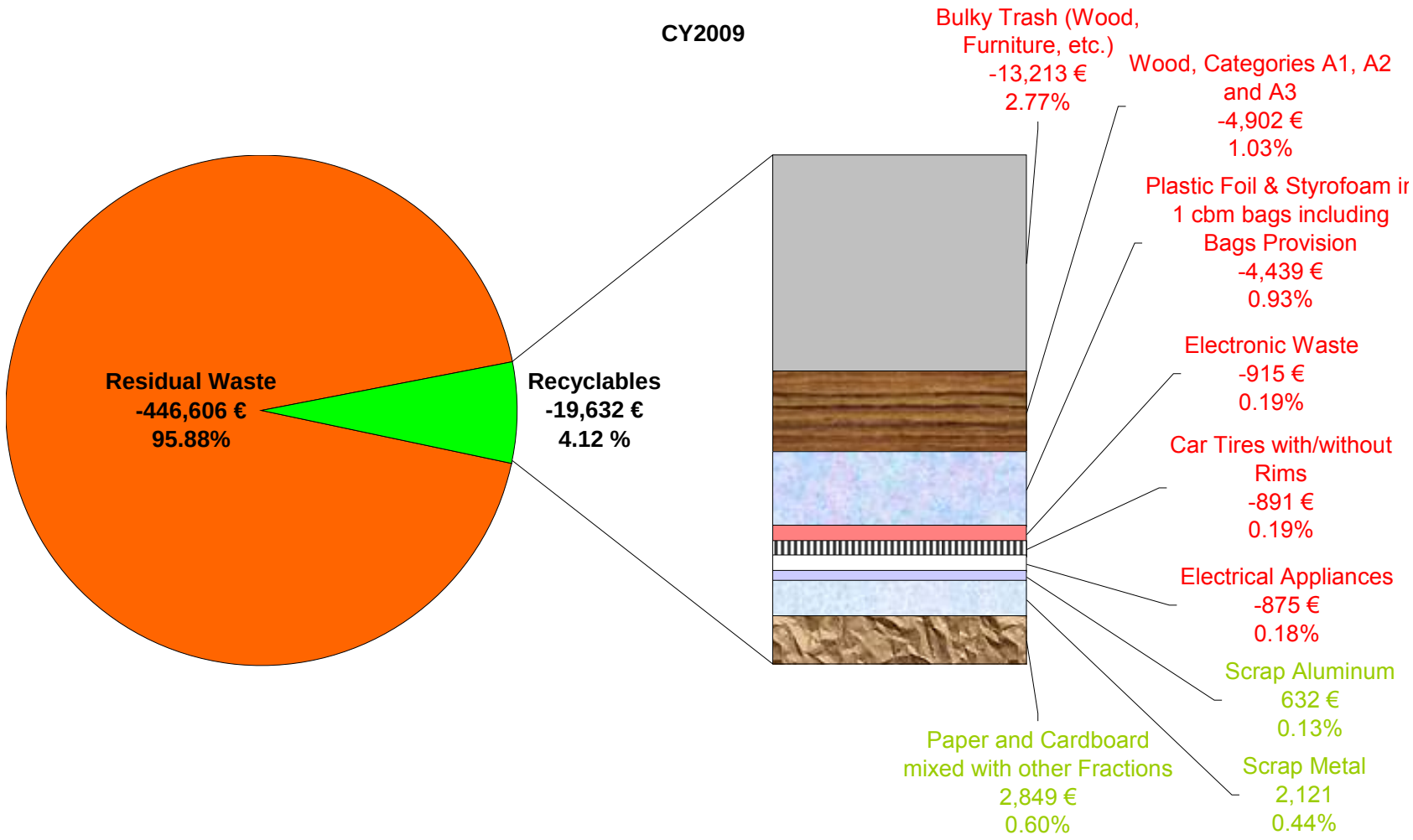


Figure 4-C Costs of Residual Waste and diverted Waste



The USAG Baumholder offers a Recycling Center (see section 4.3.3.2) for overflow of recyclables from housing/administrative areas. This unfenced, un-staffed area provides collection for the following waste streams:

- Residual Waste
- Paper and Cardboard
- Glass (separated brown, green, and clean/white)
- Metal
- Electronic Scrap
- Deutsches Rotes Kreuz (DRK) Drop-off Box

Table 4-13 provides an overview about the recyclables managed by the DPW Utilities SORT Manager. The following facilities are under the waste food contract:

- Dining Facility, Bldg. 8311
- Dining Facility, Bldg. 8544
- PX Subway Shop, Bldg. 8401
- Commissary, Bldg. 8575
- Tisa Warehouse, Bldg. 8713
- Burger King, Bldg. 8290
- Bowling Center, Bldg. 8105
- Popeye's, Bldg. 8125
- Rheinlander, Bldg. 8085

Table 4-13 Overview of the recyclables managed by the DPW Utilities SORT Program Manager

	CY2006		CY2007		CY2008		CY2009	
	Weight	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs
Recyclables managed by the SORT Manager	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Food Waste/Garbage	233,108	58,162	494,773	121,048	285,411	36,863	355,256	49,381
Glass	31,527	7,685	23,120	4,624	18,884	3,919	12,640	2,781
Total for recyclables managed by the SORT Manager	**264,635**	**65,847**	**517,893**	**125,672**	**304,295**	**40,783**	**367,896**	**52,162**

For AAFES, MWR and DECA facilities the DPW refuse collection team is taking care of the collection for the refuse, paper and cardboard. Paper and cardboard generated at the commissary is managed by DECA itself. The amount of cardboard disposed by DECA is unknown, since the contract is only related to lots and not to the weight of the container.

The USAG Baumholder provides scrap vehicle collection, holding, or recycling at Building 8433 and 8477 auto parts yard / strip lot. Collection of scrap vehicles is done on an as-needed basis. These activities are the responsibility of MWR. Scrap metal at the MWR is managed by MWR itself. Amounts of scrap metal and scrap cars disposed can be found in **Table 4-14**.

Grass clippings, yard waste and other biodegradable materials generated by Roads and Grounds are collected at the storage area of the Roads and Grounds shop. Depending on the amount needed by the contractor, the material is then transported to a composting facility. An overview of the costs and amounts can be found in **Table 4-15**

Table 4-14 Overview of the Scrap Metal and Scrap Cars managed by the MWR Strip Lot

	CY2006		CY2007		CY2008		CY2009	
	Weight	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs
Scrap Metal managed by MWR	**kg**	**Refund €**	**kg**	**Refund €**	**kg**	**Refund €**	**kg**	**Refund €**
Scrap Metal / MWR	43840	2630.4	70480	4228.8	152580	9154.8	75170	5787.2
Aluminum / MWR	3020	2416	1510	1208	3240	2592	840	672
Total Scrap Metal and Aluminum managed by MWR	**46,860**	**5,046**	**71,990**	**5,437**	**155,820**	**11,747**	**76,010**	**6,459**

	CY2006		CY2007		CY2008		CY2009	
	In	Out	In	Out	In	Out	In	Out
Scrap Cars / MWR [ea]	227	243	291	72	289	243	269	73

At Yellow marked cells contract costs from 2009 were used for calculation; current costs are unknown

Table 4-15 Overview of the biodegradable Waste managed by Roads and Grounds

	CY2006		CY2007		CY2008		CY2009	
	Weight	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs
Biodegradable Waste managed by Roads and Grounds	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Bio Waste / Roads and Grounds	623,100	14,330	758,100	17,420	483,000	11,087	540,000	12,420

Table 4-16 provides an overview of the residual waste generated at the garrison compared to the abovementioned recyclables collected at the garrison. It must be noted that besides the abovementioned recyclables, more recyclables are collected from different organizations. Examples include the abovementioned paper and cardboard amounts at the commissary (DECA). No reliable amounts are known. Information like this is missing in **Table 4-16**.

Table 4-16 Summary of the Solid Waste Streams and Recyclables from the Refuse Collection Team Contract (Residual Waste and Recyclables from OMA and HSG), the Food Waste Contract (for the Food Processing Locations at the Garrison), the Scrap Metal contract (MWR), and the Bio Waste Contract (R&G)

	CY2006		CY2007		CY2008		CY2009	
	Weight	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs	*Weight*	Disposal Costs
Totals excluding construction debris	**kg**	**€**	**kg**	**€**	**kg**	**€**	**kg**	**€**
Residual Waste	3,799,300	898,117	4,995,750	974,171	4,049,310	698,337	4,051,260	446,606
Recycled	1,501,265	111,440	2,237,553	182,406	1,886,280	99,678	1,690,381	77,755
Solid Waste Total Amounts	5,300,565	1,009,556	7,233,303	1,156,577	5,935,590	798,015	5,741,641	524,362
% *Recyclables*	28%	11%	31%	16%	32%	12%	29%	15%

Figure 4-D Overview of the Recyclables related to the Residual Waste in Percent

Solid Waste
Residual Waste and Recyclables
- Refuse Collection Team Contract (Residual Waste and Recyclables from OMA and HSG)
- Food Waste Contract (for the Food Processing Locations at the Garrision)
- Scrap Metal (MWR)
- Bio Waste (R&G)

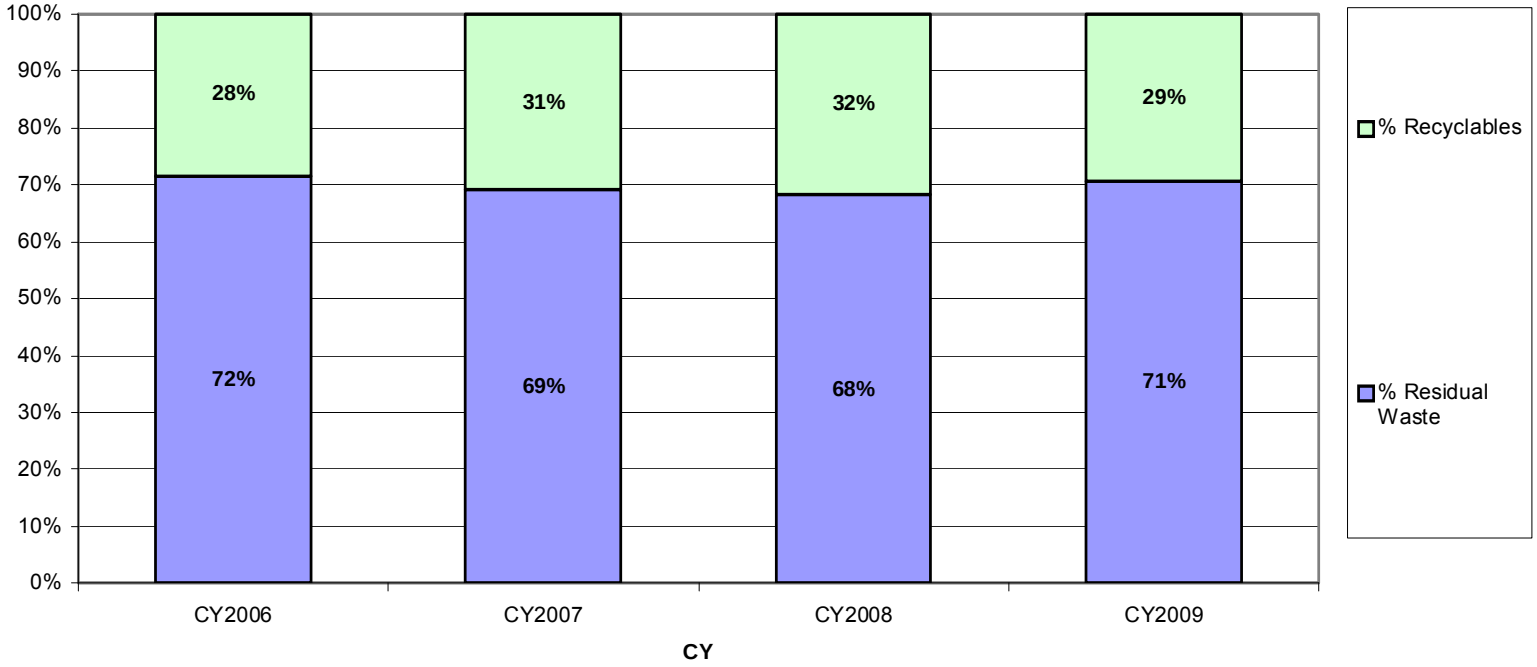


Figure 4-E Overview of the Recyclables related to the Residual Waste in kg

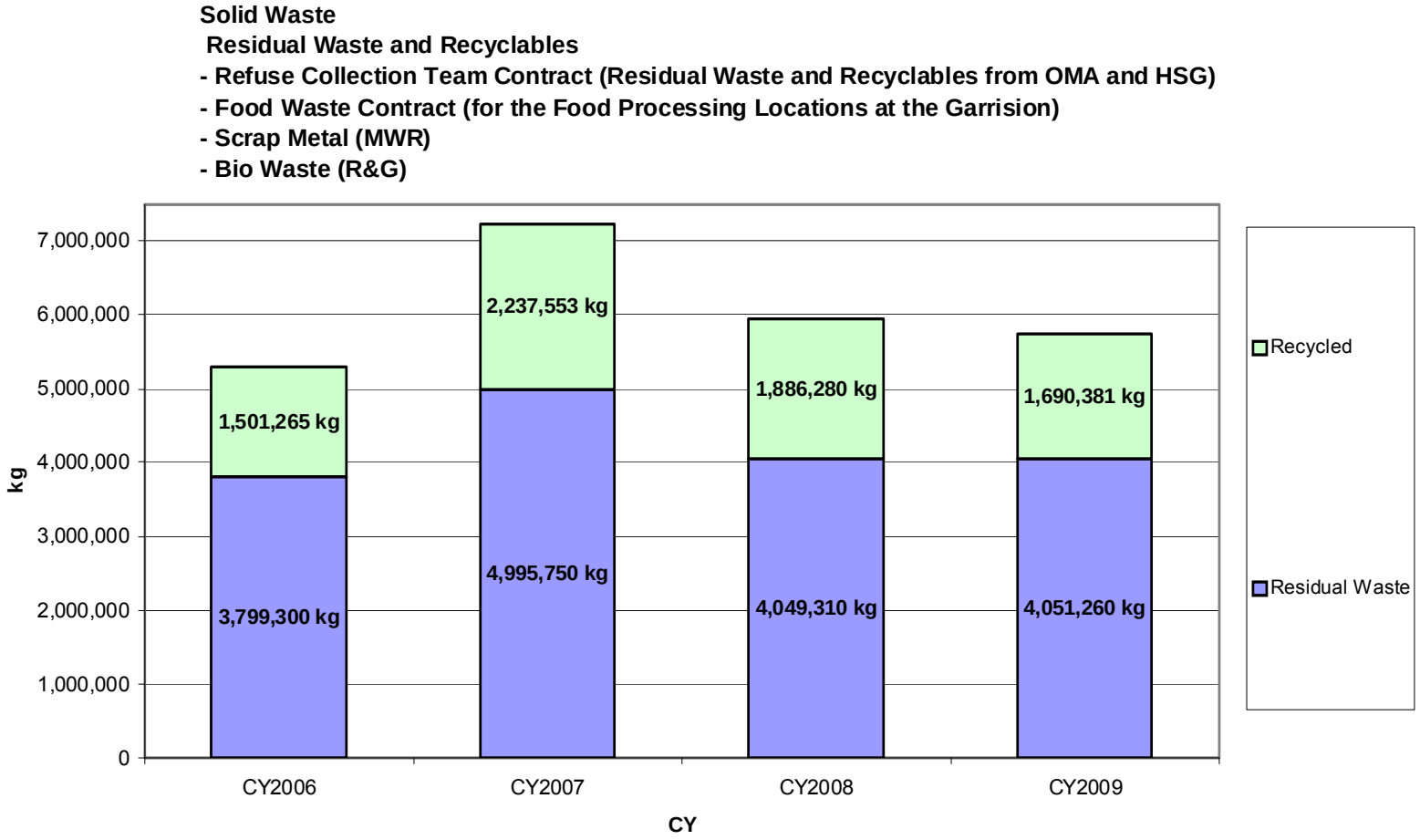


Figure 4-F Overview of the Waste Streams described in Section 4

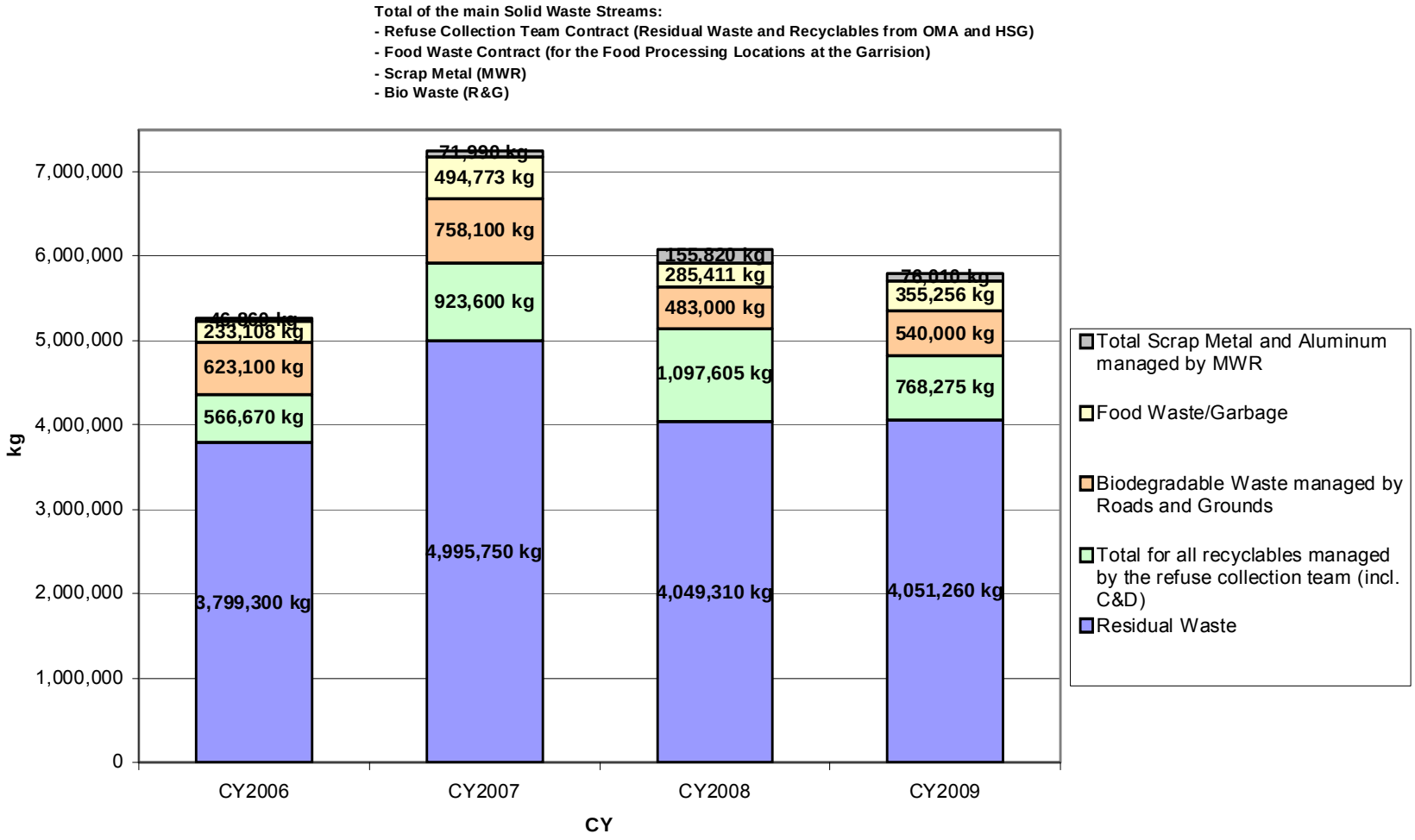
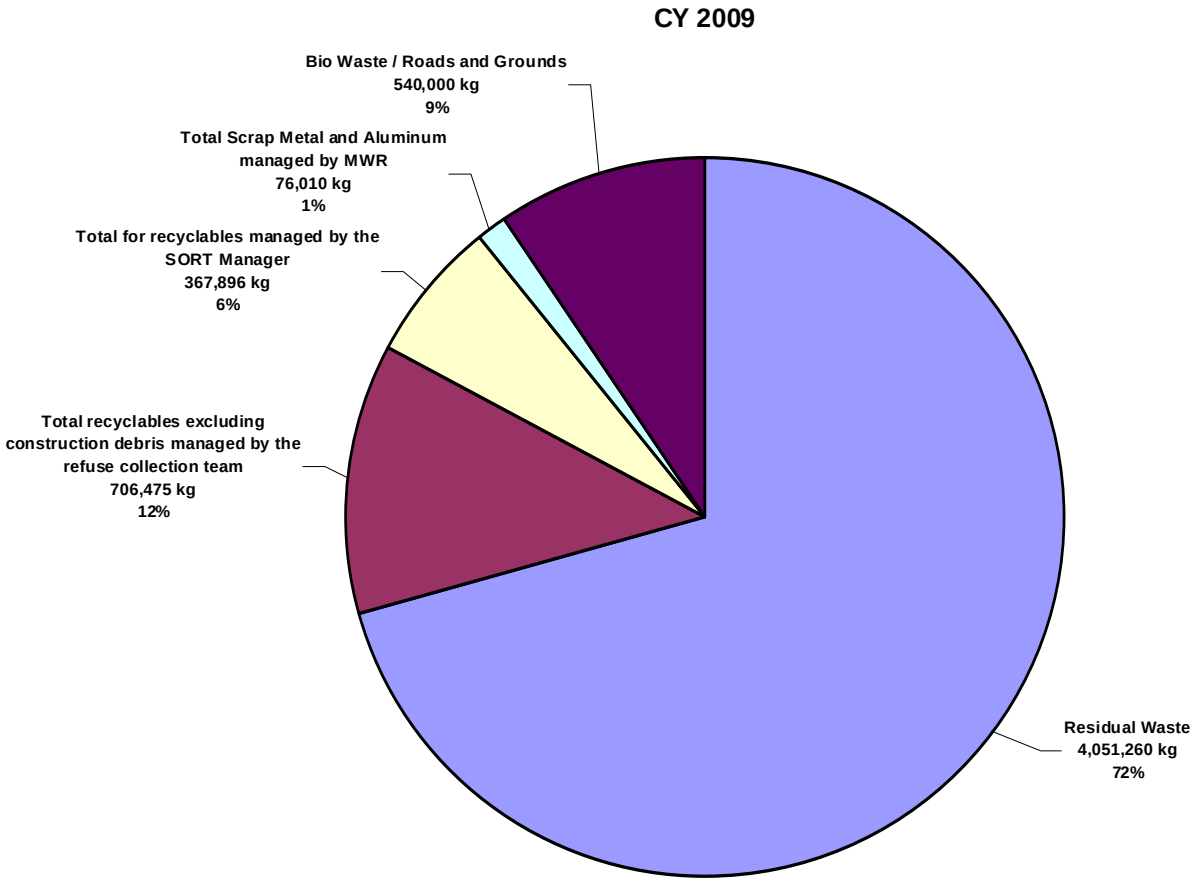


Figure 4-G Overview of the Waste Streams described in Section 4 especially for CY 2009



Recycled construction debris (mainly concrete) managed by the Engineering Division (EP&S) and the Environmental Division is roughly estimated to be 11,750 m³ in 2009. Soil recycling out of these projects is roughly estimated to be 10,000 m³. These amounts are primarily from hard stand renovations conducted at various locations at the garrison. It can be stated that construction debris, which is sorted by material, is always used as recycling material, since this is a more cost effective method. Detailed information regarding debris generated from construction projects is not available due to various contracts and transactions.

4.3.3. Solid Waste – Future

4.3.3.1. Residual Waste Incineration

Since the complete closure of the landfill in Baumholder in 2005, the refuse is sent off site to be incinerated for thermal use. The costs for this type of disposal are calculated by the weight of the waste; therefore, to reduce the cost of disposal it will be necessary to reduce the quantity of waste requiring disposal. One means of accomplishing a reduction is to separate the heavy waste streams that can be used in industry as secondary raw material and ensure those streams are recycled.

4.3.3.2. SORT and Recycling

One SORT Center is located near the Commissary in Smith Barracks and one SORT Center is located at the Wetzel Kaserne. Both are used regularly by the garrison community. Proper separation of the solid waste streams results in recovery of usable secondary raw materials that are easier to handle and incorporate into the production of new goods by industry. This leads to lower disposal costs for the garrison. Fractions like paper and cardboard, clean Styrofoam, glass, and metal are very easy to recycle and save energy, water, and working time in the production processes. Glass and metal are nearly 100 percent recyclable, because they can be directly melted and reshaped into new products.

More SORT Centers will be installed in Wetzel Housing during construction projects of new housing buildings.

The SORT manager should coordinate efforts with the DPW personnel responsible for operation of the SORT Center to evaluate options for improving waste stream separation by the community members at the time of drop off.

Currently no SORT manager is appointed full time. It is recommended to increase the efforts in this direction to increase recycling efforts.

4.3.3.3. Composting

Composting is a very effective way to dispose and “reuse” biodegradable waste. A host nation permit may be required to establish a composting facility, but the savings on disposal will likely be worth it. Grass clippings, tree cuttings, and hedges are currently stored at the DPW timber yard. The Media Manager should encourage and support the establishment of composting operations with the personnel responsible for waste disposal within the relevant activities (e.g., landscaping).

4.3.3.4. Cost savings by reducing the cost intensive residual waste amounts

Paper and Cardboard

Paper and cardboard is currently the heaviest recyclable fraction. To relieve the residual waste with its high disposal costs the separation of paper and card board from the residual waste must be

enforced. One of the biggest generators of paper waste comes from the administrative areas. Currently, recycling bins for paper and cardboard are only located at the exterior areas of administration buildings. The collection of recyclables in the administration buildings is the responsibility of each user. To increase this collection paper bins should be placed in each office. For more details see **Section 5.6**.

End-of-life Tires

Currently end-of-life tires can be brought to the Refuse Sort Center. There is currently no possibility to separate the tires from the rims. If the tires were to be separated from the rims, more cost effective waste streams could be used. For more details see Section 5.7.

Reuse of Packaging Material

The reuse and recycling of packaging material is another possible P2 opportunity that the USAG Baumholder should consider to reduce the SW disposal burden. Manufacturers and distributors who ship items to the Garrison often package these items with paper, cardboard, and plastic in the form of outer wrappings or filler. In accordance with the GFGS, the USAG Baumholder should put procedures in place to take advantage of the fact that all manufacturers and distributors are obliged to accept packaging returned to them without payment (unless they participate in a waste collection consortium, e.g., DSD). A detailed assessment about the feasibility to return packaging material should be performed. Additionally, if military units and tenants located at the USAG Baumholder receive items from distributors, the packaging materials should be evaluated for potential reuse and then recycling. If neither possibility is feasible, proper disposal should be considered as a final option.

Special Events Recycling

Recycling at special events is one way in which the recycling program could be expanded. Such events include for example the 4th of July celebration. Often, large quantities of glass and plastic bottles are generated at these events. Since the Garrison routinely recycles glass and plastic, exceptions should not be made for these events. Special care should be taken to try and place recycling containers in the most noticeable and logical places.

Information Policy

To enforce the acceptance of recycling measures, an aggressive informational policy regarding recycling at the USAG Baumholder must be maintained. The vital methods currently being practiced regarding the education of garrison personnel and housing residents with briefings in housing areas should continue. These trainings should be performed on a regular basis.

Table 4-17 Current P2 Initiatives – Solid Waste

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
No Data	Operation of the SORT Center	Residual Waste disposal reduction	DPW	No Data	No Data
No Data	Investment for an automatic tire removal	Reduction of	DPW	No Data	No Data

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
	machine	expensive recyclables			
No Data	Additional paper recycling bins for admin areas	Residual Waste disposal reduction – increasing of recyclables diversion	DPW	No Data	No Data

Table 4-18 Potential P2 Initiatives – Solid Waste

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source
Information Policy	Residual waste reduction, increase of recycling awareness	DPW ED	No Data
Reuse of Packaging Material	Residual waste reduction, increase of recycling awareness	DPW ED, units	No Data
Special Events Recycling	Residual waste reduction, increase of recycling awareness	DPW ED, units	No Data
Composting	grass clippings, timber wood, yard waste	Landscaping contractors, DPW	No Data

4.4. Air Emissions

Air emissions are defined as pollution from dust, smoke, gases, aerosols, steam, or odors. Chapter 2 in the GFGS contains requirements for the control of air emissions from DoD owned and/or operated facilities and equipment. It establishes requirements pertaining to both the type and the source of air emissions.

4.4.1. Prevention Goal

The primary air emissions goal for the USAG Baumholder is to continuously reduce the quantity of air pollutant emissions. The secondary goal, as promulgated by IMCOM-Europe for all Army installations in the region, is to better manage the cost of air pollution programs.

4.4.2. Garrison-wide Organizational Structure

The USAG Baumholder completed an Air Emissions Inventory Report in September of 2002. The new Air Emission Monitoring Work Plan from September 2007 outlines the work of this new study.

The inventory from 2007 identifies stationary sources of air pollution and the types and amounts of pollutant emissions present at the installations. The air emission sources at the USAG Baumholder are listed in **Table 4-19** below.

Table 4-19 Air Emissions Sources, USAG Baumholder

Emission Sources	USAG Baumholder Total
Steam/hot water generating unit	1
Small heating units (oil- and gas-fired)	48
Large heating units	1
Stationary internal combustion engines	11
Painting	None
Carpentry Shops	2
Fuel dispensing facilities	4 fixed, 11 mobile
Welding and cutting	12
Cold solvent cleaning tanks	14
ODS	See **section 4.5** Ozone Depleting Substances (ODSs)
Pesticides	27 types
Drinking water treatment	3
UST and AST storage	see DPW ED Tank Database

Source: Air Emissions Inventory Report (September 2010)

4.4.3. Baseline

Since current data concerning air emissions from source-specific emission tests or continuous emission monitors were not readily available, the air emissions baseline data collection for this plan was limited to the review of existing documents and studies. The information presented in this baseline is largely drawn from the Air Emissions Inventory Report (September 2007) for the USAG Baumholder. The inventory includes the following:

furnaces (oil-fired, natural gas-fired, liquefied petroleum gas-fired), gas stations, stationary internal combustion engines, maintenance shops (painting, welding and cutting, carpentry shops), cold solvent cleaning tanks, wastewater treatment plants, pesticide application, drinking water treatment, UST and above-ground storage (AST), and other miscellaneous sources of volatile organic compounds (VOCs), i.e. adhesives and sealants, photo chemicals.

In order to complete the Air Emissions Inventory Report, buildings were surveyed to identify and verify the locations and uses of air emissions sources. Field and operations personnel were interviewed to obtain information on fuel usage, raw material usage, hours of operation, and other information necessary to perform the air emissions calculations. At the time, data was not available from source-specific emission tests or from continuous emission monitors for the emissions sources identified in **Table 4-19**.

The following sections describe the sources of air emissions and air pollutants found at the USAG Baumholder, excluding non-stationary source, i.e. motor vehicles. The Air Emissions Inventory Report as well as the Air Emissions Survey and Assessment (2007) should be referred to if further information is needed.

4.4.3.1. Heating Facilities

The following types of heating facilities are used at the USAG Baumholder:

- Oil-fired heating facilities, and
- Gas-fired heating facilities (only liquefied petroleum (LP) gas-fired facilities).

A competent authority must annually inspect oil- and gas-fired furnaces that have a rated heat output of 11 kilowatts (kW) or more. Exhaust gases must be discharged through a stack and continuous emissions monitoring is required for furnaces with a capacity of at least 5 megawatts (mW). Heating facilities are generally cleaned at least once per year to help limit air emissions.

The USAG Baumholder has 46 heating units (45 with heating oil, 1 with LPG). Annual testing for opacity, oil-derivatives, and heat loss must be performed for oil-fired heating facilities according to the GFGS and German regulations. If limits are exceeded, re-testing must be performed within 6 weeks. It is recommended that gas-fired heating facilities receive annual testing for heat loss per GFGS and German regulations.

During the heating process, each boiler emits a quantifiable amount of air emissions to include VOCs, nitrogen oxides (NO_x), particulate matter (PM), sulfur dioxide (SO_2), and carbon monoxide (CO). Source-specific emission standards are provided in the GFGS. Thus, in accordance with the GFGS, one feasible approach to reducing emissions at heating units is to employ all reasonable measures in reducing NO_x emissions through upgrading and optimizing the heating systems.

Estimated emission rates for heating oil and LPG fired units can be found in the Air Emission Inventory Report, 2007. **Appendix E -, Table 0-18** show the measurement data for the heating oil units out of the Air Emission Inventory Report, 2007. For further information see the Air Emission Inventory Report, 2007.

4.4.3.2. Fueling Operations

A total of 4 fixed, 11 mobile fueling facilities have been identified at the USAG Baumholder. Fuel dispensing facilities are regulated according to the GFGS. Fueling operations at the USAG

Baumholder include the DPW gas station, AAFES gas station, USAG Baumholder Fuel Facility, Building 8558, Class III Yard, and the military units. A more detailed description of fueling operations can be found in **Section 4.7 Vehicle Fuel Conservation** of this plan. No air emissions measurement data were available in 2002; therefore, gasoline emissions were estimated for VOCs.

4.4.3.3. Stationary Internal Combustion Engines

Stationary internal combustion engines are regulated by the GFGS. Typical internal combustion engines present at the USAG Baumholder are generators and steam cleaners, air compressors, heaters, and pumps. Most of the engines burn diesel fuel (JP-8) while very few burn gasoline or a mixture of oil and gasoline.

According to the USAG Air Emissions Inventory, no measurements for internal combustion engines were available. Therefore, emissions were estimated by calculating equivalent energy input from a known fuel input to the engines using emission factors. Air Emissions Inventory data from September 2002 can be used as a baseline estimation of the emissions levels of VOCs, NO_x, PM, SO_2, and CO when attempting to reduce emissions levels.

4.5. Ozone Depleting Substances (ODSs)

Ozone depleting substances, also known as ozone depleting chemicals (ODCs), are regulated under Chapter 2, Air Emissions, of the GFGS, specifically section C2.3.6. ODSs include halons, chlorofluorocarbons (CFCs), hydro-chlorofluorocarbons (HCFCs) and certain solvents.

4.5.1. Prevention Goal

The DoD-wide goal is that Installation Commanders must eliminate their dependency on the commercial availability of ODSs Class I by end of FY 2003. According to the Ozone Depleting Chemical Elimination Plan (December 2000), the preventative goal of the USAG Baumholder, with regard to ODCs/ODSs, is to eliminate completely its dependency on Class I ODCs by responsibly managing all ODC assets, facilities, and environmental and real property resources, initiating modifications as needed, and implementing energy efficiency programs. This goal has been met. No Class 1 ODSs are present at the USAG Baumholder.

According to the GFGS chapter C2.3.6.7.3.9, the use of all class II ODSs in refrigeration and air-conditioning equipment is prohibited starting on January, 1 2015.

4.5.2. Baseline and Progress

The USAG Baumholder was resurveyed (2004) for ODCs in air conditioning, refrigerant, and fire extinguishing equipment. The database has been updated as needed. The current status can be seen in **Table 4-20**.

Table 4-20 Current status of ODS containing equipment (June 2010)

Content	Pieces of Equipment	Charge [kg]	Location
ODS Class I	None	N/A	DPW
	None	N/A	AAFES
	None	N/A	DeCA
	None	N/A	DoDDS
Total USAG	**None**	**N/A**	
ODS Class II	43	520.05	DPW
	10	107.00	AAFES
	16	504.3	DeCA
	6	2.85	DoDDS
Total USAG	**75**	**1226**	

4.5.3. ODSs - Future

In accordance with the GFGS requirements, the garrison must evaluate various approaches to reducing air emissions from Class II ODCs in the future.

The use of new or un-recycled class II ODSs in the maintenance and servicing of refrigeration and air-conditioning equipment is prohibited beginning January, 1 2010.

The garrison will begin phasing out its use of recycled Class II ODCs for the maintenance and servicing of their existing refrigeration and air conditioning equipment as mandated by 2015.

The best way to avoid future problems with ODSs is to establish fixed deadlines for the replacement of any defective or obsolete equipment that contains ODSs, with the primary focus on equipment that contains Class II ODSs. When any piece of equipment is replaced, it must be ensured that no Class II ODSs are used in the replacement equipment. In order to make progress toward the energy conservation goals (see **Section 4.8 Energy Conservation**), additional attention should be given to the energy efficiency of replacement equipment.

Air emissions (ODS) have been identified as a significant aspect. Consequently the USAG Baumholder has set itself the objective, within the garrison EMS, to keep the ODS program in compliance with FGS and Army regulations. To reach the above mentioned targets, the following objectives were established in an SOP.

- The SOP defines the roles and responsibility of personnel working at/for facilities that store, use, or service ODS-containing equipment, to include supervisors and maintenance personnel
- Personnel that maintain and handle ODS containing equipment is described (appropriate trained personal, etc.)
- The DPW ED media manager will maintain the ODS database by incorporating the latest inventories and providing printouts to the facility manager as requested and as changes occur.

For more details see the SOP: Standard Operating Procedure; HANDLING OF OZONE DEPLETING SUBSTANCES (ODS). The SOP is maintained by the DPW ED media manager.

AAFES, Defense Commissary Agency (DECA), and Department of Defense Dependent Schools (DoDDS) facilities at the USAG will be responsible to phase out of the class II ODS use by 2015 on their own.

Table 4-21 Current P2 Initiatives – ODS

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
No data	Removal of all Class II ODSs until 1 January 2015	Class II ODSs	DPW ED, DPW utilities, AAFES, DECA, DODDS, Housing	ongoing	No data

Table 4-22 Potential P2 Initiatives – ODS

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source

4.6. Water Consumption

Chapter 3 of the GFGS contains standards for providing potable water on DoD installations in the Federal Republic of Germany. Potable water is defined as water that has been examined and treated to meet the standards of chapter 3 in the GFGS and has been approved by the appropriate DoD medical authority. The USAG Baumholder is responsible for providing potable water to service members, their families, and other employees. The garrison produces drinking water at two water works.

4.6.1. Prevention Goal

The DoD has not established specific P2 goals with regard to water conservation. The goal of the USAG Baumholder is to show continuous annual reduction in water consumption. The P2 goal established by DoD for wastewater is to reduce the pollutant loadings in wastewater (domestic and industrial) and storm water discharges. It is expected that reductions in water consumption will have a positive effect in reducing pollutant loadings into the wastewater.

The following Executive Orders 13423 and 13514 includes prevention goals for reducing the annual water consumption.

EO 13423 mandates that Federal Agencies "reduce water consumption intensity beginning in fiscal year 2008, relative to the baseline of the agency's water consumption in fiscal year 2007, through life-cycle cost-effective measures by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015".

The new Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" from October 2009, was to extend the goal of the EO 13423 of reducing the water consumption intensity by 2% annually to the year 2020. In summary, by 2020, 26% less water may be used when compared to the 2007 volume use. The new EO is not yet effective for DoD operations in Germany, but it is expected that this will be the case within the nearer future.

Supplemental guidance from the U.S. Department of Energy (DOE), *Establishing Baseline and Meeting Water Conservation Goals of Executive Order 13423*, encourages Federal Agencies to use Water Management Plans and Best Management Practices (BMP) as tools for achieving the goals of EO 13423.

4.6.2. Baseline and Progress

The USAG Baumholder has prepared a Water Conservation Plan (WCP), in which available data on water consumption and wastewater disposal are compiled and analyzed. All following information regarding water conservation is derived from the WCP. All relevant information about water consumption and wastewater discharge are put into this section.

4.6.2.1. Water Consumption

The major water-consuming activities at the USAG Baumholder are family housing areas and barracks.

The USAG Baumholder generally did not meter and charge water consumption in the past. Most water users on base, i.e. troops or families, are still not charged for their water consumption; thus, for these users there is no incentive for water saving behavior.

Most buildings occupied by reimbursable customers, such as DeCA or AAFES, are equipped with water meters and the readings are used for billing the consumed water. Since fiscal year 2009 the water consumption for MEDCOM, VETCOM and DENTCOM activities is estimated and charged based on the occupied square footage.

Table 4-23 lists the average water use in 2006 and 2007 from the main consumers for which water meter readings were available.

Table 4-23 Water Consumption

Location	Daily Average Water Use (cbm/d)	% Non-Deployment Baseline
Wetzel Housing (Rüttenschacht)	533.15	14.28
QM-Area (MP-Schacht)	56.58	1.52
Dining Facility (Bldg. 8311)	21.71	0.58
Golf Course (Bldg. 8888)	21.50	0.61
Swimming Pool	13.49	0.36
Minick Field	12.99	0.37
Childcare Center (Bldg. 8862)	4.19	0.11
School (Bldg. 8882)	3.55	0.09
High School (Bldg. 8801)	3.47	0.09
Dental Clinic	0.87	0.02
Laundry	0.82	0.02

Additional water meters are currently being installed at all newly constructed or renovated buildings.

The USAG Baumholder provides a number of external consumers with water, such as the German Forces (Bundeswehr), German Rail (Deutsche Bahn), Telekom or private customers, who are served via the Verbandsgemeindewerke (VGW) Baumholder. In 2008, a total of 5,752 cbm, about 0.5 % of the total annual water production was provided to these customers.

Since the Garrison self-produces the consumed potable water, the production from the Hoppstaedten and Pfeffelbach WW provides a figure for the total water consumption of the Garrison, including leaks and losses and water sales. **Table 4-24** summarizes the monthly water production of the two water works from 2004 to 2008. Periods of deployment are highlighted in yellow.

Table 4-24 Total Water Production of WW Hoppstaedten and Pfeffelbach (cbm)

	2004	2005	2006	2007	2008	2009
Jan	115,028	119,195	100,179	122,670	133,889	92,695
Feb	110,190	108,681	88,357	115,612	113,129	85,407
Mar	124,308	117,648	99,300	125,391	128,504	84,485
Apr	104,391	112,123	99,222	119,381	105,706	75,023
May	107,702	105,500	90,655	111,819	97,298	84,993
Jun	105,828	115,225	86,779	103,510	92,943	87,121
Jul	117,399	114,074	94,380	102,792	95,400	94,386
Aug	120,800	110,983	93,545	107,952	101,257	94,113
Sep	120,424	102,547	87,942	122,954	93,109	84,120
Oct	116,388	114,770	105,211	120,984	88,435	83,437
Nov	111,425	113,900	114,252	109,604	85,481	79,469
Dec	117,977	97,361	111,400	122,962	101,701	83,980
Total	**1,371,860**	**1,332,007**	**1,171,222**	**1,385,631**	**1,236,852**	**1,029,229**

Deployment time (4500 Soldiers absent)

From 2004 to 2008 an average of 27% of the total water production was generated at the Pfeffelbach WW and 73% at the Hoppstaedten WW (see WCP, Appendix B for more details).

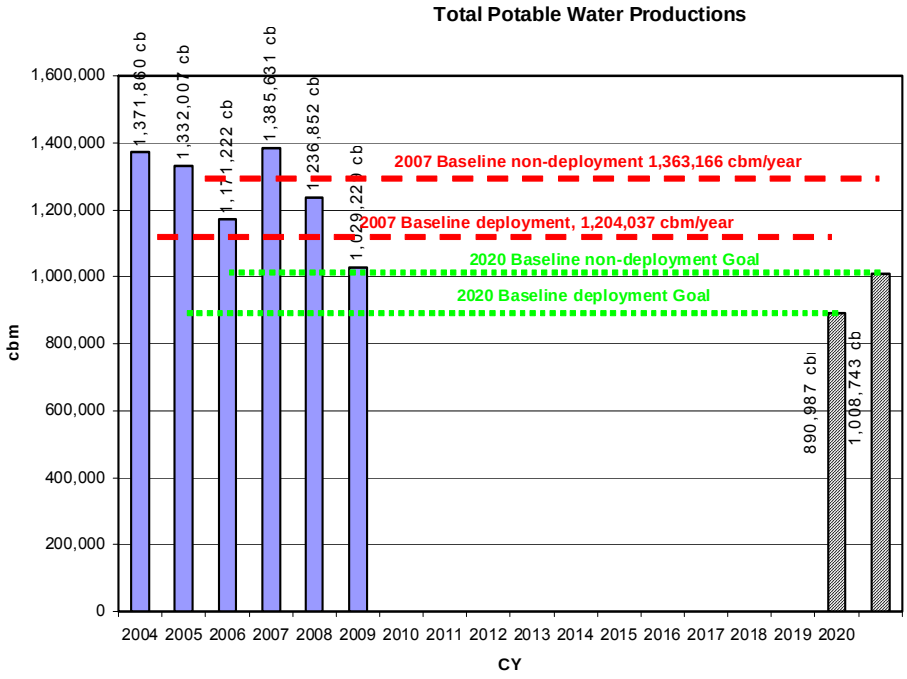
By averaging the totals listed in **Table 4-24** the following water-use baselines were calculated for periods of non-deployment and deployment (the water sales to external parties were not subtracted, since they are negligible compared to the variance in water consumption between 2004 and 2008):

Average annual water use for periods of deployment: **1,204,037 cbm/yr**

Average annual water use for periods of non-deployment: **1,363,166 cbm/yr**

It should be noted, that the annual consumption was not proportional to the total number of people living on base (soldiers + family members), i.e. during deployment periods 45% of the people living on base were absent, but only 12% less water was consumed.

Figure 4-H Overview of the Potable Water Production at the USAG Baumholder and the goal for deployment and non-deployment Baseline according to EO 13423



Wastewater Discharge

The VGW Baumholder has been operating and maintaining the sewer system for the USAG Baumholder since 2001. The discharged wastewater is treated at the VGW-owned wastewater treatment plant.

Table 4-25 summarizes the monthly wastewater discharge volumes from the USAG Baumholder into the treatment plant between 2004 and 2008.

Table 4-25 Inflow Wastewater Treatment Plant Baumholder from Garrison (cbm)

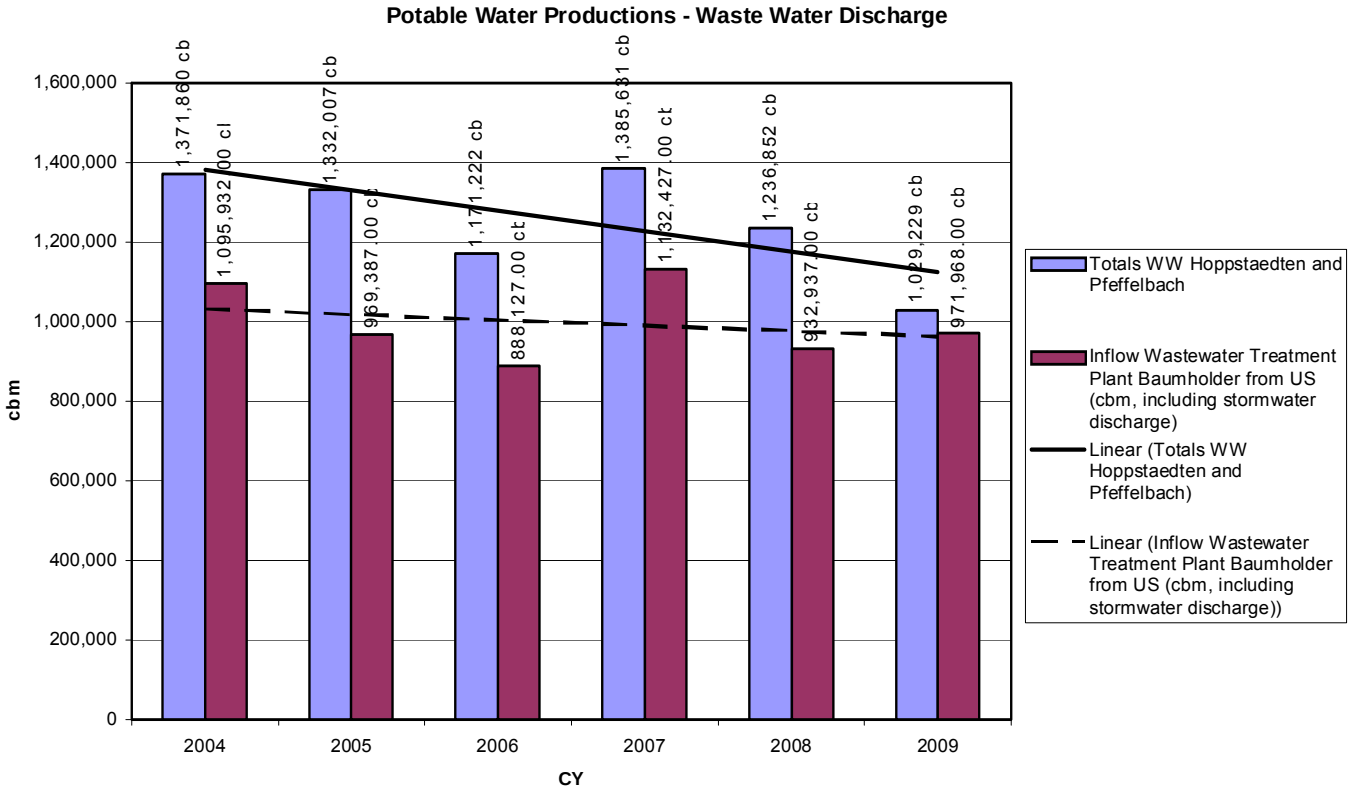
	2004	2005	2006	2007	2008	2009
Jan	107,568	91,291	76,338	119,807	95,795	94,658
Feb	96,256	103,910	66,380	111,916	86,577	87,980
Mar	98,859	103,944	100,768	121,275	134,195	86,721
Apr	65,315	105,805	102,901	94,418	91,291	61,258
May	75,733	80,591	64,115	108,407	59,506	64,925
Jun	64,147	73,003	62,520	94,480	66,129	66,670
Jul	77,376	74,193	52,079	92,689	47,513	85,799
Aug	106,723	68,478	49,596	74,788	62,572	68,993
Sep	80,234	64,805	59,581	70,575	58,671	66,706
Oct	106,396	66,614	87,362	72,030	67,432	70,031
Nov	101,185	59,554	84,627	64,533	64,576	99,305
Dec	116,140	77,199	81,860	107,509	98,680	118,922
Total	**1,095,932**	**969,387**	**888,127**	**1,132,427**	**932,937**	**971,968**

The VGW has replaced approximately 20-25% of the sewer system between 2001 and 2009. The total system is planned to be replaced within a period of 40 years. The Garrison does not combine the replacement of the sewer lines with replacing the drinking water lines.

The costs for the operation and maintenance of the wastewater treatment plant are shared by the Garrison and the City of Baumholder based on their proportion of the wastewater volumes treated at the plant. In 2008 the Garrison paid €252,948.05 ($306,269.60) for wastewater treatment. According to the VGW Baumholder approximately two-thirds of these costs are fixed, with one-third being dependent on volume of wastewater actually treated.

More detailed information about the costs and the cost reduction potentials are available in the Water Conservation Plan from November 2009.

Figure 4-I Overview of the Potable Water Production and the Waste Water Discharge at the USAG Baumholder



4.6.2.2. Losses

The wastewater volumes reaching the wastewater treatment plant significantly differ from the expected volume when compared to water consumption. That is, approximately only 80% of the water distributed by the water works reaches the wastewater treatment plant as wastewater (equals wastewater discharged/potable water produced relationship for April 07).

Five to six percent of this discrepancy can be explained by the following:

- Typically a maximum of 4% of potable water consumption is for drinking or cooking.
- The Garrison annually uses approximately 1% (0.68 – 1.22%) of its potable water for irrigating the golf course and Minick field. In addition, an unknown amount of water is used for manual irrigation by the DPW.
- The Garrison sells approximately 0.5% of the potable water it produces to external customers (5,752 cbm in 2008).

- The Garrison provides the OIE approximately 0.6 % of its annual water production to the district heating system at the heating plant, Building 8763. The amount of water used at other points within the district heating system can not be quantified due to a lack of metering/water meter readings.

The remaining 13 – 14 % of losses may be caused from different reasons, such as drinking water line ruptures, the manual irrigation by the DPW, the unaccounted water used at other points within the district heating system, or other unaccounted irrigation. Definitively, a part of this difference is caused by sewer line leaks; thus, not a drinking water loss.

Water Production and Sewage Disposal Costs, potential Cost Savings

Since the USAG Baumholder self-produces all potable water, the production costs make up of the following cost types: labor, electricity (pumping), treatment chemicals, heating oil, non-chemical supplies, treatment sludge excavation/disposal and costs for maintenance, repairs and upgrades.

Table 4-26 lists the water production costs for 2007 and 2008 (See WCP, Appendix C for raw data). The weighted means were calculated based on the contribution of each water work to the total annual production, i.e. Hoppstaedten 73% and Pfeffelbach 27%. The fixed costs, such as labor, were averaged over the period for which data was available.

Table 4-26 Water Production Costs CY 2007/2008

	Hoppstaedten	Pfeffelbach	Weighted Mean
Variable Costs			
Electricity	0.16 €/cbm	0.21 €/cbm	0.171 €/cbm
Chemicals	0.072 €/cbm		0.072 €/cbm
Sludge excavation/ disposal	0.22 €/cbm	No disposal costs for Pfeffelbach	0.016 €/cbm
Fixed Costs			
Labor	ca. 767,000 €/yr		
Non-chemical supplies	ca. 86,000 €/yr		
Heating oil	ca. 23,000 €/yr		
Maintenance contracts	ca. 73,000 €/yr		
Major repair and upgrade projects	> 80,000 €/yr		

It can be concluded that with a 16% reduction of water consumption by 2015, savings of €190,000 – €214,000 per year (8 – 9%) may be generated (see WCP, Appendix G for calculation). If the October 2009 EO will be implemented, i.e. 26% reduction of water consumption by 2020, the potential savings are €307,000 – €348,000 per year (13.9 – 14.7%) on the water production side.

Actual savings will depend on the development of the price level, especially for the energy costs related with the operation of the plants and pumps.

The costs for wastewater treatment listed in **Table 4-27** are based on the invoice for the total wastewater treated in 2008 and an estimate by the VGW Baumholder that the fixed costs make up approximately two-thirds of the total costs.

Table 4-27 Wastewater Treatment Costs 2008

Fixed Costs	ca. 168,632.03 €	
Variable Costs	ca. 84,316.02 €	0.090 €/cbm
Total	**252,948.05 €**	**932.937 cbm**

It can be concluded that a reduction of water consumption of 16% by 2015 would generate wastewater treatment savings of approximately €14,000 – €15,000 per year (5 – 6%), (see WCP Appendix G for calculation). If the October 2009 EO will be implemented, i.e. 26% reduction of water consumption until 2020, the potential savings are €22,500 – €25,500 per year (8.8 – 9.5%) for wastewater treatment.

Actual savings will depend on future re-negotiations of the wastewater treatment contract between the USAG Baumholder and the VGW Baumholder.

4.6.3. Water Consumption - Future

The potential water conservation activities for the garrison are derived out of the Best Management Practices (BMP) presented on the Federal Energy Management Program (FEMP) web site (http://www1.eere.energy.gov/femp/water/water_bmp.html) as they relate to the USAG Baumholder for meeting the EO 13423 water conservation goal.

In the WCP for the garrison, the next steps are summarized identified for the BMPs. The WCP evaluates their potential contribution to the USAG Baumholder water conservation efforts.

Furthermore, the Command of the USAG Baumholder must develop and publish a 'Water Use/Water Efficiency Policy' and specific water use reduction targets in order to comply with BMP # 1.

The ongoing program to replace the standard washing basin faucets with water and energy efficient variants is described in detail in the P2 opportunity assessment in **Section 5.9.**

P2 initiatives, with the goal to conserve water should also focus on changing personal water-use habits through educational and training programs.

Since the main water consumption activities occur in housing areas, it is important that a conservation program stresses good water-use practices. The following guidelines are helpful in eliminating common water-wasting problems:

- Use recommended washing machine settings according to specifications.
- Do not operate the dishwasher without a full load.
- Minimize water usage when washing dishes by hand.
- Do not continuously run water while preparing food.

- Turn off water while brushing teeth and shaving.
- Use a short shower instead of a full bath.
- Turn off water in the shower while shampooing the hair and soaping the skin.
- Water lawns only as required; water lawns at night and do not over irrigate.
- Do not use the toilet as a waste basket.

Changing personal habits to conserve water is the most difficult conservation method to implement. However, a good education program can significantly reduce water consumption.

4.7. Vehicle Fuel Conservation

A variety of fueling stations exist throughout the USAG Baumholder. They are operated by the Directorate of Logistics (DOL) and AAFES. Tactical, non-tactical, as well as privately owned vehicles (POV) obtain fuel at the different fueling facilities.

4.7.1. Prevention Goal

The goals of the USAG Baumholder with respect to vehicle fuel conservation are to meet the requirements in EO 13423. These fuel conservation goals are listed below.

- Reduce vehicle petroleum consumption by 2% annually by the end of fiscal year 2015 from a fiscal year 2005 baseline.
- Increase the alternative fuel consumption at least 10% annually from a fiscal year 2005 baseline.
- Increase purchase of alternative fuel, hybrid, and plug-in hybrid electric vehicles when commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles.

4.7.2. Baseline and Progress

All of the fuel used by U.S. Army units and organizations is ordered from the HQ 21 TSC. Various German contractors distribute the fuel from the Defense Fuel Support Point (DFSP) in Speyer to the fueling stations of the USAG Baumholder.

Retail purchase of fuel for government owned vehicles is available at the DPW Fuel Facility, Building 8160 and USAG Baumholder Fuel Facility, Building 8458. The TMP fuel station, Building 8415 was also available until May 2006 for this purpose; this fuel station has since been closed. Any vehicle with a fuel key has access to the DPW and USAG Baumholder Fuel Facility and therefore not only non-tactical vehicles are fueled. The AAFES gas station, Building 8251 can be used by U.S citizens with POVs, MWR, AAFES, and holders of fuel cards.

Class III Yard, Building 8738 at the Quartermaster Area is used by units to fuel up Heavy Expanded Mobility Tactical Trucks (HEMTT) directly from the rail head fuel wagons. Many military units operate with this fuel source their own fueling points for their tactical vehicles at the motor pools or in the field during training exercises. The USAG Baumholder Fuel Facility, Building 8458 is used by the military units for their tactical vehicles. Until 2008 this gas station was also fueled with HEMTTs, loaded at the Class III Yard. Since 2008, the USAG Baumholder Fuel Facility, Building 8458 is under the direct responsibility of DOL and its fuel is ordered by DOL.

Since the P2 program vehicle fuel conservation goals concentrate on non-tactical vehicles, the fuel situation for tactical vehicles is neglected for this baseline data collection. **Table 4-28** below shows, in detail the AAFES and TMP fueling stations at the USAG Baumholder.

Table 4-28 Fueling Stations at the USAG Baumholder

Installation	Bldg	Unit	Fuel Type	Tank	Tank Volume	
	#			Storage	[L]	[gal]
Smith Barracks	8251	AAFES	Super Unleaded	UST	40,000	10,567
Smith Barracks	8251	AAFES	Super Plus	UST	20,000	5,283
Smith Barracks	8251	AAFES	Normal Unleaded	UST	30,000	7,925
Smith Barracks	8160	DPW	Normal Unleaded	UST	50,000	13,209
Smith Barracks	8160	DPW	Diesel	UST	50,000	13,209
Smith Barracks	8458	USAG BMH Fuel Facility	JP-8	UST	100,000	26,417
Smith Barracks	8458	USAG BMH Fuel Facility	JP-8	UST	100,000	26,417
Smith Barracks	8458	USAG BMH Fuel Facility	JP-8	UST	60,000	15,850
Quartermaster Area, Class III Yard	8738	DOL	JP-8	UST	10,000	2,641
Quartermaster Area, Class III Yard	8738	DOL	MOGAS	UST	10,000	2,641
Smith Barracks	8415	TMP*	JP-8	UST	7,000	1,849
Smith Barracks	8415	TMP*	MOGAS	UST	20,000	5,283

* closed since May 2006

The TMP fleet includes vehicles used by DPW, TMP, military units and others (see **Table 4-29**). Fuel for these vehicles is mainly procured at the DPW gas stations using fuel keys.

Table 4-29 Vehicle Fleet – USAG Baumholder

Vehicle Type	Fuel Type	Vehicle Amount	Vehicle Source
Amertek 2500L (Feuerwehr-Tankwagen / fire fighting tank truck)	Diesel	1	ARMY OWNED
IVECO 140-25A (Feuerwehr-Leiterwagen / fire engine)	Diesel	1	ARMY OWNED
IVECO ML 130 E (LKW-Kipper / dump truck)	Diesel	1	ARMY OWNED
IVECO ML 135 E (LKW-Kipper / dump truck)	Diesel	1	ARMY OWNED
MAN 8-163 (Feuerwehr-Gerätefahrzeug / fire truck)	Diesel	1	ARMY OWNED
MAN 8-163 (LKW mit Arbeitsbühne / truck mounted boom lift)	Diesel	1	ARMY OWNED
MAN L26 (Feuerwehr-Gerätefahrzeug / fire truck)	Diesel	1	ARMY OWNED
MAN LE 10.220 (Allrad-Kipper / four weel drive dump truck)	Diesel	1	ARMY OWNED
MAN TGA 18.360 (Feuerwehr-Wechsellader)	Diesel	1	ARMY OWNED

Vehicle Type	Fuel Type	Vehicle Amount	Vehicle Source
Merc. 1012 (LKW - Allrad-Kipper / four weel drive dump truck)	Diesel	1	ARMY OWNED
Merc. 1017 (LKW – Allrad / four weel drive truck)	Diesel	1	ARMY OWNED
Merc. 1217 (LKW / truck)	Diesel	1	ARMY OWNED
Merc. 2028 (LKW – Sattelschlepper / articulate truck)	Diesel	1	ARMY OWNED
Merc. 313 CDI (Allrad-Kipper / four weel drive dump truck)	Diesel	2	ARMY OWNED
Merc. 512D (Allrad-Kipper / four weel drive dump truck)	Diesel	1	ARMY OWNED
Merc. Unimog (Mäh-Streu-Fahrzeug / lawn mowing-gritter)	Diesel	2	ARMY OWNED
Merc. Vito (Feuerwehr-Einsatzleitfahrzeug / fire fighting command vehicle)	Diesel	1	ARMY OWNED
Mercedes 15-28 (Feuerwehr-Tankwagen/ fire fighting tank truck)	Diesel	1	ARMY OWNED
Bus Neoplan 5200	Diesel	1	DFMWR
Ford Curier	Diesel	2	DFMWR
Ford Transit	Diesel	3	DFMWR
IVECO C25V (Kastenwagen / van)	Diesel	2	DFMWR
IVECO Cabiat (LKW-Abschleppfahrzeug / tow truck)	Diesel	1	DFMWR
Merc. 815 (LKW mit Ladekoffer / box van)	Diesel	1	DFMWR
Merc. Sprinter 15-Pax	Diesel	1	DFMWR
Opel Astra	Diesel	2	DFMWR
VW (LKW-Abschleppfahrzeug / tow truck)	Diesel	1	DFMWR
Ford Escort	Mogas	3	DFMWR
Ford F150 (Pritschenwagen / pick-up)	Mogas	1	DFMWR
Ford KA	Mogas	2	DFMWR
Ford Windstar	Mogas	1	DFMWR
Ford Focus	Diesel	47	IFMS
Ford Mondeo	Diesel	11	IFMS
Freightliner FL60	Diesel	5	IFMS
Freightliner MT45	Diesel	2	IFMS
IVECO Bus 32-Pax	Diesel	3	IFMS
Merc. Sprinter 15-Pax	Diesel	4	IFMS
Merc. Sprinter Kasten / van	Diesel	4	IFMS
Merc. Sprinter Pritsche / pick-up	Diesel	17	IFMS
Merc. Vito 7/8-Pax	Diesel	53	IFMS
Merc. Vito Kasten / van	Diesel	2	IFMS
Opel Antara	Diesel	4	IFMS
Opel Combo	Diesel	1	IFMS
Opel Vivaro Kasten / van	Diesel	53	IFMS
Thomas Bus 28-Pax	Diesel	2	IFMS
Thomas Bus 36-Pax	Diesel	1	IFMS
Thomas Bus 44-Pax	Diesel	2	IFMS
Chrysler Voyager 7-Pax	Mogas	2	IFMS

Vehicle Type	Fuel Type	Vehicle Amount	Vehicle Source
Dodge Caravan 7-Pax	Mogas	1	IFMS
Dodge RAM 4x4 Pritsche / pick-up	Mogas	4	IFMS
Ford Escape	Mogas	3	IFMS
Ford Explorer	Mogas	2	IFMS
Ford Mondeo	Mogas	8	IFMS
Jeep Cherokee	Mogas	3	IFMS
Merc. 2532 (LKW - Müllauto / refuse collection truck)	Diesel	3	LEASED
Merc. 808 (LKW mit Ladebühne / with tail lift)	Diesel	1	LEASED
Merc. 815 (LKW mit Arbeitsbühne / / truck mounted boom lift)	Diesel	2	LEASED

Source: USAG Baumholder TMP DOL, April 2010

The TMP motor pool is in the process to reduce the vehicle fleet continuously. The following 24 vehicles were given back without replacement.

- 6 Auto Sedan, Ford Focus Trend
- 7 Stat Wag, Ford Focus, Diesel
- 1 Bus, 52 Pax, Blue Bird
- 1 Bus, 28 Pax, Blue Bird
- 1 Bus, 32 Pax, Iveco
- 1 Trk, CGO P/U 4X2, Dodge RAM 1500
- 3 Trk, CA 4X2, Chrysler Voyager
- 1 Trk, CA 4X4, Dodge Caravan
- 1 Trk, Van 10Ton, Freightliner FL60
- 1 Trk, Van Delivery, Ford E350

AAFES gas stations are frequented by many different organizations and customers with POVs, as mentioned earlier, and the USAG Baumholder has no influence on the fuel management of AAFES. AAFES was not able to provide an overview of the last few years with regard to the yearly sales at the fuel station. Only a rough estimate for CY 2009 was provided of about 4,200,000 Liter (1,109,523 Gallons).

The fuel quantities in **Table 4-30** include the fuel amounts from the DPW Gas Station and from the 2006 closed TMP fuel station. The fuel consumption shown is not exclusively that of non-tactical vehicles.

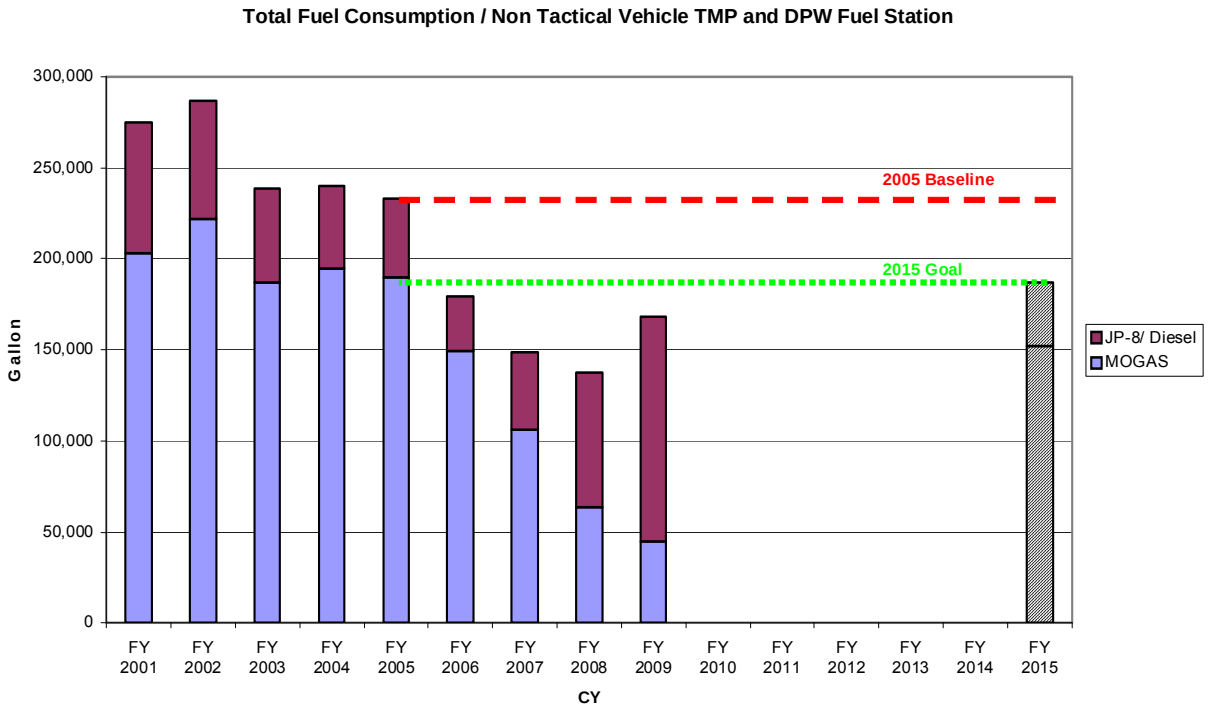
Table 4-30 Fuel Quantities at the DPW and TMP Fuel Station

YEAR	TMP		DPW		TOTAL	TOTAL	TOTAL
	MOGAS	JP-8	MOGAS	JP-8/ Diesel	MOGAS	JP-8/ Diesel	FUEL
	[gal]	[gal]	[gal]	[gal]	**[gal]**	**[gal]**	**[gal]**
FY 2001	155,837	34,176	47,206	37,676	**203,043**	**71,852**	**274,895**
FY 2002	140,733	5,714	81,269	58,517	**222,002**	**64,231**	**286,233**
FY 2003	108,234	1,898	78,615	49,682	**186,849**	**51,580**	**238,429**
FY 2004	92,382	1,069	101,980	44,385	**194,362**	**45,454**	**239,816**
FY 2005	88,840	2,747	101,215	40,398	**190,055**	**43,145**	**233,200**
FY 2006	13,431	closed	135,640	30,281	**149,071**	**30,281**	**179,352**
FY 2007	closed	closed	106,282	42,389	**106,282**	**42,389**	**148,671**
FY 2008	closed	closed	63,319	73,902	**63,319**	**73,902**	**137,221**

It must be noted that the DPW fuel station was switched from JP-8 to Diesel in January 2008.

The goals from EO 13423 are set on a FY 2005 baseline. As can be seen in **Figure 4-J**, that baseline year will be realistic for the USAG Baumholder in 2015, since facilities were given back to the host nation (Idar Oberstein, Neubrücke), the garrison's vehicle fleet is steadily reduced, vehicles using gasoline were reduced, and vehicles using Diesel were increased. Nevertheless, the efforts of fuel conservation should be steadily continued.

Figure 4-J Fuel Quantities Trend at the DPW and TMP Fuel Station



To give a complete picture of the fuel consumption at the garrison, below are the amounts for the fueling points of the units for the tactical vehicles listed. It must be noted, that these amounts are excluded from the fuel consumption conservation goals.

Table 4-31 Fuel Quantities from the Class III Yard and USAG Baumholder Fuel Facility, Building 8558

YEAR	USAG Baumholder Fuel Facility		Class III Yard		TOTAL	TOTAL	TOTAL
	MOGAS [gal]	JP-8 [gal]	MOGAS [gal]	JP-8 [gal]	MOGAS [gal]	JP-8/ Diesel [gal]	FUEL [gal]
FY 2001		*	26,070	431,684	**26,070**	**431,684**	**457,754**
FY 2002		*	12,849	386,754	**12,849**	**386,754**	**399,603**
FY 2003		*	0	111,211	**0**	**111,211**	**111,211**
FY 2004		*	4,144	131,796	**4,144**	**131,796**	**135,940**
FY 2005		*	0	357,033	**0**	**357,033**	**357,033**
FY 2006		*	0	66,736	**0**	**66,736**	**66,736**
FY 2007		*	0	264,695	**0**	**264,695**	**264,695**
FY 2008		2,528	0	0	**0**	**0**	**2,528**
FY 2009		5,906	0	107,959	**0**	**107,959**	**113,865**

*Included in Class III Yards amounts

4.7.3. Vehicle Fuel Conservation - Future

EO 13423 mandates the Federal government reduce the petroleum consumption by utilizing AFVs. These mandates for fleet operations in acquiring AFVs could be met by purchasing, leasing, or converting vehicles currently operating on conventional gasoline. Vehicles that operate on non-petroleum based fuels not only emit fewer air pollutants, in turn reducing the formation of ground level ozone and acid rain, but also assist in decreasing "greenhouse" gases.

Alternative fuels are identified as any fuel that is substantially non-petroleum, which prohibits air quality degradation by producing fewer toxic chemicals that contribute to air pollution. Listed below are some typical alternative fuels:

- Methanol – an alcohol that can be utilized as a high-performance liquid fuel.
- Ethanol – an alcohol fuel very similar to methanol.

- Natural Gas – a fossil fuel composed of a mixture of hydrocarbons, namely methane.
- Liquefied Petroleum Gas (LPG) – a gas composed of a mixture of hydrocarbons with at least 95 percent being propane.
- Electricity – not actually a fuel but provides energy that is stored in a battery to operate a vehicle.
- Hydrogen – a very attractive alternative fuel due to extremely small air emission amounts.
- Biofuel – a fuel derived from biological and natural resources.

Currently, none of the fueling stations at the USAG Baumholder provide alternative fuels. Furthermore, the USAG Baumholder does not have any influence on the procurement or leasing of non-tactical vehicles. Vehicles are distributed through IFMS, and therefore P2 initiatives regarding non-tactical vehicles and their fuel consumption are very limited.

Since the USAG Baumholder is not mandated to acquire vehicles that operate on alternative fuels, there are other opportunities available to reduce vehicle emissions and improve air quality. Air pollutants from vehicle emissions can be reduced from government or private vehicles by avoiding unnecessary driving, avoiding car idling, maintaining vehicles, and driving wisely by applying common sense.

Table 4-32 Current P2 Initiatives – Vehicle Fuel Conservation

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
No data	Reduction of TMP vehicles	Fuel consumption	DOL	No data	No data

Table 4-33 Potential P2 Initiatives – Vehicle Fuel Conservation

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source

4.8. Energy Conservation

EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management, sets forth the requirements for Federal facilities to improve their energy management significantly in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change. The energy sources of the USAG Baumholder consist of electricity, district heat, propane gas, and heating oil.

4.8.1. Prevention Goal

The goal of the USAG Baumholder energy conservation program is to meet the requirements of EO 13423. The energy conservation goals are listed below.

- Reduce energy intensity by 30% from a baseline of fiscal year 2003 by the end of fiscal year 2015
- Reduce energy intensity by 3% annually from a baseline of fiscal year 2003 through the end of fiscal year 2015
- Ensure that at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources
- Ensure to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use

Goals of the new Executive Order 13514 extend the goals of the EO 13423. The relevant goals for the energy chapter are listed below:

- Establish percentage reduction targets of scope 1, 2 and 3 green house gas emissions by fiscal year 2020. (Baseline FY2008)
- All Federal agency buildings that enter the planning process after 2020 are designed to achieve zero-net-energy by 2030 (no net emissions of greenhouse gases).
- Prefer sustainable acquisition to ensure that 95 percent of new contract actions are energy efficient (Energy Star or Federal Energy Management Program (FEMP) designated)
- Increasing agency use of renewable energy and implementing renewable energy generation projects on agency property
- Aligning Federal policies to increase the effectiveness of local planning for energy choices, such as locally generated renewable energy
- Identifying and analyzing impacts from energy usage and alternative energy sources in all Environmental Impact Statements and Environmental Assessments for proposals of new or expanded Federal facilities under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.);
- Pursuing cost-effective, innovative strategies, such as highly reflective and vegetated roofs, to minimize consumption of energy, water, and materials.

- Managing existing building systems to reduce the consumption of energy, water, and materials, and identifying alternatives to renovation that reduce existing assets' deferred maintenance costs;
- Energy efficient management, duplex printing and other environmental preferable feature policies shall be established and implemented.
- Ensuring the procurement of energy-efficient equipment.

4.8.2. Garrison-wide Organizational Structure for Energy Sources

The USAG Baumholder receives its electricity from various German companies depending on the respective energy source. District heat is provided by the OIE AG in Idar-Oberstein. ESWE Wiesbaden supplied electricity until the end of 2008 and ENBW Biberach supplies electricity since 2009. Heating oil is delivered by different companies over the years (fiscal year 2001 to fiscal year 2003 from DEA Inc, fiscal year 2004 to 2007 from Heede Inc, fiscal year 2008 from Walter Inc, and since fiscal year 2009 Valentin Inc has provided the heating oil). Propane gas is supplied by Inc Progas.

4.8.3. Baseline and Progress

Data concerning energy consumption (electricity, district heat, propane gas, and heating oil) are maintained by the DPW Utilities Division, which is responsible for the USAG Baumholder energy program.

The main goal derived from the EO 13423 is reducing energy consumption. The following tables and figures provide detailed energy consumption information for electricity, district heat, propane gas, and heating oil by installation; they help to track and manage the improvements in energy conservation and should be regularly updated.

Table 4-34 Secondary Energy Consumption USAG Baumholder, FY 2001 through FY 2009

Secondary Energy	Units	Source	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Electricity	10^6 KWh	German power authorities	49.2	48.0	43.4	41.0	47.6	47.1	44.1	42.0	36.1
Steam	10^6 KWh	German power authorities	130.2	129.1	118.1	120.6	127.3	115.6	113.7	121.6	101.7
Total Secondary Energy	10^6 KWh	German power authorities	179.4	177.1	161.5	161.6	174.9	162.7	157.8	163.6	137.8
Deployment			No	Yes	No	Yes	No	Yes	No	Yes	Yes

Figure 4-K: Electricity and Steam Consumption USAG Baumholder, Fiscal Years 2001 through 2009

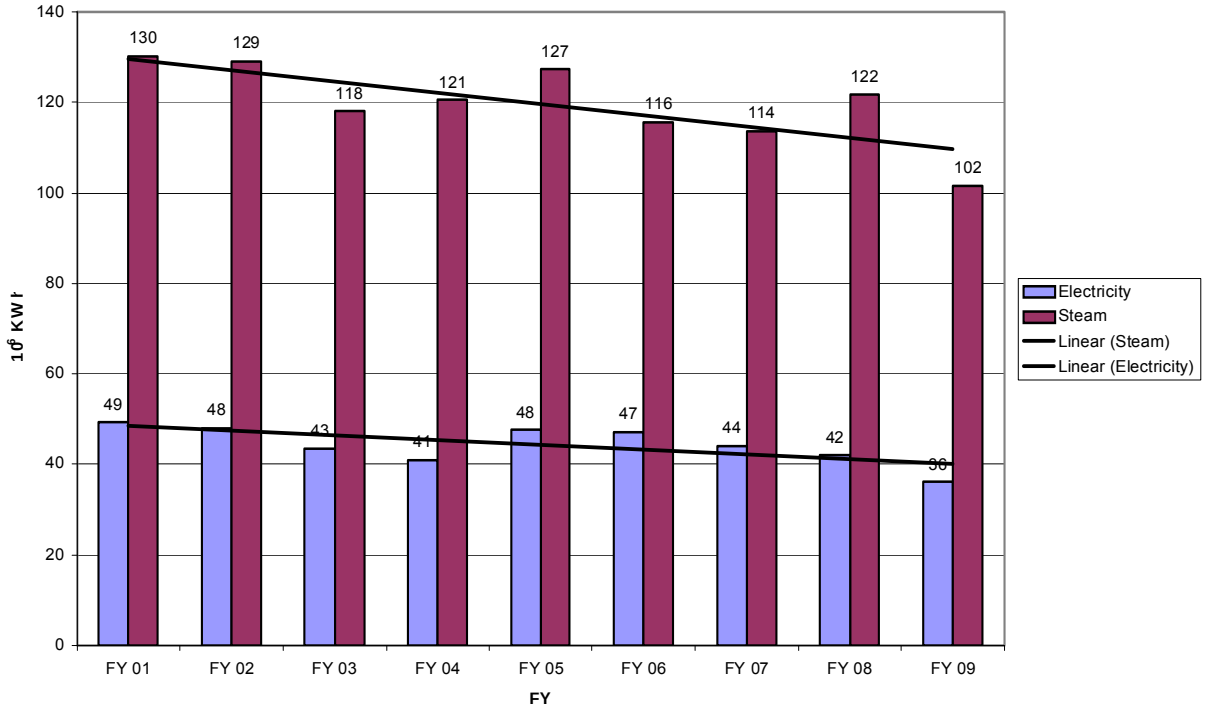
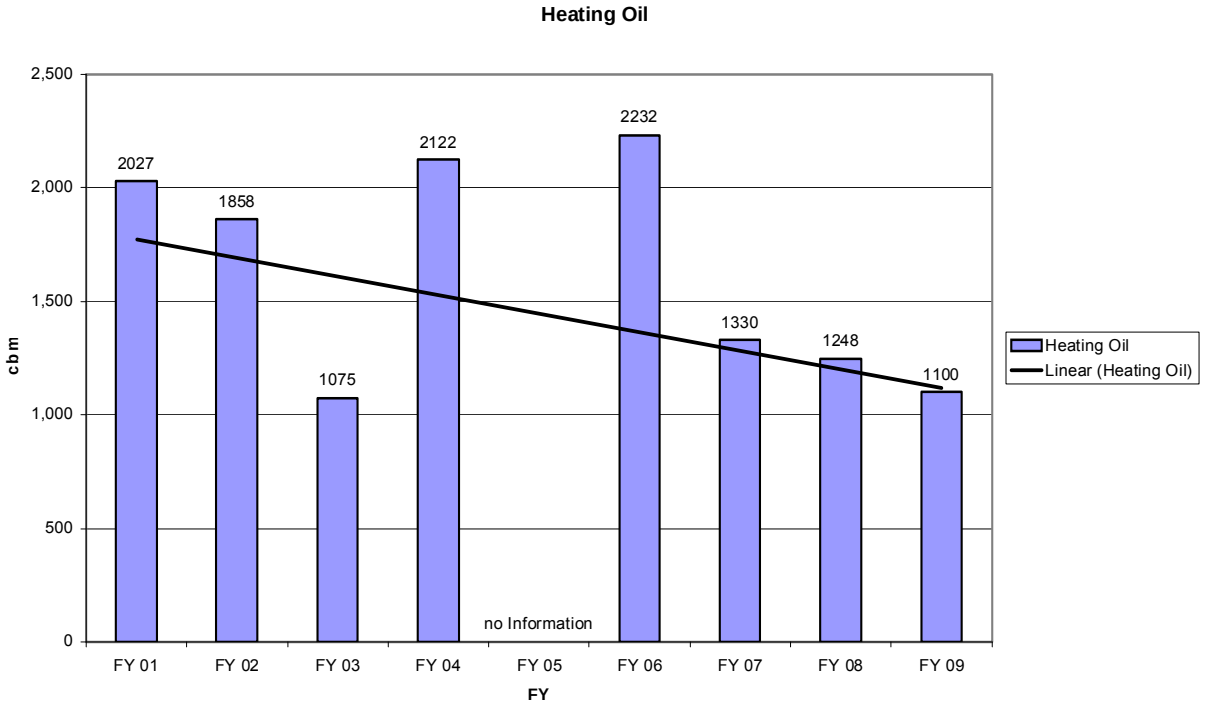


Table 4-35 Primary Energy Consumption USAG Baumholder, Fiscal Years 2001 through 2009

Primary Energy	Units	Source	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Heating Oil	10^3 L = m^3	German market	2,026.8	1,857.7	1,075.4	2,121.6	No info	2,231.8	1,329.8	1,248.0	1,100.0
Propane Gas	10^3 L = m^3	German market	41.0	33.5	37.8	36.9	39.7	33.1	31.1	30.9	17.6
Deployment			No	Yes	No	Yes	No	Yes	No	Yes	Yes

Figure 4-L Heating Oil Consumption USAG Baumholder, Fiscal Years 2001 through 2009



Propane gas is only used in one location but it is considered in this plan as a reminder to check continuously the consumption. Furthermore the propane gas consumption declines over the fiscal years 2001 to 2009. The reason for this is that two of the three buildings are no longer using propane gas.

During deployment approximately one third of the total population were absent from the base. As a result of getting no detailed information about the population in each year a comparison is only partly possible. Only the total development over the years could be compared.

A reduction of the energy consumption from 2001 to 2009 is recognizable in the consumption figures shown above. An explanation for that is that some of the facilities (Birkenfeld, Strassburg Kaserne) have been returned to the host nation. Furthermore, it is assumed that some of the energy reduction measurements within the garrison involve a positive effect.

Table 4-36 Energy Costs USAG Baumholder, Fiscal Years 2001 through 2009

Energy Source	Units	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Electricity	Million $	No info	2.99	2.69	3.15	3.56	3.65	4.77	4.60	4.47
	Million €	No info	3.75	3.43	3.25	3.67	3.21	4.07	3.93	3.64
Steam	Million $	No info	No info	No info	7.69	9.03	12.66	11.36	12.28	15.89
	Million €	No info	No info	No info	7.93	9.31	11.12	9.69	10.14	12.52
Heating Oil	Million $	0.43	0.48	0.41	0.52	No info	1.47*	0.94*	1.28*	0.71*
	Million €	0.43	0.61	0.52	0.53	No info	1.29*	0.80*	1.06*	0.56*
Propane Gas	Million $	No info	0.011	0.006	0.011	0.015	0.014	0.014	0.021	0.013
	Million €	No info	0.014	0.007	0.011	0.013	0.012	0.012	0.017	0.010
Total costs	Million $	No info	No info	No info	11.37	No info	17.79	17.08	18.18	21.08
	Million €	No info	No info	No info	11.72	No info	15.63	14.57	15.15	16.73

* The heating oil costs are calculated by an estimated average-value considering German market prices (www.fastenergy.de/heizoelpreis-verlauf.htm).

The following tables divide the used energy into energy sources, the consumer, and, if applicable, the location under separation of the different fiscal years. This additional information is presented to identify in more detail the energy consumption.

Table 4-37 Electricity Consumption USAG Baumholder, Fiscal Years 2002 through 2009

Location	Units	Consumer	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Baumholder	10^6 KWh	OMA	23.30	20.98	19.64	23.50	19.46	21.68	21.00	15.86
	10^6 KWh	HSG	16.41	14.81	14.57	16.88	13.75	15.24	14.40	17.16
Waterwork Pfeffelbach	10^6 KWh	OMA	0.20	0.22	0.21	0.25	3.84	0.33	0.29	0.20
	10^6 KWh	HSG	0.37	0.45	0.47	0.46	3.95	0.45	0.51	0.56

Location	Units	Consumer	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Waterwork Hoppstaetten	10^6 KWh	OMA	0.80	0.63	0.63	0.62	0.44	0.59	0.60	0.50
	10^6 KWh	HSG	1.36	1.26	1.26	1.14	1.00	1.01	1.11	0.81
Strassburg Kaserne	10^6 KWh	OMA	2.27	2.04	1.61	1.96	2.04	2.04	1.58	0.19
	10^6 KWh	HSG	1.62	1.41	1.18	1.42	1.47	1.51	1.16	0.19
Neubrücke	10^6 KWh	OMA	0.96	0.92	0.85	0.80	0.70	0.75	0.78	0.25
	10^6 KWh	HSG	0.68	0.66	0.58	0.52	0.48	0.54	0.53	0.39
Birkenfeld	10^6 KWh	OMA	0.01	0.01	0.01	0.01	0.00	0.00		
	10^6 KWh	HSG								
Total	**10^6 KWh**	**OMA**	**27.54**	**24.80**	**22.95**	**27.14**	**26.48**	**25.39**	**24.25**	**17.00**
	10^6 KWh	**HSG**	**20.44**	**18.59**	**18.06**	**20.42**	**20.65**	**18.75**	**17.71**	**19.11**
	10^6 KWh	**Total sum**	**47.98**	**43.39**	**41.01**	**47.56**	**47.13**	**44.14**	**41.96**	**36.11**
Deployment			Yes	No	Yes	No	Yes	No	Yes	Yes

Table 4-38 Steam/ District Heating Consumption USAG Baumholder, Fiscal Years 2001 through 2009

Location	Units	Consumer	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Baumholder	10^6 KWh	OMA	68.88	68.43	60.64	50.03	65.70	59.54	59.20	63.09	57.71
	10^6 KWh	HSG	40.46	40.19	38.60	52.94	43.80	39.69	39.47	42.06	38.47
Strassburg Kaserne	10^6 KWh	OMA	6.87	6.66	6.43	4.27	5.75	5.57	5.06	5.49	0.85
	10^6 KWh	HSG	6.87	6.66	6.43	7.76	6.75	6.53	5.94	6.44	1.00
Neubrücke	10^6 KWh	OMA	1.53	1.92	2.62	2.38	2.17	1.83	1.74	1.98	1.53
	10^6 KWh	HSG	3.79	3.29	2.21	2.39	2.71	2.43	2.32	2.58	2.38
Birkenfeld	10^6 KWh	OMA									

Location	Units	Consumer	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
	10^6 KWh	HSG	1.95	1.92	1.13	0.88	0.40				
Total	**10^6 KWh**	**OMA**	**77.28**	**77.00**	**69.69**	**56.68**	**73.62**	**66.93**	**66.00**	**70.56**	**60.09**
	10^6 KWh	**HSG**	**53.06**	**52.06**	**48.38**	**63.96**	**53.66**	**48.66**	**47.73**	**51.09**	**41.85**
	10^6 KWh	Total sum	**130.34**	**129.06**	**118.07**	**120.64**	**127.28**	**115.59**	**113.73**	**121.65**	**101.93**
Deployment			No	Yes	No	Yes	No	Yes	No	Yes	Yes

The EO 13514 extended the reduction goals of greenhouse gas emissions. The baseline for the reduction goals was set for fiscal year 2008. Since the accounting and reporting for greenhouse gas emission will be guided by the Chair of the Council on Environmental Quality (CEQ Chair) it is recommended to wait for this direction.

4.8.4. Energy consumption – Future

Currently a lot of energy reduction measures are planned and are continuously being implemented. The following measures have been executed:

a) Installation of high efficient pumps (status: 13% changed)

b) Installation of water efficient fixtures (status: 49% changed)

c) Insulation of heating distribution lines and the heating system

d) Hydraulic balancing of the heating systems (reduces the heating losses)

e) Adapt control system to the demand (reducing run times and temperatures)

f) Modernization of potable water and district heat lines

g) Installation/ replacement of heat exchanger

h) Equipment monitoring by remote control technology

i) Installation of energy saving bulbs

j) Building thermography with infrared camera

k) Capturing of building envelope and systems engineering with energy consultant software and analyzing various options for remediation

Energy reduction should be reached by changing the pumps at the heating systems. By August 2009, 350 of the 2400 old pumps had been upgraded to **high efficient pumps**. With the installation of these pumps a reduction of 82.000 KWh/year energy consumption was realized. There is a further energy reduction potential of 1,318.000 KWh/year if the other pumps are also upgraded. For more details see **Section 5.8.**

At the USAG Baumholder, 49% **water reduction faucets** are currently in use. It is planned for the future to upgrade all standard faucets to water reduction faucets. The energy reduction effect in these faucets is seen by using the faucet in the normal position only when cold water is provided, and not by mixed water, which is seen using the standard faucets (see also **Section 4.6 Water Consumption**). The P2 opportunity assessment for the installation of water-efficient fixtures is described in **Section 5.9**

The **installation of energy saving bulbs** is continuously being implemented. When new bulbs are discarded they will be replaced by energy saving bulbs. All bulbs will be replaced with energy saving bulbs.

Furthermore, many other energy reduction measures are planned in the future. The planned measures for 2010 and the following years are listed as follows:

- Enhancement of the building structure
- Installation of solar thermal systems
- Installation of heat pumps
- Reduction of heat losses by insulating measures
- Modernization of long distance heating lines
- Biomass energy
- Installation of high efficient pumps
- Installation of heat meter
- Optimization of the remote control technology
- Installation of photovoltaic facilities
- Installation of a turbine in water works Hoppstaedten
- Installation of a wind power plant

According to a conversation with Mr. Patel on January 19, 2010, in addition to these measures, an energy pass is planned for some buildings to identify if more reduction potentials are feasible.

In total, the existing, the implemented, and the planned energy reduction measures will aid the garrison in achieving its goals. Technically, nearly all of the existing measures are considered. The most important point for improvement is increasing the awareness to reduce energy consumption. The occupants of the garrison must be sensitized and motivated to reduce their energy consumption. The main challenge to this is that all energy costs are not paid by the soldiers and their families. Consequently, they have no real interest in reducing their consumption and there is no appeal to

conserve resources. One measure could be to implement an economical compensation. By undershooting a fixed consumption value, a bonus could be paid to the user. If this fixed consumption value is exceeded, the user must pay a fee. This could be one solution in increasing the residents' environmental awareness.

General information:

The Media Manager should coordinate with the key personnel responsible for the procurement and operation of primary energy-consuming equipment to develop and implement a strategy to assess progress toward meeting the DoD energy goals. As soon as it is available, the calculation of energy consumed per square foot should be incorporated in this P2 Plan as a baseline. Although the trend in energy consumption is influenced by the weather, other factors, including the garrison population, should be evaluated with regard to their potential to impact energy consumption so that appropriate conservation strategies may be developed and implemented.

Instilling basic energy saving practices as part of the routine at USAG Baumholder would benefit the garrison in the future. Many of the energy saving measures are operational changes that can be implemented with the proper support from the chain of command. Additionally, the Media Manager should encourage and support the evaluation of renewable energy-based utilities (e.g., solar and wind farms) operating in the region so that the garrison can make energy purchasing decisions based on the resource use and technology that is environmentally preferable.

Energy Efficient Construction

As mentioned concerning air emissions, it is important to replace outdated equipment with state-of-the-art equipment. The schedule for replacement should be reviewed to determine which units are due to be replaced and whether alternatives are available which are more energy efficient or which operate on renewable fuel sources. For facilities that have a large demand for heating energy, such as the schools, a woodchip furnace (*Hackschnitzelfeuerungsanlage*) would be an excellent alternative to replace an oil-fired or gas-fired unit. According to a conversation with Mr. Patel this opportunity is in negotiation stage with the OIE.

Energy Conservation Training and Outreach

Awareness training that addresses energy conservation should be developed and offered to all garrison residents. It may be possible to incorporate this training into the Newcomer's briefings presented to new garrison members.

The Media Manager should continue to identify outreach opportunities to promote awareness of the need for energy conservation through contact with various organizations (e.g., DPW Housing, DoDDS, DCA) across the garrison.

Table 4-39 Current P2 Initiatives – Energy Consumption

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
	Installation of high efficient pumps	Energy Consumption	DPW Utilities	ongoing	

Project Number	Project Name / Description	Targeted Pollution Source	Activity Name & Location	Imple-mentation Date	Funding Source
	Installation of water efficient fixtures	Water Conservation Energy Consumption	DPW Utilities	ongoing	
	Installation of energy saving bulbs	Energy Consumption	DPW Utilities	ongoing	

Table 4-40 Potential P2 Initiatives – Energy Consumption

Project Name	Targeted Pollution Source	Activity Name & Location	Potential Funding Source
Insulation of heating distribution lines and the heating system	Energy Consumption	DPW Utilities	
Installation/ replacement of heat exchanger	Energy Consumption	DPW Utilities	
Capturing of building envelope and systems engineering with energy consultant software and analyzing of various options for remediation	Energy Consumption	DPW Utilities	

4.9. Affirmative Procurement

4.9.1. Compliance Issues

The USAG Baumholder is required to comply with affirmative procurement (AP) requirements set forth in EO 13423.

The Federal government has a special responsibility to lead the way in building markets for recycled goods. “Affirmative procurement” is the name given to this buy-recycled purchasing program. Before EO 13423 and EO 13101, EO 12873 was the order that mandated the AP program. It emphasized to buy recycled-content products. These products were originally singled out for AP because they help reduce solid waste disposal, minimize natural resource use, and often use less energy to produce compared to "virgin" material products. These are good environmental performance characteristics, but there are other considerations that recycled-content products generally do not address, such as reducing toxicity, preventing air or water pollution, or reducing negative effects like global warming or ozone depletion.

EO 13423 has now superseded EO 12873 and EO 13101. They were written to improve the Federal government's use of recycled-content products and to expand the AP program to include other environmentally preferable products and services. The scope of existing AP plans/programs must be broadened to include new types of environmentally preferable purchases. The new emphasis is on environmentally preferable purchasing (EPP), a specific approach promoted by the EPA to encourage the purchase of products which have lesser or decreased effects on human health and the environment, when compared with competing products or services that serve the same purpose.

The EPP requirements for procurement ensure that environmental considerations are included in Federal agency purchasing decisions, along with traditional factors such as price and performance. The EPP program provides guidance for Federal agencies to facilitate purchases of goods and services that pose fewer burdens on the environment.

The regulations require any person or agency procuring designated products using appropriated Federal funds to purchase those items composed of the highest percentage of recovered materials practicable. EO 13423 required the EPA to designate products that are or can be made with recovered materials and to recommend practices for buying these products. To meet this requirement, EPA published Comprehensive Procurement Guidelines (CPGs) for designated products, and Recovered Materials Advisory Notices (RMANs) to provide recycled-content recommendations and guidance on buying recycled-content products. Compliance with the CPGs and RMANs is required for purchases of designated products. Information on affirmative procurement of EPA-designated products can be obtained on the internet at www.epa.gov/cpg.

In 1999, EPA released the Final Guidance on EPP, a document that assists executive agencies mandated to adopt environmentally preferable purchasing. The Final Guidance is centered on the five guiding principles listed below:

- Include environmental considerations as part of the normal purchasing process.
- Emphasize pollution prevention early in the purchasing process.
- Examine multiple environmental attributes throughout a product's life cycle.
- Compare environmental impacts when selecting products.

- Make purchasing decisions based on accurate and meaningful information about environmental performance of products and services.

The Final Guidance is primarily intended for Federal government use; however, state and local government purchasers, "green" vendors, and those in the environmental community may also find the concepts and information applicable in their environmentally preferable purchasing efforts. The Final Guidance is published in the Federal Register, August 20, 1999 (http://www.epa.gov/fedrgstr/EPAFR-CONTENTS/1999/August/Day-20/contents.htm).

4.9.2. Prevention Goal

One of the cornerstones of any P2 program is the implementation of an AP program. The goal of the USAG Baumholder is to increase the procurement of environmentally preferable products and services. In order to achieve this goal, all organizations at the USAG Baumholder must receive education and awareness training to reinforce the AP principles set forth in EO 13423.

4.9.3. Baseline

Very limited data are available with regard to AP which has not been a priority for the USAG Baumholder. As the P2 program develops at the USAG Baumholder and the opportunities arise for promotion and implementation of AP efforts within the garrison, the development of meaningful baseline data may be possible.

4.9.4. Progress and Recommendation

The USAG Baumholder activities responsible for contracting should integrate AP language into contract specifications and performance requirements. The Directorate of Logistics (DOL) should provide a list of the environmentally preferable items that are available through local purchase to meet AP program goals. Under the EQCC, a subcommittee could be formed to ensure that AP and “Greening of the Government” goals are met and documented.

4.10. Conclusion

This P2 Management Plan presents baseline inventories for all P2 program areas. The collected information will serve as a foundation for future P2 initiatives as well as for the management of the entire P2 program at the USAG Baumholder.

Many of the goals for the P2 areas could not be evaluated because data of required baseline years were not available, not complete, or not in an adequate quality. Therefore, the P2 baseline data of the USAG Baumholder should be frequently updated and assessed for improvements and the attainment of P2 goals. As determined by the DPW Environmental Division during the baseline studies, some P2 areas are more important to the USAG Baumholder than others. The P2 program will as a result concentrate on future projects regarding **HM, HW, SW, and Energy** which have the most potential for improvement.

4.10.1. Environmental Management System

Presidential EO 13148 requires all Federal agencies, including those in the DoD, to implement an EMS at their facilities. The U.S. Army decided to implement the EMS in general accordance with the International Organization for Standardization (ISO) 14001 criteria. Due to the nature of DoD installations, strict conformance with ISO 14001 may not be feasible, nor may it be desirable. Therefore flexibility in the EMS development should be allowed by individual installations in order to achieve the most functional system.

As part of the EMS implementation program, the first essential element is the Environmental Policy (see **Appendix D -USAG Baumholder Environmental Policy Statement**). The commitments of the USAG Baumholder Commander's Policy (Environmental Policy) include a commitment that all activities identify and address P2 opportunities and assist to meet or exceed U.S. Army goals for P2.

The P2 program should be a significant aspect in EMS per ISO 14001. Implementation of this plan should adhere to the procedures, requirements, and recommendations outlined in the IMCOM–Europe implementation timelines. P2 initiatives, opportunities, goals/objectives, projects, funding, and execution timelines should be documented, updated as required and maintained in conformance with the EMS.

The EMS program manager recently provided a list that is regularly updated with rankings of environmental areas that could improve most. SW generation, HW POL generation, energy conservation, and ODS elimination were identified as the top EMS priority aspects for the USAG Baumholder.

4.10.2. P2 Initiatives

Options to meet reduction requirements must be identified. These options are identified through PPOAs. Opportunity assessments allow an installation to identify process improvements or options. Conducting an opportunity assessment involves examination of all input sources, material usage, and waste generation by type and weight, and determining practical and economical options for reduction. A PPOA generally involves examining each process regarding a targeted substance to determine ways to avoid the use or minimize the generation of that substance. Detailed baseline information characterizing material use and waste streams for each process may be gathered concurrently with the assessment process. Opportunity assessments may be performed by trained post-level personnel or contractors, and to be effective, must have the involvement of process-level personnel.

The following sections include PPOAs that suggest measures to be implemented in the near future. The projects developed from baseline inventories apply P2 approaches such as source reduction, reuse, recycling, or waste minimization. Any P2 initiative with a payback period of less than 5 years will be implemented into the Status Tool for Environmental Program (STEP) for evaluation. STEP is one tool to facilitate the management of environmental project information. The Executive Summary in the front of this plan summarizes all of the recent PPOAs and should be regularly updated with future P2 initiatives.

5. POLLUTION PREVENTION OPPORTUNITY ASSESSMENTS

5.1. Reuse Center

5.1.1. Introduction

Having a centralized, expert-staffed Reuse Center on the installation supports the soldier and the units for hazardous waste management and regulatory compliance. The Reuse Center will be responsible for the often time-consuming, expensive and confusing processes of re-issuing, recycling or disposing of hazardous materials. The Reuse Center will function as a service so that the soldier may concentrate on other crucial mission tasks.

5.1.2. Baseline – Unit HM Procurement

Currently all of the military units within the USAG Baumholder procure most of their HMs mainly from the Supply Support Activities (SSA) located within Smith Barracks in Building 8338. The 24th BSB (Brigade Support Battalion) runs the SSA.

The government owned credit card (IMPAC) is not supposed to be used for purchases of HM but often serves immediate needs when HMs are not available through common supply channels.

In general, the units at the USAG Baumholder do not know how much HW they generate nor do they have current inventories of their HMs. In many shops, there are stockpiles of old paint, solvents, etc. for which they have no immediate use but feel that those materials "might be needed in the future." Therefore, large quantities of HMs expire and must be disposed of as HW due to a lack of recordkeeping, inappropriate ordering, and overstocking.

The implementation of a Reuse Center, will help all of the units within the USAG Baumholder manage their HM as well as their HW. It will also reduce materials purchased and disposal costs.

5.1.3. Goals

The following goals drive the Reuse Center PPOA for the USAG Baumholder:

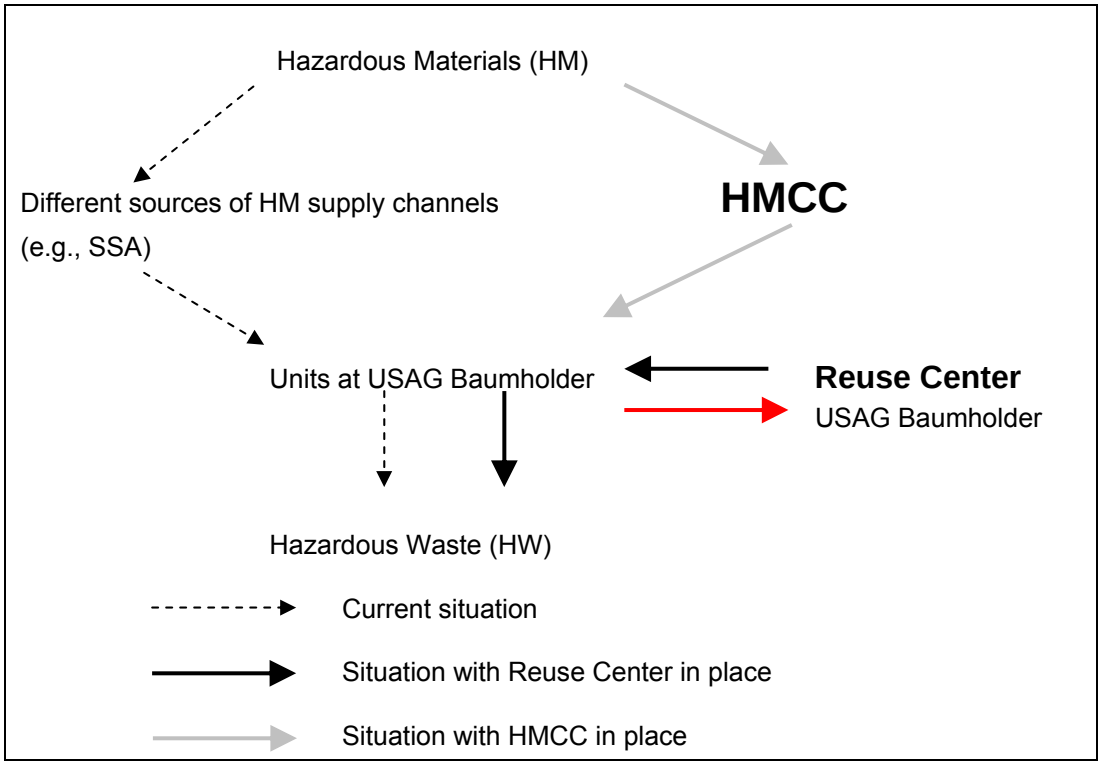
- Use of environmentally friendly products (EO 13423)
- Reuse of products (EO 13423)
- Reduce HW generation (EO 13423, IMA-Europe MoM)
- Reduce use of toxic chemicals and hazardous substances (EO 13423)
- Reduce variety of HMs used

5.1.4. Technical Feasibility

Building 8468 is currently used as the Hazardous Waste Storage Area for the USAG Baumholder. The Hazardous Waste Storage Area will be relocated to Bldg. 8469 in 2010 after the upgrade of this facility is completed. Construction measures at this prospective location will start in 2011. Thereafter, Building 8468 will be customized to a Reuse Center for the Garrison.

5.1.5. Process Flow Diagram

Figure 5-1 HM Supply Support / HW Generation Process



5.1.6. Environmental Feasibility

In preparation to implement the HMCC, it has been proposed to introduce the Hazardous Material Management System (HMMS) as an automated materials tracking system, to develop authorized use lists (AULs), and to continuously barcode all materials procured.

The change in focus towards prevention rather than compliance requires a more concentrated effort in HM tracking in order to analyze processes and prevent pollution before it starts. The Department of Defense has mandated the use of the HMMS for HM management. This system satisfies the functional requirements of EO 12856 (which has been superseded by EO 13423), the Pollution Prevention Act, the Emergency Planning and Community Right to Know Act (EPCRA), and the 1990 Defense Authorization Act. The HMMS is an integrated system that will interface logistics, supply, medical, and environmental functions as part of a coordinated effort to minimize the use of HM. This system has proven to be extremely effective when fully functional and therefore should be an integral part of the HMCC.

Listed below are some of the HMMS functional features:

- Maintains information from MSDSs
- Maintains chemical constituent and hazard information
- Maintains information on all processes that use HM or generate HW

- Tracks HM from receipt through issue for specific processes
- Calculates chemical release information and emission reporting
- Tracks HW from generation through disposal
- Prints HW manifest

With the help of the HMMS the proposed HMCC will accomplish many P2 goals such as the continuous reduction of HM procurement as well as HW generation through careful HM management.

As a first stage, the USAG Baumholder Reuse Center will reduce HM procurement and avoid HW generation.

5.1.7. Economic Feasibility

The central management of expired and surplus HM for all units allows such material to be reused. In addition, the installation's overall HW disposal fees will be reduced due to the decrease in the amount of materials with an expired shelf-life. However, these savings and avoidances may not necessarily reflect back to the USAG Baumholder in particular.

Cost reduction estimates are only available for garrisons which have implemented Reuse Centers in combination with HMCCs, which can be seen at the USAG Grafenwoehr.

Again, based on HMCC implementation experience on other military installations, procurement cost avoidance as well as reduction of the HW generation through an HMCC is generally about 30 percent.

5.1.8. Summary and Recommendation

The implementation of the reuse center is already an active project within the environmental program at the USAG Baumholder. The project will not be funded initially through the P2 program. This P2 feasibility assessment document supports the realization and achievement of a Reuse Center for the USAG Baumholder.

The Reuse Center will reduce hazardous material purchases and shrink disposals costs. Units will save numerous man hours associated with the administration of regulatory requirements, disposal assistance, and stock management. Other savings that can not be quantified directly include reduced regulatory actions, improved safety standards, improved readiness, and improved material control efficiency.

5.2. Parts Washing

5.2.1. Introduction

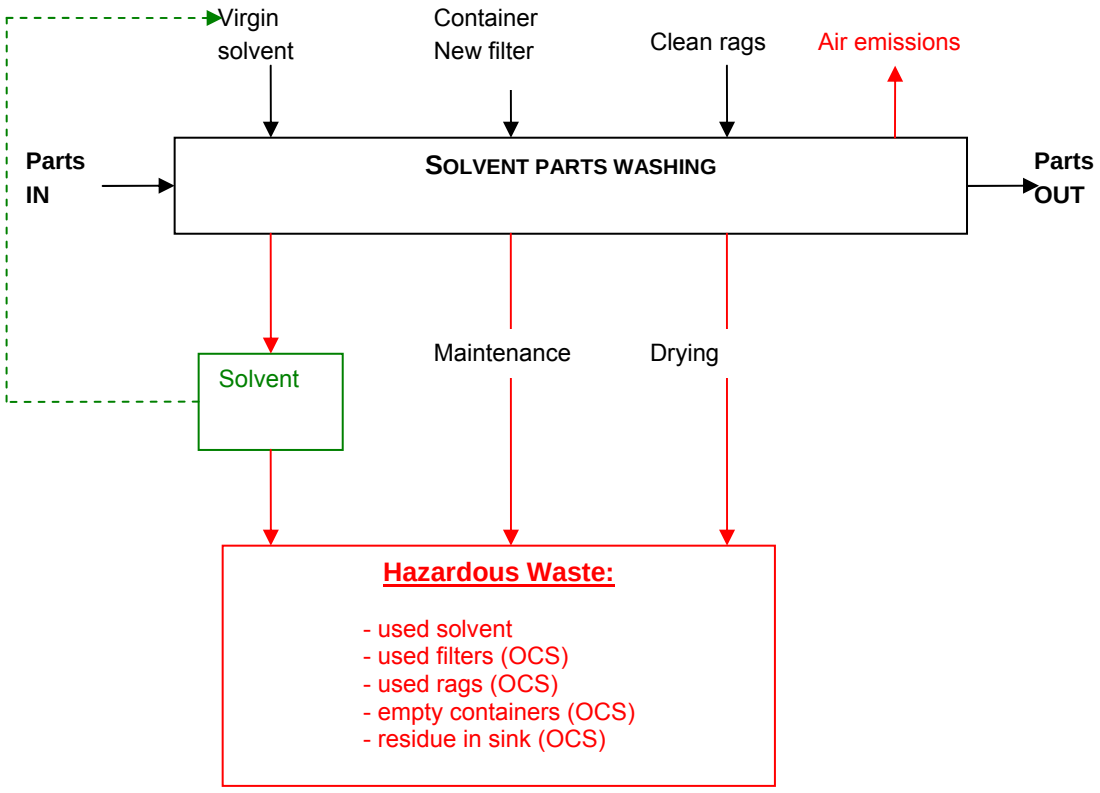
The parts washing process is an important element in the maintenance program of any vehicle with parts that require cleaning or degreasing to improve performance. Parts washing can be performed in different ways; manually by using aerosol solvents and rags, or mechanically by using parts washers. Most units with motor pools at the USAG Baumholder own at least one parts washer system (see **Table 5-1**).

Typically, a parts washer is a sink mounted on top of a cleaning fluid reservoir drum. The fluid re-circulates through a hand-held brush with the help of a pump. Rags are frequently used to dry parts after the washing process.

5.2.1.1. Solvent parts washing

Solvent parts washers typically use solvents with a VOC content and flammable properties as cleaning fluid. Spent solvent is disposed of as hazardous waste (HW) since it exceeds regulatory limits for ignitability and heavy metals.

Figure 5-2 Process Flow Diagram for Solvent Parts Washing



5.2.2. Baseline – Unit Parts Washer Survey

Nearly each unit at the garrison has at least one parts washer in its motor pool. The amount, the type, the locations and the conditions of these washers can be found in **Table 5-1.** Different solvents and parts washers are currently used in motor pools throughout the USAG Baumholder. However, none of the parts washers are in proper condition. Most of them are defective. Even though most of the units have a parts washer system, units usually clean the parts using rags, dry-cleaning solvents, or diesel fuel. This practice is not a good alternative to parts washer systems since the solvents typically end up as HW in oil contaminated solids (OCS) containers instead of being reused. Furthermore, a few units use steam cleaners to clean parts, another poor maintenance procedure since POL are then washed through the drainage system and not disposed of properly.

Most units in the garrison are provided with washers by Inland Tech.

- 11 parts washers are from the company Inland Tech.,
- 4 parts washers are from other manufactures,
- 2 parts washers belong to AAFES and
- 2 parts washers belong to MWR

MWR and AAFES will not be considered in this opportunity assessment. However, those solvents need to be changed frequently due to contamination and decreasing cleaning capacity. A garrison-wide maintenance contract is not in place. Therefore, maintenance of the parts washer is conducted entirely by the unit, and this leads to the malfunction of the devices (see **Table 5-1).** As a result, toxic and chlorinated solvents are used instead of the environmentally responsible products. The purchased solvents are generally cold-cleaning solvents.

Table 5-1 Tactical Unit Parts Washer Survey, Air Emission Inventory 2007

Unit		Bldg #	Parts Washer Type	[#]	Solvent	NSN 6850-	Status / Condition
Smith Barracks	40th EN	8139	Inland Tech. Inc. IT-48WC	3	Breakthrough	6850-01-378-0666	2 are defective, and 1 solvent needs to be changed
Smith Barracks	1-70 IBCT	8259	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	solvent needs to be changed
Smith Barracks	24th BSB Alpha	8260	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	defective
Smith Barracks	24th BSB	8264	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	defective
Smith Barracks	24th BSB Charlie	8268	none	0	N/A	N/A	N/A
Smith Barracks	HHC 24th BSB	8278	FB 36 ZEB	1	Breakthrough	N/A	Not installed
Smith Barracks	HHC 2-18 INF	8328	Inland Tech. Inc. IT-48WC	2	Breakthrough	6850-01-378-0666	1 is defective 1 solvent needs to be changed
Smith Barracks	3-4 IN	8330	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	defective
Smith Barracks	AAFES	8407	Safety Kleen	2	Breakthrough	6850-01-378-0666	
Smith Barracks	CST Baumholder	8420	CB Biotechnology	1	N/A	N/A	defective
Smith Barracks	589th SIG Co	8426	none	0	N/A	N/A	N/A
Smith Barracks	MWR Auto Craft	8438	Safety Kleen	2	Breakthrough	6850-01-378-0666	

Unit		Bldg #	Parts Washer Type	[#]	Solvent	NSN 6850-	Status / Condition
Smith Barracks	92nd MP Company	8452	Flojet 1450 Brake Washer and Snap On Composite Thermal Aquas Cleaner, PBC 33	1 1	Brake washer Concentrate unknown	29710 Ammco, Hennessy Industries Inc unknown	Both not in use
Smith Barracks	HHC 4-70 AR	8456	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	defective
Smith Barracks	1-84 FA Service Battery	8530	Inland Tech. Inc. IT-48WC	1	Breakthrough	6850-01-378-0666	defective
			Total	**19**			**All are not properly functioning**

Technical and maintenance information for the parts washer systems from a study at the USAG Baumholder is summarized in **Table 5-2**.

Table 5-2 Technical Data of Existing Systems

Existing parts washers	#	Solvent capacity [gal]	Interval of solvent change [per yr]	Necessary refill quantity [gal/yr]	Interval of filter change [per yr]	Sink dimensions L*W*H [inches]
Inland Tech. Inc. IT-48WC	15	42	0.5 [1)]	75 [2)]	12 [3)]	48 x 28 x 18
Safety Kleen 170	2	16	9 [4)]	32 [6)]	9 [4)]	31 x 20.5 x 7
Safety Kleen 440	5	32	9 [4)]	32 [6)]	9 [4)]	36 x 26 x 8
Snap-on PBC33	1	35	0.5 [1)]	20 [1)]	4 [1)]	31.5 x 21 x 10

1) estimated, based on surveys and interviews at Motor Pools
2) from "Construction Engineering Research Laboratory (CERL)" and "HQ FORSCOM", 1999
3) from Technical Manual by Inland Technology Inc.
4) from service contract with Safety Kleen

Besides the MWR Auto Craft Shop and the AAFES work shop, none of the garrisons part washers are properly maintained according to their units nor by their maintenance contract. All parts washers located at the motor pools are filled with cold cleaning solvents with an expired life time. Unnecessary sources of air emissions from the washers are found in nearly every motor pool.

The companies Terma GmbH, Safety Kleen, and Harry Mayer GmbH offer contracts for maintenance services.

5.2.3. Goals

The following goals drive the parts washing PPOA for the USAG Baumholder:

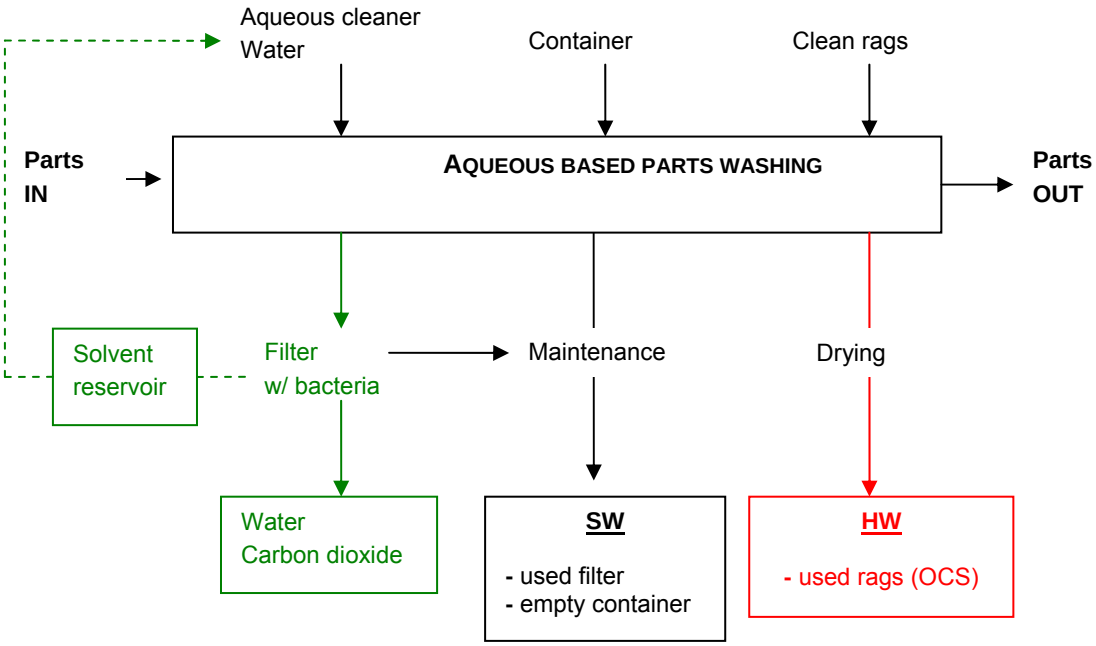
- Eliminate use of chlorinated solvents, and significantly reduce use of hydrocarbon solvents (EO 13423)
- Reduce HW generation (EO 13423, IMA-Europe MoM)
- Reduce air emissions (IMA-Europe MoM)
- Increase worker safety
- Increase environmental safety

5.2.4. Aqueous-based Parts Washing

Aqueous-based parts washers are an environmentally responsible alternative to solvent parts washers. Heated, aqueous parts washers have been found to be effective for many parts cleaning applications, including activities at the USAG Baumholder. The comparison of different parts washer systems during the USAG Baumholder-wide survey revealed that some units already had used aqueous based cleaners. A test run with a product of CB Biotechnology at the 7 JMTC TSC had a positive result according to staff and ED; however, the contract was not extended. By using aqueous (non-solvent) parts washer systems, the amount of VOC emissions is reduced. Additionally, spent aqueous solutions may be appropriate for disposal as non-hazardous waste, while most solvents will

be characterized as HW. Aqueous cleaning solutions, however, should be selected carefully to prevent possible galvanic corrosion of the parts being cleaned.

Figure 5-3 Process Flow Diagram for Aqueous-based Parts Washing



5.2.5. Alternatives

Proposed Alternatives I and II are P2 opportunities intended for the units in vehicle motor pools. Aqueous-based parts washer systems are also recommended for MWR and AAFES. These are independent organizations that support garrison operations and also need to be in compliance with environmental laws and policies. The funding, however, is independent from the garrison and any P2 initiatives would have to be paid on their own.

5.2.5.1. Status Quo

Currently, units can not use the available parts washers, which are mostly sink-type, re-circulating solvent parts washers without filtration, since maintenance and service on these existing systems are not available. Maintenance duties are only improperly handled regarding occupational health and adequate work procedures.

5.2.5.2. Alternative I

Alternative I provides the 11 Inland Technology Inc. parts washers and introduces Chemfree parts washers to units that currently operate parts washer systems from different manufacturers. This will consequently keep the maintenance contracts minimized to two manufacturers.

Inland Technology Inc.

Figure 5-4: IT-48WC parts washer from Inland Technology

11 parts washers from the Inland Technology IT-48WC type (see **Figure 5-4**) are currently located at the garrison. Inland Technology uses environmentally responsible technologies and complies with U.S. Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations. When used with the recommended solvents, Breakthrough, Skysol, or Skysol 100, a significant waste reduction has been documented throughout DoD installations. These solvents are environmentally compliant and have been given a toxicity clearance from the U.S. Army Public Health Command or USAPHC (formally the U.S. Army Center for Health Promotions and Preventive Medicine or CHPPM). Breakthrough has no listed components and no characteristics of HW per EPA. Furthermore, Inland Technology provides a lifetime warranty and free replacement of any damaged, worn-out, or broken parts as long as company equipment has been used. Additional information can be found at www.inlandtech.com or by calling 1-800-552-3100. **Unfortunately, the company does not have representatives located in Germany.**

Chemfree Corp.

The bio-remediating parts cleaning system Smartwasher was developed by the American corporation Chemfree, which has international distributors in many countries all over the world, including Harry Mayer GmbH in Germany. The Smartwasher system (see **Figure 5-5**) uses the bio-degradable water-based cleaning fluid Ozzy-Juice to clean parts that are contaminated by hydrocarbons, such as oil and grease. The replaceable filter, Ozzy-Mat, contains live bacteria that transform the hydrocarbons into water and carbon dioxide. The fluid must be slightly heated constantly in order to achieve efficient cleaning and optimum bacterial activity. Additional brushing action is required during cleaning as the fluid behaves more like a surfactant and less like a solvent. The filter media replacement is dependent on usage, but normally a new one should be installed once every month. The fluid, however, stays in the unit and is continually cleaned by the bio-remediation process. Additional fluid is added only as needed to maintain normal operating levels.

Figure 5-5: Smartwasher system from Chemfree Corp.

For corrosion prevention it is recommended to use Ozzy-Juice SW-6, which, according to Harry Mayer GmbH, offers sufficient rust inhibition. Since it's a local company, Harry Mayer GmbH offers service

contracts for any maintenance and repair issues. The Smartwasher system provides a 1-year warranty on the equipment and all parts.

For additional information see www.chemfree.com or www.harry-mayer.de or call Harry Mayer GmbH at 06723-99 99 51 or 0171-53 21 525.

5.2.5.3. Alternative II

For Alternative II Chemfree parts washers will be introduced to all units in vehicle motor pools.

5.2.6. Technical Feasibility

The two suggested alternative parts washer systems are currently widely used and accepted throughout the Army. Units operate Inland Technology Inc. systems at the USAG Baumholder and they are readily available. The Smartwasher system from Chemfree is the preferred choice to the Clean3 Biosystem. Although they both operate with the same bioremediation principle, Harry Mayer GmbH would be instantly available for any maintenance and repair issues.

SOPs, technical manuals, as well as MSDSs for the cleaning fluids should always be on-hand for any user. Specific training should not be necessary for either type of equipment once the contractor has demonstrated use during the initial setup. It is highly recommended to use a service contract for all of the units. This will provide technical service for the equipment and associated lifetime extension of cleaning fluids and equipment. Deployment, field exercises, or change of personnel would no longer result in unnecessary solvent replacement and/or disposal. And the current situation at the motor pools regarding the failed parts waster will be avoided.

5.2.7. Environmental Feasibility

Inland Technology Inc. and Chemfree both use environmentally friendly alternatives to the cold cleaning solvents typically used for parts washing. Worker health and safety would be increased under both alternatives.

The purchase and use of proper quantities of cleaning fluid (only what is necessary) would prevent over-stocking and expiration of materials and thereby reduce quantities of both HM and HW at the installation. Additional waste streams, such as air emissions, will be completely eliminated with a parts washer system such as the Smartwasher from Chemfree. If all motor pools were to operate with Chemfree's equipment as described in Alternative II, parts cleaned with soaked rags, the transport of solvents, or the contaminated parts would no longer be a problem.

5.2.8. Economic Feasibility

The economic feasibility is determined by conducting a cost analysis for each alternative. For the cost analysis the payback period is an important tool in evaluating opportunities.

The payback period can be calculated with the following formula:

$$Payback\ \ Period\ \ (years) = \frac{Startup\ \ Cost}{Avoided\ \ Cost - Annual\ \ Cost}$$

Table 5-3 below breaks down the expenses for the current situation. Based on the values below, the startup cost, avoided cost, and annual cost were determined for each alternative. Estimates from the companies were built-in to the calculations as well.

Table 5-3 Status Quo – Current Annual Operating Costs

Requirements (annually per parts washer)	Number of parts washers	Costs per parts washer	Total Cost
11 existing IT-48WC parts washers filled with Inland Tech solvent			
42 gallons of virgin "Breakthrough" or "Skysol" solvent to be changed every 2 years (costs broken down per year)	11	€ 563 [1)]	€ 6,193
42 gallons used solvent to be disposed of every 2 years (costs broken down per year)	11	€ 41 [2)]	€ 451
20 gallons of virgin "Breakthrough" or "Skysol" solvent to be refilled annually due to evaporation	11	€ 536 [1)]	€ 5,896
12 EdgeTek filters to be changed monthly (disposal of used filters is negligible)	11	€ 184	€ 2,024
Total cost per system		**€ 1,320**	**€ 14,564**
2 existing parts washer assumed with similar technology as the SmartWasher			
8 filters with microbes to be changed every 6 weeks (disposal of used filters is negligible)	2	€ 396 [3)]	€ 792
5 gallons of Clean 3 to be refilled annually due to evaporation	2	€ 106 [3)]	€ 212
Energy cost (€ 40 per year)	2	€ 40 [3)]	€ 80 [3)]
Maintenance contract (€ 166 per year)	2	€ 166 [3)]	€ 332
Total cost per system		**€ 708**	**€ 1416**
2 existing parts washer with unknown technology, assumption that system is filled with Kaltreiniger EL200			
53 gallons changed annually; disposal of used solvent is included (estimate)	2	€ 1,000	€ 2,000
Total cost per system		**€ 1,000**	**€ 2,000**
Total current cost		**N/A**	**€ 17,980**

1) Mixed price of € 1,475 per 55 gal; € 26.8 /gal (refilled every 2 years)
2) Disposal of non-halogenated solvent = € 0.52 /kg or € 1.97 / gal (disposed of every 2 years)
3) Estimated to be the same cost as Harry Mayer GmbH Smartwasher system

5.2.8.1. Startup Cost

The startup cost includes expenses for equipment purchases, installation, labor, raw materials, energy, maintenance, etc. For Alternative I, the startup cost consists of the procurement and installation of five new Smartwasher systems. Twenty-one new Smartwasher systems are introduced in Alternative II. Smartwasher equipment from Chemfree is readily available through the GSA system. It has been authorized and approved to be used within the U.S. Army.

Table 5-4 Parts Washing - Startup Cost Summary

Startup cost	Status Quo 24 solvent parts washers	Alternative I 11 ex. Inland Technology 4 new Smartwashers SW-28	Alternative II Aqueous parts washer 15 new Smartwashers SW-28
Equipment purchase incl. filter / solvent	-	4 * € 852 = € 3,408	15 * € 852 = € 12,780
Installation	-	Included	Included
Total	**€ 0**	**€ 3,408**	**€ 12,780**

Note: Prices derived from GSA website for SW-828 Smartwasher Supersink Parts Washer
Conversion: 1 US Dollar = 0.7905 Euro (see Table 3-2 for US Dollar (2009))

5.2.8.2. Avoided Costs

The avoided costs per year can include reduced cleanup costs, reduced waste disposal costs, reduced equipment rental costs, and others. The values in **Table 5-5** below were determined from **Table 5-3** based on the projected cost savings for each alternative.

Table 5-5 Parts Washing - Projected Cost Avoidance

Avoided cost	Status Quo 15 solvent parts washers	Alternative I 11 ex. Inland Technology 4 new Smartwashers SW-28	Alternative II 15 new Smartwashers SW-28
11 ex. Inland Tech	-	-	€ 14,564
2 ex. Bio-washers	-	€ 1416	€ 1416
2 ex. parts washer	-	€ 2000	€ 2000
Total	**N/A**	**€ 3,416**	**€ 17,980**

5.2.8.3. Annual Cost

The annual cost per year includes expenses for maintenance, service, energy consumption, and training, etc. Again, the values in **Table 5-6** below were established from **Table 5-3** for each alternative.

Table 5-6 Parts Washing - Projected Annual Cost Summary

Annual cost	Status Quo 15 ex. solvent parts washers	Alternative I 11 ex. Inland Technology 4 new Smartwashers SW-28	Alternative II 15 new Smartwashers SW-28
11 ex. Inland Tech	€ 14,564	€ 14,564	-
2 ex. Bio-washers	€ 1,416	-	-
2 ex. parts washer	€ 2000	-	-
4 new Smartwashers	-	4 * € 708 = € 2,832	-
15 new Smartwashers	-	-	15 * € 708 = € 10,620
Total	**€ 17,980**	**€ 17,396**	**€ 10,620**

5.2.8.4. Calculation of Payback

$$Payback\ \ Period\ \ (years) = \frac{Startup\ \ Cost}{Avoided\ \ Cost - Annual\ \ Cost}$$

Alternative I

$$Payback\ \ Period\ \ (years) = \frac{3{,}408€}{3{,}416€ - 2{,}832€} = \frac{3{,}408€}{17{,}980€ - 17{,}396€} = \textbf{5.8 years}$$

Alternative II

$$Payback\ \ Period\ \ (years) = \frac{12{,}780€}{17{,}980€ - 10{,}620€} = \textbf{1.7 years}$$

The calculations show that Alternative II has a shorter payback period than Alternative I. In just less than two years through the introduction of the Chemfree Smartwasher to all garrison-stationed units and a maintenance contract from Harry Mayer GmbH, to the garrison could expect a return on their initial investment. This figure does not include the cost savings associated with reduced labor costs. Adding those savings into the equation would shorten the payback time.

5.2.9. Summary and Recommendation

Alternative II is the best technical, environmental, and economic option based on this study and hence is recommended as the P2 alternative for parts washing. The installation of aqueous-based parts washer systems at all garrison-stationed units is the ultimate goal of this alternative. These systems reduce waste streams by nearly 100%, thereby saving costs for HW disposal. Only occasional replenishment is necessary, and the system is safe to use.

Alternative II also includes a maintenance contract, thereby insuring proper handling and care of the equipment. The current inadequate parts washer systems, with nearly 100% failure, could be completely eliminated. HM procurement could be reduced to a minimum, resulting in cost savings for each individual unit. With properly working equipment, units would be able to increase efficiency and increase readiness for their missions.

To remediate the current situation immediately, it is highly recommended to empty and clean all defective parts washers in order to remove the unnecessary hazardous waste from the motor pools.

Information for all of the parts washing equipment companies mentioned in this study can be found in **Table 5-7**.

Table 5-7 Vendors and Sources of Information

Company Name	Address	Telephone / Fax	Internet	Services offered
GSA	*Through supply chain*	*Through supply chain*	www.gsa.gov	Chemfree parts washers
Chemfree Corp.	8 Meca Way Norcross, GA 30093 USA	Ph: 1-800-521-7182 1-770-564-5582 Fax: 1-770-564-5533	www.chemfree.com	Bioremediation parts washer
Harry Mayer GmbH	Tiefengasse 33 65375 Oestrich-Winkel GERMANY	Ph: 49-(0)6723-99 99 51 49-(0)171-53 21 525 Fax: 49-(0)6723-999891	www.harry-mayer.de	Bioremediation parts washer, service contract
Inland Technology Inc.	401 East 27th Street Tacoma, WA 98421 USA	Ph: 1-800-552-3100 Fax: 1-253-593-8749	www.inlandtech.com	Solvent parts washer
CB Biotechnology				Bioremediation parts washer, service contract
Safety Kleen Deutschland GmbH	Robert-Bosch-Str.6 65520 Bad Camberg GERMANY	Ph: 49-(0)6434-90450 Fax: 49-(0)6434-904522	www.safety-kleen.co.uk	Solvent parts washer, service contract
Snap-on Inc.	P.O.Box 1430 Kenosha, WI 53141 USA	Ph: 1-262-656-5200	www.snapon.com	Solvent parts washer

5.3. Absorbents

5.3.1. Introduction

Spills of liquid products, such as POL and antifreeze, can occur during vehicle maintenance and other operational processes at the USAG Baumholder. These spills should be minimized to the extent possible; but even with an aggressive prevention program, some accidental releases will occur. Predictable spills, such as from an oil filter removal, should be captured in a drip pan. For spills that reach the floor, absorbent material is used to capture the liquid product.

There are two types of absorbents typically found at vehicle maintenance facilities:

- Absorbent pads (socks, blankets, pillows, etc.)
- Dry sweep absorbents (granulate, powder, “kitty litter”, etc.)

Absorbent pads are mainly used in spill kits for emergencies and transportation. In contrast, dry sweep absorbents are known to do a better job of extracting oil that is deeply embedded in a porous floor. Dry sweep absorbents can be swept up after use and reused several times. Due to the nature of materials being captured, the absorbent material typically requires disposal as HW. Since HW is paid for by unit weight, lighter weight absorbents are more economical in the disposal process. Absorbent disposal is one of the Top 10 waste streams at the USAG Baumholder.

The use of adequate absorbents is a measure of an effective spill prevention program. Therefore, this P2 initiative will focus on optimizing the use of dry sweep absorbents. **Table 5-8** shows the German classification of absorbents by application area.

Table 5-8 German Federal Environmental Agency classification of absorbents

Class	Identification	Appropriate for absorption of …
A	Absorbent for acids	e.g., Sulfuric acid, Hydrochloric acid
B	Absorbent for bases	e.g., Ammonia, Sodium hydroxide
F	Absorbent for flammable liquids	e.g., Cyclohexane, Xylene, Isopropanol
H	Absorbent for POL	e.g., Petroleum hydrocarbons
O	Absorbent for oxidative substances	e.g., Hydrogen peroxide, Chlorine bleach
P	Absorbent for aqueous / polar substances	e.g., Water, Ethylene glycol
V	Universal absorbent	e.g., All liquids

Oil, fuel, antifreeze, brake fluid, and acids are the most commonly used and spilled HM during vehicle maintenance. Therefore, based on **Table 5-8**, the most applicable absorbents for the USAG Baumholder motor pools are class H absorbents that can be used to cleanup POL products and class V absorbents for all types of liquid.

5.3.2. Baseline

A variety of different absorbents is currently used at vehicle motor pools, maintenance areas, and at the fire department throughout the USAG Baumholder. The units obtain their absorbents from various supply channels, mainly the SSA for the units, directly from the GSA system or from local German companies.

At most facilities throughout the USAG Baumholder, absorbents are disposed of as HW after only one use, even if they are not fully saturated. Only infrequently do units try to reuse an absorbent material. As a result, waste absorbents contribute significantly to the amount of OCS (see section 4.2 Hazardous Waste).

The disposal of absorbents as part of the OCS waste stream is quite expensive at $0.63 per kilogram. In the 2009 fiscal year at the USAG Baumholder 9,100 kg of OCS was disposed of. The disposal costs of $5,736 OCS is a mix of different POL wastes (contaminated metals, plastics, rags, and others), but waste absorbents contribute to the majority of the OCS weight. POL contaminated solids are one of the major HW streams at the garrison (see **Table 4-5 Top Ten Hazardous Waste Streams**). **Figure 5-6** shows the yearly amounts of disposed POL contaminated solid.

Figure 5-6 POL contaminated solid amounts at the USAG Baumholder

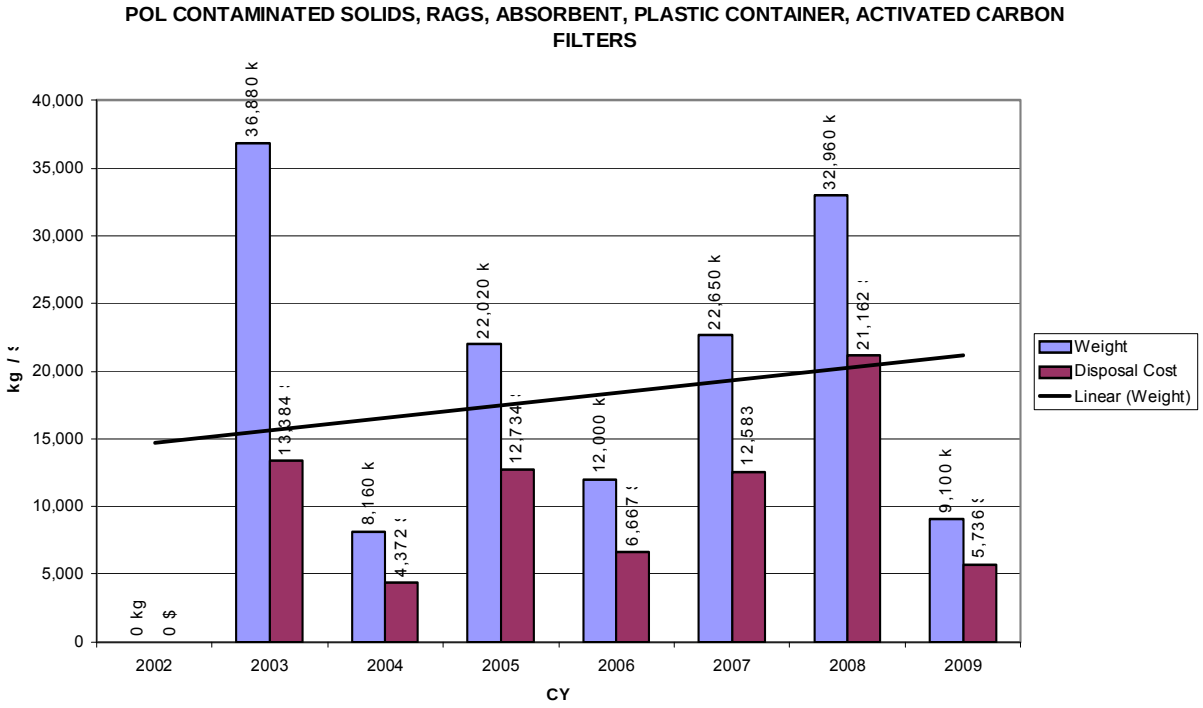
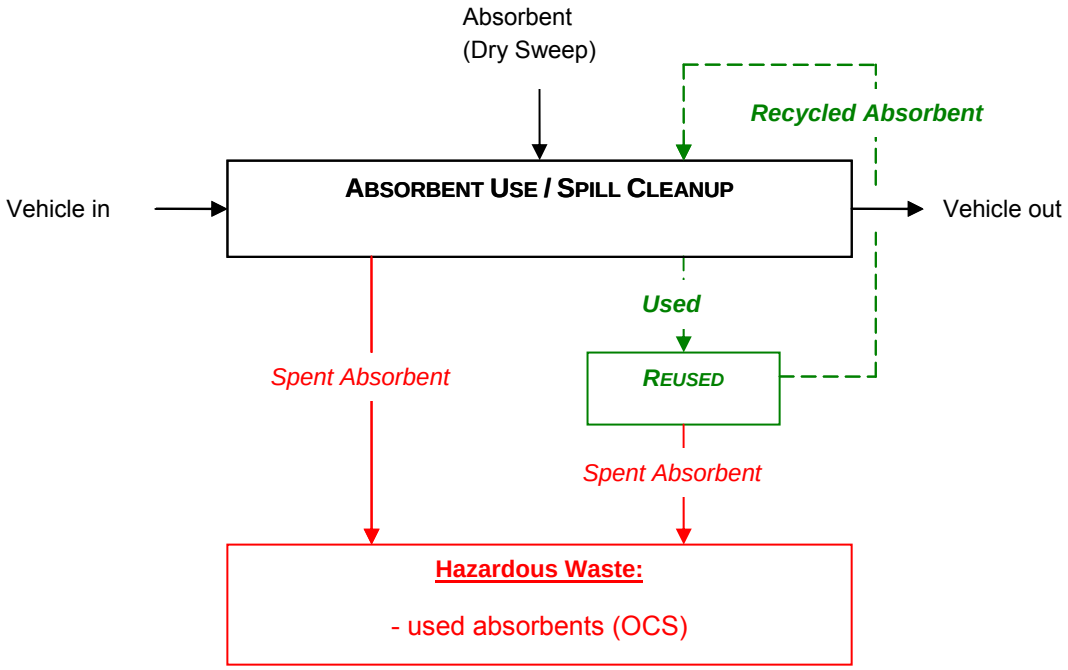


Figure 5-7 illustrates the typical process flow for the use of absorbents at maintenance areas. Some units reuse absorbents, but this does not include fully saturated absorbents, which is shown as the dashed recycling process. Other units dispose of their absorbents after their initial use, shown as the solid process.

Figure 5-7 Process flow diagram for absorbent use and spill cleanup



5.3.3. Goals

The following goals drive the absorbents PPOA for the USAG Baumholder:

- Reduce quantity of procured HMs
- Reduce procurement cost
- Reduce quantity of HW generated (EO 13423, IMA-Europe MoM)
- Reduce cost of HW management program

5.3.4. P2 preference #1: Optimize absorbent management practices

A potential P2 initiative for the more efficient use of absorbents is the change in management practices during the utilization of absorbents. Using the appropriate absorbent material in case of a spill can prevent and reduce the absorbent waste product for disposal. **In addition, if all units were to practice the reuse of unsaturated absorbents by providing three separate drums for a) new, b) partially used, and c) saturated absorbents, a further reduction in waste absorbents could be achieved.**

As mentioned in **Chapter 5.5.1**, operations at the USAG Baumholder mostly require the use of class H absorbents for the cleanup of POL products. In Germany, class H absorbents are further differentiated by their properties:

- Type I: Use on all waters (including industrial), high buoyancy
- Type II: Short-term use on small bodies of waters, can be used on land
- Type III: Special use on solid surfaces, streets and grounds
- Type IV: Special use on waters where complete recovery is needed

According to the definitions above, class H type III absorbents are most suitable for the cleanup of POL spills at vehicle motor pools, maintenance areas, and used by the fire department. Class P absorbents are appropriate for the cleanup of occasional brake fluid or antifreeze spills (see **Table 5-8**). Instead of storing and utilizing different types of absorbents, a universal class V absorbent for the cleanup of all kinds of liquid spills should be considered in order to further reduce the quantity of procured absorbents.

Due to the wide range of applications, many different types of absorbents are available in the market. Absorbent types from different manufacturers consist of materials with varying densities, characteristics, and absorbing capacities. The absorbing capacity is an important measure for the quality of an absorbent and is defined as follows:

Absorbing capacity = unit weight of liquid absorbed / unit weight of absorbent material

Since the waste absorbent mass plays an important role in the cost of absorbent disposal, the most preferable absorbent materials should have maximum absorbing capacities at a minimum disposal weight. In general, apart from the lower weight, fine absorbents offer a greater surface area and hence more contact area with the spilled liquid. At the same time, both characteristics, the small weight and the larger surface area, also pose disadvantages. As units at vehicle motor pools found out, fine absorbent materials such as Stardust tend to be blown away when used outdoors. They also tend to leave stains after cleanup due to their adherence to the ground surface.

Therefore, the different types of absorbents must be compared by their absorbing capacities, specific weights, and procurement and disposal costs. **Table 5-9** shows examples of absorbents that might be used throughout the USAG Baumholder, as well as other available absorbents with the desired properties. A good indicator to compare various absorbents is the calculation of how much the cleanup of 100 liters of spilled oil in a confined area would cost.

Table 5-9 Comparison of existing and proposed absorbents

Absorbent	Class	Specific Weight	Grain Size	Oil absorbing capacity		Cost	Cont. size	Material	Cleanup of 100-L spill			Notes
									Proc.	Disp.	Total	
		(kg/L)	(mm)	(L/L)	(kg/kg)	(€/kg)	(kg)		€	€	€	
FRANTZ COMPANY Oil Zorb	no info	no info	no info	no info	no info	0.71	25	no info	no info	no info	no info	NSN: 7930-00-269-1272 Not available in Germany
STARDUST Super Absorbent	V	0.255	powder	0.380	1.282	2.06	7	Alumina-silicate	138.24	33.55	171.79	NSN: 7930-01-418-1164; not for hydrofluoric acid
WASTE SOLUTIONS Exsorbet	H (III)	0.150	powder	1.250	7.167	no info	8/16	Natural peat	no info	no info	no info	NSN: 4235-01-423-7221; buoyant
DAMOLIN Absodan Plus	**V**	**0.500**	**0.5-1.5**	**0.450**	**0.774**	**0.68**	**10**	**Molar, diatom soil**	**75.56**	**55.55**	**131.11**	**Preferred by German fire departments; price for orders**
DENSORB Ölbinder Allwetter	**H (III)**	**0.405**	**0.13-4**	**0.486**	**1.032**	**0.50**	**20**	**Polyurethane foam**	**41.25**	**41.66**	**82.91**	**Suitable for outside use under wet conditions; price for orders**

Notes: Specific gravity of oil = 0.86 kg/L
Disposal cost of OCS waste = €0.50 per kg

An appropriate absorbent for all areas of application requires the following characteristics:

- Absorbs any type of spill → Class V absorbent;
- Is not too coarse → particles with grain size < 1.0 mm;
- Is not too fine → specific weight > 0.4 kg/L;
- Is effective → absorption rate > 0.4 L/L;
- Is cost effective (procurement and disposal);
- Is approved by Federal Environmental Agencies.

As a result, the comparison in **Table 5-9** suggests the utilization of DAMOLIN Absodan Plus (a class V absorbent) as a dry sweep absorbent for any kind of application. DENSORB Ölbinder Allwetter (a class H type III absorbent) is a cheaper absorbent and an alternative for only POL spills. **Table 5-10** below shows the vendor information for both recommended absorbents.

Table 5-10 Vendors and sources of information

Absorbent	Application Area	Suitable for the absorption of	Vendor Information	Contact Information	Delivery conditions
DAMOLIN Absodan Plus	Inside / Outside	Any liquid material	Handelsforum Würzburg www.hafowuerzburg.de	Ph.: 0931-270 65 55 Fax: 0931-270 65 56 hfw@onlinehome.de	Delivery at no cost
DENSORB Ölbinder Allwetter	Outside, wet conditions	POL	Denios AG www.denios.de	Ph.: 0800-753 00 01 Fax: 0800-753 08 00 verkauf@denios.de	Delivery at no cost

5.3.5. P2 preference #2: Absorbent reuse

Many units at the USAG Baumholder readily discard absorbents after their initial use, even if the absorbent material is not fully saturated. This practice leads to a larger generation of HW and therefore should be controlled. The reuse of unsaturated absorbents should become a common practice among all units for minor cleanup spills.

As mentioned before, providing **three separate containers for new, partially used, and saturated absorbents** at all unit maintenance areas would be a first step in reusing absorbents and reducing waste. A further reduction in waste absorbents could be achieved by introducing a separation unit that enables the segregation of used absorbent materials.

5.3.5.1. Technical Feasibility

As an example, the German company DENIOS AG has developed such a system to easily control the separation of absorbents. The system consists of a mobile unit with two compartments: one for the storage of new absorbents and the other one for the separation of saturated particles and reusable materials via a sieve. The material remaining on the sieve will be disposed of as waste absorbent,

whereas the material that falls through the screen is reused until it is saturated and left on the sieve. **Figure 5-8** illustrates the principle of the segregation unit from DENIOS AG.

Figure 5-8 Example of DENIOS segregation unit

Even though dry sweep absorbent material cannot be completely eliminated in vehicle repair and maintenance facilities, it can be significantly reduced by reuse. The gradual implementation of a separation system will support the units at the USAG Baumholder in their efforts to reuse unsaturated absorbents.

Table 5-11 Vendors and sources of information

Company Name	Telephone / Fax	Internet	Services offered
DENIOS AG	Ph: 49-(0)800-753-000-1 (orders) 49-(0)800-753-000-2 (help) Fax: 49-(0)800-753-0800 (orders)	www.denios.de	Absorbent segregation unit, delivery at no cost

5.3.5.2. Environmental Feasibility

The use of the recommended segregation unit equipment provides several environmental benefits. The increased reuse of absorbents will considerably reduce the generation of HW, and will remove the burden from the soldier to question whether the absorbent material is saturated. In addition, less space is required for the storage of new absorbent materials since the procurement will be decreased. Worker safety is increased because the mobile segregation system provides an easy and clean way to handle the separation process.

5.3.5.3. Economic Feasibility

The economic feasibility is determined by conducting a cost analysis. For the cost analysis the payback period is an important tool in evaluating opportunities. The payback period can be calculated using the following formula:

$$Payback\ Period\ (years) = \frac{Startup\ Cost}{Avoided\ Cost - Annual\ Cost}$$

Data about the amount of absorbents ordered by each unit or motor pool is not available. For further calculation it was assumed that one motor pool uses at least 500 kg of adsorbents per year. About 14 motor pools are in use currently at the garrison. **Table 5-12** breaks down the annual expenses for that particular dry sweep absorbent. The adsorbent below was selected, since all relevant data is available.

Table 5-12 Current annual operating costs

Units	Requirements (annually)	Amount per motor pool [kg]	Cost per motor pool [€/kg]	Total Costs per motor pool [€]
14 motor pools	Procurement Stardust	500	2.06 [1)]	1,030
	HW disposal	641 [2)]	0.50 [3)]	321
			Total current cost	**€ 1,351**
			Total costs for 14 motor pools	**€ 18,914**

1) Procurement cost (see **Table 5-10**)
2) Absorbent capacity = 1.282 kg/kg (see **Table 5-9**)
3) OCS HW disposal price

5.3.5.3.1. Startup cost

The startup cost includes expenses for equipment purchase, installation, labor, raw materials, energy, and maintenance, etc. For this P2 initiative the startup cost consists of the procurement and installation for one DENIOS segregation system at each of the 14 motor pools in the garrison.

Table 5-13 Startup cost summary

Startup cost	# of Motor Pools in use	Costs per system [€]	Total Costs [€]
Equipment purchase DENIOS segregation system	14	235	3,290
		Total	**€ 3,290**

5.3.5.3.2. Avoided cost

The avoided cost per year can include reduced cleanup costs, reduced waste disposal, reduced equipment rental, and others. The numbers in **Table 5-14** are determined from **Table 5-9**'s projected cost savings. It is estimated that about 20% of dry sweep absorbents can be saved annually through reuse practices.

Table 5-14 Projected cost avoidance

Units	Requirements (annually)	Amount [kg]	Cost [€/kg]	Total Costs [€]
14 motor pools	20% savings procurement STARDUST	1,400	2.06	2,884
	20% savings HW disposal	1,795	0.50	897,5
			Total cost savings	**€ 3,781,5**

5.3.5.3.3. Annual cost

The annual cost per year can include expenses for maintenance, service, energy consumption, and training, etc. The operational costs for the use of the segregation system would not change compared to current absorbent use operations, resulting in no net recurring costs.

Table 5-15 Projected annual cost summary

Annual cost	# of Motor Pools in use	Costs per system [€]	Total Costs [€]
No change in operational costs compared to current absorbent use operations	14	0	0
		Total annual cost	**€ 0**

5.3.5.3.4. Calculation of payback

$$Payback\ \ Period\ \ (years) = \frac{Startup\ \ Cost}{Avoided\ \ Cost - Annual\ \ Cost}$$

$$Payback\ \ Period\ \ (years) = \frac{3{,}290€}{3{,}782€ - 0€} = \ 0.9 \text{ year}$$

After less than one year the introduction of the DENIOS AG segregation system in the fourteen garrison vehicle motor pools a return of the initial investment would be realized.

Keep in mind that a payback period of less than one year might be an underestimated value with an annual dry sweep absorbent utilization rate of about 500 kg per unit. Most units on the installation use less than the average of 500 kg of absorbents per year but the introduction of the separation system would still be economically feasible (five year payback period) for an annual dry sweep absorbent utilization rate of about 100 kg per unit. Therefore, the equipment is cost-effective for most units and activities.

5.3.6. Summary and Recommendation

The implementation of absorbent segregation systems and the utilization of the most efficient absorbents, including changes in management practices, are relevant P2 tools for units throughout the USAG Baumholder. Compared to current practices, there would be numerous advantages in the reduction of waste absorbents. The new techniques would allow for a cleaner and more cost saving absorbent use and a better spill prevention program.

5.4. Toner Cartridges

5.4.1. Introduction

Printers are used in offices throughout the Baumholder garrison. The majority of printers are laser printers, but some ink printers can also be found. Toner cartridges can last from 2,500 up to 12,000 printed pages, depending on the model. Since printing is conducted on a daily basis, a considerable amount of empty toner cartridges accumulates during a year within the USAG Baumholder.

Toner cartridges contain substances harmful to human health. In particular, the dust that inevitably escapes from toner cartridges and pollutes the ambient air includes heavy metals. Therefore, used cartridges are required to be treated as HW.

5.4.2. Baseline

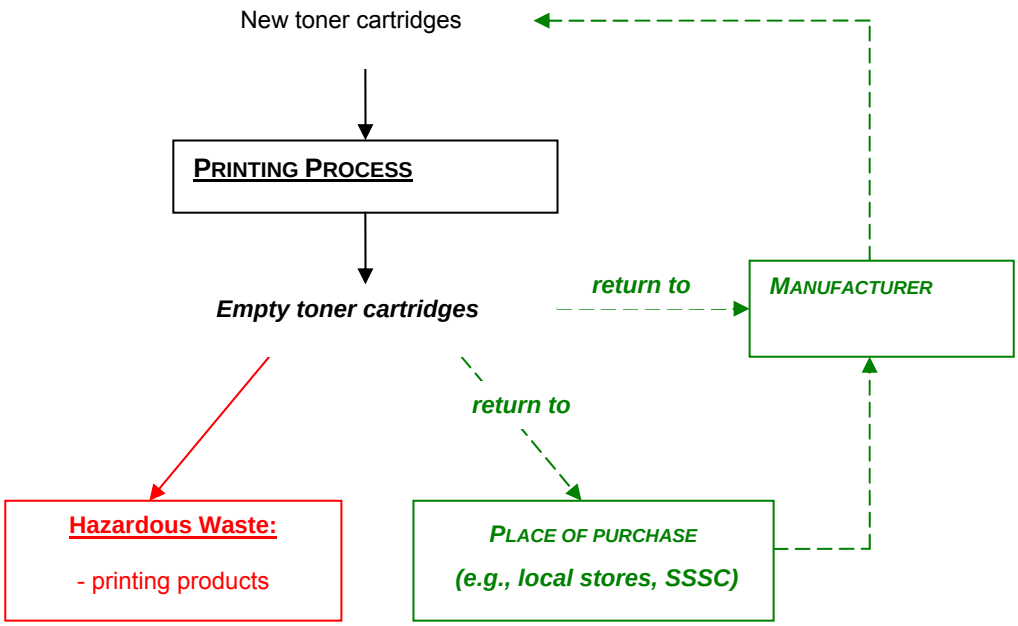
Different types of printers and, hence, toner cartridges can currently be found at the USAG Baumholder. Offices order their toner cartridges from different sources, either through their unit supply system, from local German vendors, or from Self Service Supply Centers (SSSC). The SSSC stores generally receive the toner cartridges directly from the U.S. through the General Services Administration (GSA) system.

Anyone in Germany selling toner cartridges is obliged by German law to take the empty cartridges back, free of charge. In addition, all of the manufacturers of printing products provide labels and information for the free return of empty toner cartridges.

Many offices practice the free return of used toner cartridges. Yet, every year empty cartridges appear in the HW cycle of the USAG Baumholder under the DRMO removal contract CLIN N1700 – “Printing Products, halogenated and non-halogenated, including (but not limited to) toners and inks”.. In 2009, the USAG Baumholder discarded 870 kg of empty toner cartridges. The disposal of empty toner cartridges costs $0.31 per kg, and in 2009 this resulted in an unnecessary extra HW disposal cost of $271.

Figure 5-9 illustrates toner cartridge use at USAG Baumholder. The dashed recycling processes are the methods that everyone should practice. The disposal of toner cartridges as HW should be completely eliminated throughout the USAG Baumholder.

Figure 5-9 Process flow diagram for toner cartridges



5.4.3. Goals

The following goals drive the toner cartridges PPOA for the USAG Baumholder:

- Reduce quantity of HW generation (EO 13423, IMA-Europe MoM)
- Reduce cost of HW management program

5.4.4. P2 preference #1: Return cartridges directly to manufacturer

HW disposal costs can be avoided entirely by simply returning toner cartridges to the supplier, free of charge. Toner cartridges should never be added to the waste stream.

Manufacturers provide an easy method for the return of empty toner cartridges. Prepaid mailing labels inside every new cartridge box offer a simple way to return the empty toner cartridge back to the manufacturer at no cost. This approach should be preferred to any other method since this is the most direct route back to the manufacturer.

Figure 5-10 and **Figure 5-11** illustrate the manufacturer's detailed return instructions for a HP toner cartridge. **Figure 5-10** and **Figure 5-11** demonstrates the layout of a prepaid mailing label for Germany.

Figure 5-10 Instructions for the return of empty HP cartridges

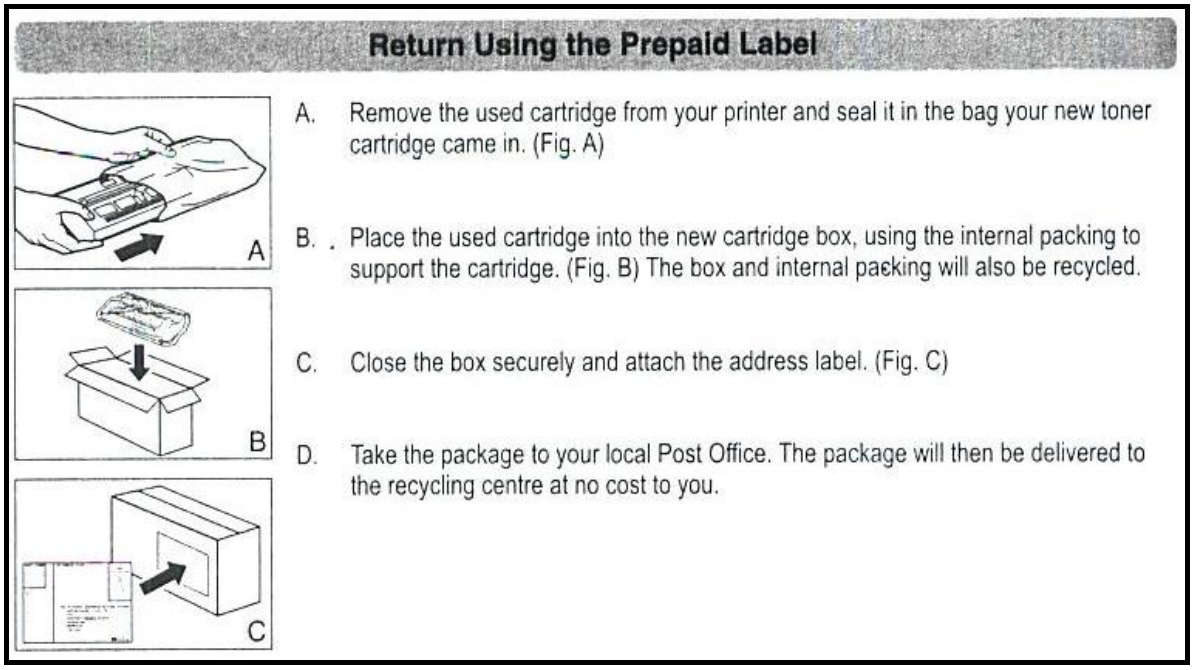


Figure 5-11 HP prepaid mailing label for Germany

Prepaid labels are available for different countries. The **German "Retoure" label** should be used for empty toner cartridges accumulating in Germany. The only part to add is return address of the sender in the left hand corner.

5.4.5. P2 preference #2: Return cartridges to place of purchase

If, for some reason, the original return labels are no longer available, empty toner cartridges can always be returned to the place of purchase. For example, the system administrators from DPW collect the toner cartridges provided by DELL. These cartridges are picked up by the vendor (DELL).

5.4.6. Technical, Environmental, and Economic Feasibilities

This P2 opportunity assessment only consists of advice on how to better manage empty toner cartridges. Since both suggested and preferred methods do not include any technical processes, no feasibility study was necessary.

The ultimate goal of this initiative is the increase in awareness of environmentally friendly procedures in order to eliminate the disposal of cartridges as HW. By returning toner cartridges back to the manufacturer, reuse and recycling, the cornerstones of any P2 program, are actively executed. An effective conservation of resources is thereby assured.

Since no costs are involved in the implementation of this project, an immediate payback is guaranteed when all offices follow the provided guidelines. It will be necessary to monitor the HW disposal records over the next few years in order to achieve the complete elimination of empty toner cartridges as HW.

5.4.7. Summary and Recommendation

It is bad management practice for empty toner cartridges to end up as HW and create expenses that can easily be avoided. Awareness of how to return toner cartridges must be increased throughout the USAG Baumholder. Every unit dealing with empty cartridges should be obliged to return them straight to the manufacturer using the prepaid mailing labels (which is the preferred method) or to return them in their original packaging to the place of purchase. It must be noted that the same practice for empty toner cartridges is available for empty ink cartridges. They are not classified as HW but the returning to the manufacturer is also an environmentally friendly procedure in order to eliminate the disposal of cartridges to the residual waste. Recycling is enforced.

5.5. Household Chemicals

5.5.1. Introduction

It is not widely understood at the garrison that household chemicals are hazardous materials and that their disposal is classified as the generation of hazardous waste. Reportedly, household chemicals have been found in residual waste containers. For example, during the investigation of a truck load of residual waste, which originated from the Smith Housing Area (as described in **Section 4.3.2),** small amounts of household chemicals were found.

5.5.2. Baseline

There are two possibilities in disposing of household chemicals at the USAG Baumholder. The dangerous goods pickup vehicle collects hazardous waste once a month from the housing areas. The trash pick-up schedule states the locations of the pick-up points and is available for the residents.

The second possibility is to take the hazardous items to the Hazardous Waste Storage Facility in Building 8468.

The hazardous materials listed below are examples of materials that may be considered household chemicals:

- Motor oil, lubricants and filters
- Antifreeze
- Aerosol cans
- Cleaners and disinfectants
- Washing agents and bleach
- Waxes and polishes
- Medicines
- Nail polish and nail polish removers
- Thermometers
- Paint and varnishes
- Paint thinners and removers
- All types of batteries
- Pesticides and fertilizers
- Fluorescent and energy saving light bulbs
- Stain removers
- Corrosion inhibitors

- Wood preservatives
- Shoe polish
- Adhesives
- Turpentine
- Solvents
- Rug shampoo
- Flea spray
- Grease
- Compressed Gas Cylinders for BBQs

Awareness campaigns must be developed and implemented to ensure that disposal and handling of household chemicals is done. Housing areas must especially be targeted. Flyers need to be distributed and posters need to be placed in the housing areas.

In addition, awareness training on each Earth Day should be held to train residents regarding the proper usage and disposal of household chemicals.

5.5.3. Goals

The following goals drive the household chemical awareness training PPOA for the USAG Baumholder:

- Continuously reduce solid waste generated (EO 13423).
- Continuously increase SW diversion rate.
- Reduce HW generated (EO 13423)
- Increase worker safety
- Increase environmental safety

5.5.4. Technical Feasibility

To give the residents of the USAG Baumholder opportunities for the disposal of hazardous waste that is generated from their households, the dangerous goods pickup vehicle must continue to operate. Furthermore, the awareness campaign must also include the possibility that household chemicals can be disposed of at the HWSA.

An effective awareness campaign will communicate the methods of handling household chemicals, which will avoid HW being disposed of in the trash dumpster as residual waste. It will also avoid HW being flushed down the sink/toilet. Even though it is common sense that disposing/abandoning HW/HM in the environment (e.g. disposing of old car batteries in a playground) is prohibited, it should also be mentioned in the awareness campaign.

More detailed information for the handling of hazardous materials should also be mentioned. This information should include, but not limited to, use and storage of household chemicals according to the instructions on the label.

The policy should also provide guidance and promote awareness:

- in replacing chemicals by other methods (use plunger instead of chemical drain cleaner);
- in buying and using chemicals only in quantities needed; and
- in buying biodegradable products.

5.5.5. Summary and Recommendation

Providing guidance, especially for the housing residents, regarding household chemicals is already an ongoing activity at the ED. A flyer has already been published and distributed. Nevertheless, continuing the awareness trainings to encourage proper handling and disposal of household chemicals will contribute to a safer environment.

5.6. Paper and Cardboard recycling

Paper and cardboard is currently the heaviest recyclable fraction. To relieve the residual waste with its high disposal costs the separation of paper and card board out of the residual waste must be enforced. One of the biggest generators of waste paper comes from the administrative areas. Currently recycling bins for paper and cardboard are only located at the exterior areas of admin buildings. The collection of recyclables in the admin buildings is the responsibility of the user. The removal of paper and cardboard out of the residual waste stream is desirable.

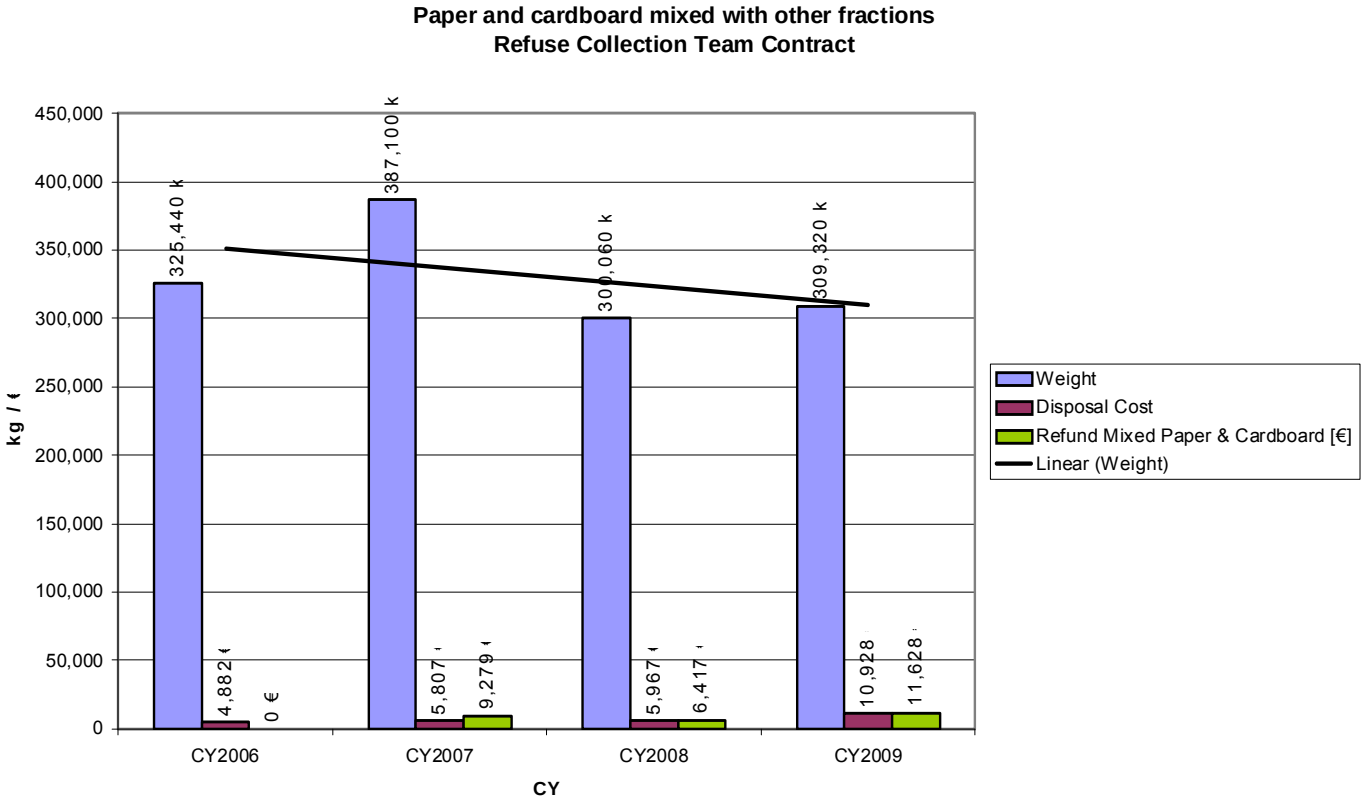
5.6.1. Introduction

To increase and enforce the collection of paper it is recommended to place paper bins in all administrative offices. The following calculates the investment of locating recycling bins in the offices. It is assumed that 8% paper and cardboard can be removed out of the residual waste from OMA by enforcing the separation of this recyclable fraction, especially in administration areas.

5.6.2. Baseline

In **Figure 5-L** the weights, costs, and refund for paper and cardboard for the garrison are provided.

Figure 5-L Weights, Costs, and Refund of Paper and Cardboard



As in **Figure 4-B** can been seen, the amount of paper and cardboard is only 7 % of the recyclables, which in total, is only 15 %. There is a definite potential to increase the amount of recyclables.

5.6.3. Goals

The following goals drive the paper and cardboard recycling PPOA for the USAG Baumholder:

- Reduce the quantity of residual waste generated and increase the recycling rate (EO 13432, IMA-Europe MoM)
- Reduce the cost of the Solid Waste management program

5.6.4. Technical, Environmental, and Economic Feasibilities

The below calculation example is from October 2008 to September 2009. The disposal and recycling costs were used from the 2009 contract.

Table 5-16 Calculation example for additional Paper and Cardboard recycling

Residual Waste and Paper/Cardboard Rate in [t]			**Residual Waste and Paper/Cardboard Costs in [€]**	
Oct 08-Sept 09	Total	Costs per ton	Oct 08-Sept 09	Total
Residual Waste OMA	1,561 t	- 93.7 €/t	Residual Waste OMA	-146,254 €
Paper & Cardboard OMA	140 t	- 20.5 €/t	Paper & Cardboard OMA	-2,873 €
8 % additional Paper collected as a percentage of the Residual Waste OMA	125 t	+ 73.2 €/t	Benefit of 8 % additional Paper recycled	9,150 €

For a rough estimate it was assumed that about 1,560 offices are located within the USAG Baumholder. The costs to have a recycling bin for paper at each of these offices was estimated to be 7 € per recycling bin. Thus a total of approximately 10,000 € must be invested to place the bins in the offices. To empty them in the recycling bins next to the office building is the responsibility of the staff.

The pay back period would be about one year.

5.6.5. Summary and Recommendation

The benefit to increase the recycling of paper and cardboard goes in two directions. The reduction of residual waste amounts are under the current solid waste contract of 93.7 €/t. The increase of recyclable paper and cardboard amount brings the earnings to 21.5 €/t under the current contract. Earnings for each ton of paper and cardboard are 73.2 €/t. To enforce the recycling efforts in the units/office buildings it is recommended to start an informational campaign. To provide a complete picture, the campaign should not only inform about the benefits of paper and cardboard recycling, but also the benefits of general recycling should be considered.

5.7. End-of live Tires recycling

5.7.1. Introduction

The disposal of tires that are no longer useful can be quite problematic due to the varying physical and chemical properties of worn tires, such as form, consistence, and flammability. This P2 opportunity assessment will focus on used tires from POVs disposed of at the recycling point managed by the refuse collection team only. Tires from military vehicles are a special case and require strict adherence to military guidelines and SOPs.

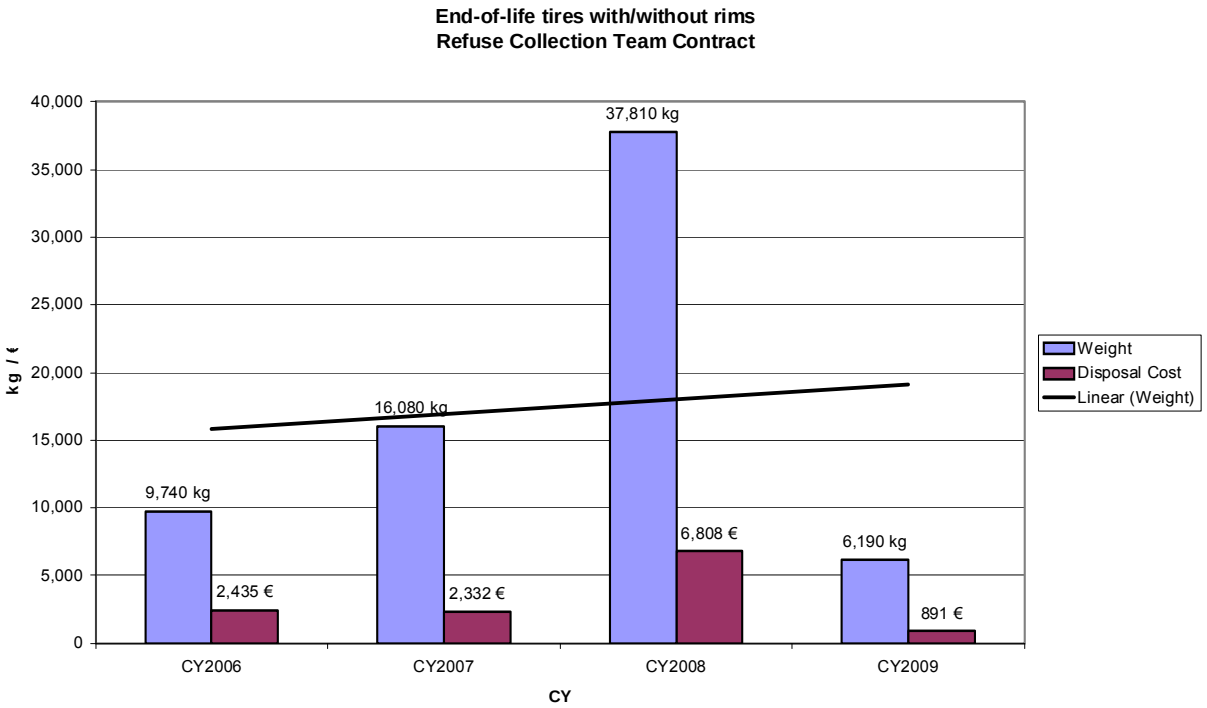
The refuse collection team recycling point accepts and stores used tires, with or without rims, from their customers. The tires are then disposed of as waste under the DRMO HW contract, and then sent to a recycling facility.

The biggest portions of these end-of-life tires are the ones that have rims. Unfortunately, there is no possibility to separate the rubber from the metal at the recycling point. Disposal costs for the tires can be reduced and the user is able to receive money for the metal of the rims. Therefore, it is an opportunity not only to save money but also divert the waste streams.

5.7.2. Baseline

Figure 5-M shows the amounts and costs for the end-of-live tires managed by the refuse collection team.

Figure 5-M Weights and Costs of end-of-life Tires



DPW staff from the Refuse Sort Center tested the weight of the tires and the rims. They concluded that the relation between the weight of the tires and the rims is about 50%.

5.7.3. Goals

The following goals drive the used tire recycling PPOA for the USAG Baumholder:

- Reduce quantity of HW generated (EO 13432, IMA-Europe MoM)
- Increase amount of recyclables (EO 13432)
- Reduce cost of HW management program

5.7.4. Technical, Environmental, and Economic Feasibilities

Based on this information and the disposal values from October 2008 to September 2009 the following calculation was made.

Table 5-17 Calculation Example for the Segregation of Tires and Rimes to use more cost effective Waste Streams

	Oct 08-Sept 09	Costs per ton		Oct 08-Sept 09
Tires Rate in [t] with or without Rims (Metal)	13.2 t	- 75 €/t	Tires Disposal Costs in [€] with or without Rims	-987 €
50% Tires	6.6 t	- 75 €/t	Disposal Costs for the Tires	-494 €
50% Metal	6.6 t	+ 90 €/t	Disposal Costs for the Rims	592 €
			Total	1085 €

Investment for an automatic tire removal machine would be approximately 1000 €.

The pay back period for the investment is about one year.

5.7.5. Summary and Recommendation

Better management practices, such as separating tires from rims, will result in a reduction of tire waste and corresponding disposal costs.

The calculation above confirmed that the investment for an automatic tire removal machine would be beneficial to the USAG Baumholder. The used tires should be taken off the rims. Since disposal costs are determined by weight, rims can add a tremendous amount of mass thereby increasing the tire disposal costs. As an additional benefit, metal rims are very valuable as a resource and can be turned in at no charge to DRMO for scrap metal recycling.

5.8. High efficiency Heating Pumps

5.8.1. Introduction

The DPW utilities have started to replace old heating pumps with new, high efficiency pumps. In real terms, these pumps are up to 80% more efficient than the standard fixed speed pumps. With high energy costs, these replacements represent huge energy savings.

There is minimal awareness regarding the amount of energy that is required for the pumps. The advantage of heating controls is that the heat and energy can be turned off or turned down when it's not needed. High efficiency pumps also have the advantageous capability to operate and consume energy only when needed. Compared to pumps that operate all the time, savings on energy consumption can be made.

There is a large number of old, uncontrolled pumps and circulators operating on heating systems at the garrison – using far too much electricity than is really necessary in this day and age.

5.8.2. Baseline

One of the biggest consumers of energy in the buildings is the numerous pumps used in HVAC systems. Currently, about 2400 old heating pumps are installed. During the course of replacement, about 350 old pumps have been exchanged with new high efficiency pumps. The complete overview of the pumps installed at the garrison can be seen in **Table 5-18**.

Table 5-18 Installed heating pumps and energy consumption vs. installation of high efficiency pumps

Amount of installed Pumps	Installed Pump	[KW/H]	high efficiency pump replacement	[KW/H]	Pump rate [m²/h]	Adjusted lifting height of the pump [m]	Savings [KW] per Pump	Total savings	Runtime hours/yr.	Savings kWh per year	Savings CO^2 kg/year
15	Wilo Pumpe D - 30	0.074	Stratos ECO 30/1-5	0.020	2.000	0.650	0.054	0.810	6000	4860	2527
11	Wilo Pumpe D - 40	0.074	Stratos 25/1-6	0.020	3.000	0.800	0.054	0.594	6000	3564	1853
15	Wilo Pumpe D - 50	0.083	Stratos 30/1-6	0.040	5.000	0.600	0.043	0.645	6000	3870	2012
8	Wilo Pumpe DOS 32/80	0.150	Stratos D 32/1-8	0.100	2.500	4.000	0.050	0.400	6000	2400	1248
5	Wilo Pumpe DOS 40/90	0.220	Stratos D 40/1-8	0.130	4.000	4.500	0.090	0.450	6000	2700	1404
9	Wilo Pumpe DOS 50/100	0.420	Stratos D 50/1-9	0.280	8.000	5.000	0.140	1.260	6000	7560	3931
25	Wilo Pumpe P 100/200	2.750	IL100/170	1.450	40.000	8.000	1.300	32.500	6000	195000	101400
48	Wilo Pumpe P 40/100	0.150	Stratos 40/1-4	0.055	5.000	2.200	0.095	4.560	6000	27360	14227
19	Wilo Pumpe P 40/160	0.250	Stratos 40/1-8	0.120	4.000	4.500	0.130	2.470	6000	14820	7706
27	Wilo Pumpe P 50/125	0.270	Stratos 50/1-8	0.110	9.000	2.600	0.160	4.320	6000	25920	13478
18	Wilo Pumpe P 50/160	0.480	Stratos 50/1-9	0.220	9.000	4.800	0.260	4.680	6000	28080	14602
3	Wilo Pumpe P 65/125	0.400	Stratos 65/1-9	0.250	15.000	3.800	0.150	0.450	6000	2700	1404
2	Wilo Pumpe P 65/160	0.700	Stratos 65/1-9	0.355	15.000	5.600	0.345	0.690	6000	4140	2153
2	Wilo Pumpe P 80/125	0.550	Stratos 80/1-12	0.320	20.000	3.800	0.230	0.460	6000	2760	1435
98	Wilo Pumpe RP 30/100	0.130	Stratos 30/1-8	0.040	3.000	2.400	0.090	8.820	6000	52920	27518
102	Wilo Pumpe RS 25/60	0.080	Stratos 25/1-5	0.035	2.000	3.000	0.045	4.590	6000	27540	14321
12	Wilo Pumpe RS 25/70	0.100	Stratos 25/1-5	0.035	2.000	3.000	0.065	0.780	6000	4680	2434
30	Wilo Pumpe RS 25/80	0.175	Stratos 25/1-8	0.083	2.500	5.000	0.092	2.760	6000	16560	8611
15	Wilo Pumpe RS 30/100	0.300	Stratos 30/1-12	0.175	3.000	9.000	0.125	1.875	6000	11250	5850
14	Wilo Pumpe RS 30/70	0.100	Stratos ECO 30/1-5	0.055	2.000	3.000	0.045	0.630	6000	3780	1966
25	Wilo Pumpe RS 30/80	0.165	Stratos 30/1-8	0.090	3.500	5.000	0.075	1.875	6000	11250	5850
6	Wilo Pumpe S 40/80	0.150	Stratos 40/1-4	0.100	4.000	4.000	0.050	0.300	6000	1800	936

Amount of installed Pumps	Installed Pump	[KW/H]	high efficiency pump replacement	[KW/H]	Pump rate [m²/h]	Adjusted lifting height of the pump [m]	Savings [KW] per Pump	Total savings	Runtime hours/yr.	Savings kWh per year	Savings CO^2 kg/year
36	Wilo Pumpe S 40/90	0.280	Stratos 40/1-8	0.200	6.000	6.000	0.080	2.880	6000	17280	8986
4	Wilo Pumpe S 50/100	0.550	Stratos 50/1-9	0.266	8.000	6.000	0.284	1.136	6000	6816	3544
3	Wilo Pumpe S 50/80	0.250	Stratos 50/1-8	0.180	5.000	6.000	0.070	0.210	6000	1260	655
115	Wilo Pumpe Z - 15	0.020	*Star Z Nova ab Sept 09*	0.004	0.200	0.750	0.016	1.840	6000	11040	5741
296	Wilo Pumpe Z - 20/1	0.038	Stratos ECO Z-25 /1-5	0.009	0.750	0.900	0.029	8.584	6000	51504	26782
512	Wilo Pumpe Z - 25/2	0.050	Stratos ECO Z-25/1-5	0.022	1.500	1.500	0.028	14.336	6000	86016	44728
69	Wilo Pumpe Z - 30 /7	0.270	Stratos Z-30/1-8	0.060	3.000	3.800	0.210	14.490	6000	86940	45209
35	Wilo Pumpe Star E 25/1-5	0.070	Stratos ECO 25/1-5	0.055	1.500	3.800	0.015	0.525	6000	3150	1638
42	Wilo Pumpe Star E 30/1-5	0.070	Stratos ECO 30/1-5	0.055	1.500	3.800	0.015	0.630	6000	3780	1966
243	Wilo Pumpe TOP E 40/1-10	0.250	Stratos 40/1-12	0.150	6.000	5.000	0.100	24.300	6000	145800	75816
425	Wilo Pumpe TOP E 50/1-7	0.320	Stratos 50/1-9	0.220	8.000	5.000	0.100	42.500	6000	255000	132600
118	Wilo Pumpe TOP E 50/1-10	0.320	Stratos 50/1-12	0.220	8.000	5.000	0.100	11.800	6000	70800	36816
169	Wilo Pumpe TOP E 65/1-10	0.500	Stratos 65/1-12	0.380	12.000	5.000	0.120	20.280	6000	121680	63274
5	Wilo Pumpe TOP E 80/1-10	0.900	Stratos 80/1-12	0.600	27.000	5.000	0.300	1.500	6000	9000	4680
154	Wilo Pumpe Top S 50/7	0.420	Stratos 50/1-9	0.285	12.000	5.000	0.135	20.790	6000	124740	64865
2,735										**1,450,320**	**754,166**

5.8.3. Goals

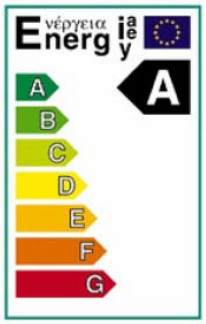
The following goal drives the high efficiency heating pumps PPOA for the USAG Baumholder:

- Reduce energy intensity (EO 13423)

5.8.4. Technical Feasibility

The main supplier of pumps at the garrison comes from the company WILO. The pumps are used for various secondary hot water circulation systems and hot water heating systems. Since WILO now offers high efficiency pumps, replacing the old pumps does not pose any technical problems. When replacing the pumps, different factors need to be considered. If necessary, the hydraulic conditions of the building need to be considered and updated. The heating controls must also be adjusted to the needs of the building usage. Furthermore, the thermal insulation must to be checked and upgraded if necessary. If there are major deficiencies at these aforementioned points, they must initially be resolved in order to avoid oversized pumps from being installed.

5.8.5. Environmental Feasibility



Variable speed drives are used to regulate the speed of the electric motor driving the pump. According to the European energy efficiency rating system, WILO developed an 'A' rated pump using regulated speed technology. This technique offers about 80% energy consumption reduction for standard uncontrolled pumps. Besides the reduction of energy consumption, the reduction of carbon dioxide production is an added environmental benefit.

5.8.6. Economic Feasibility

Table 5-18 shows the inventory of all pumps installed at the garrison prior to the start of the replacement campaign. It also shows the proposed high efficiency pump for replacement and the corresponding energy and carbon dioxide savings. For carbon dioxide, the assumption was made that one kWh causes 0.52 kg carbon dioxide emissions.

With 350 pumps already replaced, energy savings of 82,000 kWh/yr was realized. By replacing the remaining 2400 conventional pumps, the potential for further savings is estimated to be about 1,318,000 kWh/yr (see **Table 5-18)**.

The following calculation examples are for smaller heating pumps and their use in the garrison. The costs for an existing "conventional" pump vs. an adequate, high efficiency replacement are shown.

Table 5-19 Conventional heating pumps vs. high efficiency pumps

Pump status	Type	Costs per Pump [€]	Energy demand* [kWh/yr]	Costs** According German Marked [€/a]	Costs*** According prices for Army Installations [€/a]	Savings**** [€/a] and pay back period
existing	TOP-S 40/7	364	1,852.0	407.34	222.24	167 €/yr.
High efficiency pump replacement	Stratos 40/1-8	783	460.2	101.25	55.22	2.5 yrs
existing	P40/100r	482	1,061.0	233.42	127.32	107 €/yr.
High efficiency pump replacement	Stratos 40/1-4	451	170.7	37.55	20.48	Immediate pay back, since new pump is cheaper

* run time 6000 hours/years

** electricity costs on the German marked, 0.22 €/kWh,

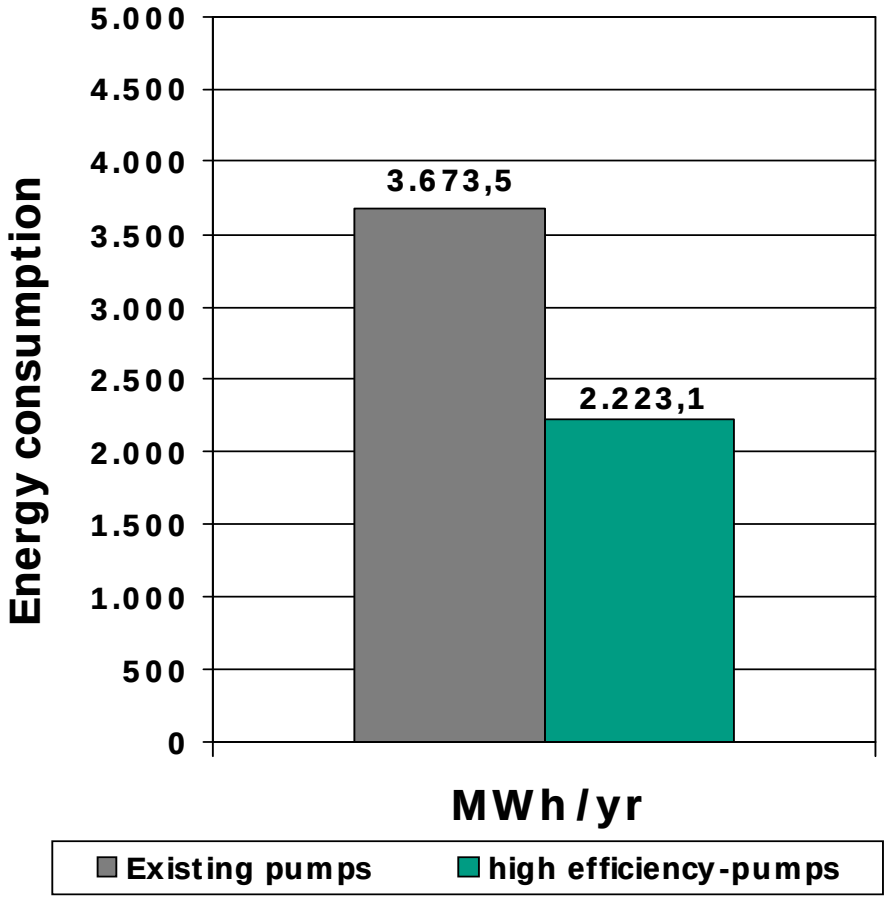
*** electricity costs for the USAG Baumholder, 0.12 €/kWh

****savings electricity prices for the garrison

The pay back period for a high efficiency pump, i.e. Stratos 40/1-8 was calculated to be 2.5 years. For the second example, the investment cost for the high efficiency pump is even lower than buying a conventional pump.

Potential savings at the USAG Baumholder from replacing all old heating pumps with new high efficiency pumps can be seen in **Figure 5-N**.

Figure 5-N Potential savings with the installation of high efficiency pumps



From the installation of high efficiency pumps, the potential energy savings is about 1,450.4 MWh/yr. With the assumption of 0.12 €/kWh, the annual savings is more than 174,000 €/yr.

5.8.7. Summary and Recommendation

Continuing to replace the existing heating pumps with high efficiency heating pumps is a relevant P2 tool for the garrison. The advantages of this new technique are the reduction of energy consumption, the reduction of energy costs and the reduction of carbon monoxide. At a minimum, defective pumps must be replaced with high efficiency pumps. Buildings with huge heating demands should be a higher priority since the new technology is more effective in these buildings.

5.9. Water-Efficient Fixtures

5.9.1. Introduction

The use of water-efficient faucets and showerheads help the garrison meet its water conservation goals. Federal guidelines mandate that lavatory and kitchen faucets use no more than 2.2 gallons per minute (gpm). In addition, the FEMP requests Federal Agencies to purchase showerheads with flow rates of 2.2 gpm or less. The EPA WaterSense Program requires residential bathroom lavatory faucets to have a maximum flow rate of 1.5 gpm. According to the FEMP a flow rate of 0.5 gpm should suffice for public restroom faucets. The FEMP recommends using faucets with flow rates of 0.5 gpm or less in public restrooms.

5.9.2. Baseline – Water-Efficient Fixtures

The USAG Baumholder is in the process of replacing old faucets with energy and water efficient variants, which are called the “Mora ESS” faucets with the “Turbo-Jet” function. There is no specific replacement campaign, but the replacements are continuously made by the DPW Plumber Shop when called for maintenance or repair. Between November 2007 and July 2009 a total of 422 faucets had been replaced in troop accommodations and 237 in housing. All newly constructed or renovated buildings are being equipped with the new technology.

Table 5-20 shows the values of conventional and Mora faucets used by the USAG Baumholder. This table indicates that the housing sector is well equipped with the new faucets, though a significant number of faucets in the troop accommodations are still using the inefficient conventional types.

Table 5-20 Replacement Status Faucets and Showerheads

Status: 1 Jul 09				
Location/Room	**Total**	**Mora**	**%**	**Comments**
Housing				
Kitchen sinks	1,497	1,314	**88%**	
Wash basins	1,700	1,263	**74%**	
Bath tubs	1,700	1,274	**75%**	
Showers			**100%**	
Troop accommodations				
Kitchen sinks/Other sinks	698	141	**20%**	+ 22 non wall-mounted mixers, no data for total available
Wash basins	1,881	222	**12%**	
Showers	1,019	26	**3%**	
Bath tubs	224	11	**5%**	
No data available for office buildings, hospital, motor pools, and others				

5.9.3. Goals

The following goals drive the water-efficient fixtures PPOA for the USAG Baumholder:

- Reduce the water consumption intensity beginning in fiscal year 2008, relative to the baseline of the agency's water consumption in fiscal year 2007, through life-cycle cost-effective measures by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015 (EO 13423)
- Reduce energy consumption (EO 13423)
- Reduce wastewater generation

5.9.4. Technical Feasibility

The new faucets have a dual-flow cartridge ("Turbo-Jet"), i.e. for the wash basin in the normal handle position the flow rate is 6 lpm (1.6 gpm) at 3 bar. The flow can be increased to 12 lpm (3.2 gpm) by pushing the handle further and holding it in place. From this second position the handle spring-returns when released. This faucet should meet the US requirement, as the standard flow is below 2.2 gpm

and near 1.5 gpm. This dual-flow cartridge is currently not used for the kitchen sinks, since it is assumed that the kitchen faucets are used to fill the sink with water and not for just rinsing. Hence a flow reduction would not lead to water savings but only increase the time needed to fill the sink. The showerheads (Mora) have a flow rate of 15 lpm (4 gpm) at 3 bar, i.e. similar to standard products. Additional flow restrictors are currently not installed, since it is believed that lowering the flow further would result in an inconvenience. There is no activity to equip public restrooms with 0.5 gpm faucets. Assuming that there are 300 public restroom faucets on base, each used 20 times per day for 20 seconds per wash, a flow reduction to 0.5 gpm (reduction by 31% compared to "Mora ESS" faucets) would lead to savings of 4 cbm/year, which is negligible compared to the baseline.

5.9.5. Environmental and Economic Feasibility

As a desired side effect, the "Mora ESS" faucets used for washing basins are designed to save energy by altering the mixing positions of hot and cold water (cold in center position).

The total number of conventional wash basins is 2,096 (59%). The water consumption out of these wash basins is estimated as follows:

Table 5-21 Water Consumption at Wash Basins at Troops and Housing

	Persons	[lpcd]	[cbm/d]	Comments
Troops + families	10,000	40	400	Statistical average drawn from faucets in U.S. per capo
Others	1,950	7	13.65	
Total (would be drawn, if only conventional type faucets)			**413.65**	
May actually been drawn from conventional type		59%	**242.11**	

Potential maximum savings with Mora fixtures are about 50 %. The estimated actual savings are assumed to be 40 %. These savings would result as follows:

Table 5-22 Water Consumption Savings with Mora Fixtures installed at Wash Basins for Troops and Housing

	cbm/d	cbm/yr	Savings [%]	Comments
Potential savings max. 50%	121	44,186	3.2%	of non-deployment baseline
Estimate actual savings 40%	97	35,349	2.6%	of non-deployment baseline

By replacing the remaining conventional type wash basin faucets, 2-3% potable water can be saved compared with the non-deployment baseline.

5.9.6. Summary and Recommendation

According to the Water Conservation Plan the potable water production costs are as follows

With production cost as follows:		
Electricity	0.171	€/cbm
Chemicals	0.796	€/cbm
Sludge excavation/disposal	0.017	€/cbm
Sum variable costs	**0.984**	**€/cbm**
Labor	770,000	€/yr
Supplies, not chemicals	86,000	€/yr
Heating oil	23,000	€/yr
Maintenance contracts	72,830	€/yr
Bigger maintenance, repair and upgrade projects, at least	80,000	€/yr
Sum fixed costs	**1,031,830**	**€/yr**

With a total amount of 1.029,229 cbm/yr for CY 2009 the fixed cost can be distributed to the water production as follows:

1,031,830 [€/yr] /1,029,229 [cbm/yr] = 1 €/cbm

For a rough estimate it is assumed that the production costs are 2 €/cbm. Savings of 3 % of the non-deployment baseline (1,363,166 cbm/yr) are about 40,900 cbm/yr. These would result in cost savings of about 80,000 €/yr.

The installation of water-efficient fixtures is a beneficial opportunity for the USAG Baumholder to reduce the water consumption. Therefore the replacement of standard wash basin faucets with water and energy efficient variants must be continued.

To ensure the proper functioning of replaced faucets, maintenance must be performed through routine inspections. The custodial crews and users must be encouraged to report problems to eliminate malfunctions immediately.

Appendix A - References

Regulations and Guidance

Army Regulation 200-1 (February 2007): Environmental Protection and Enhancement

Army in Europe Regulation 200-1 (October 2007): Army in Europe Environmental Quality Program

Army Regulation 420-1 (February 2008): Army Facilities Management

Army Regulation 420-49 (September 2005): Utility Services

DoD Instruction 4715.4 (June 1996): Pollution Prevention

DoD Memorandum (May 1998): New DoD P2 Measure of Merit

Executive Order 13423 (January 2007): Strengthening Federal Environmental, Energy, and Transportation Management

Executive Order 13514 (October 2009): Federal Leadership in Environmental, Energy, and Economic Performance

Guidance for Developing Army Pollution Prevention Plans (June 2001)

Pollution Prevention Act (1990): 42 U.S.C. 13101-13109

Sample Text for Army Pollution Prevention Plans (June 2001)

U.S. Department of Defense (January 2003): Environmental Final Governing Standards – Germany

Literature

(September 2005): Pollution Prevention (P2) Plan

(October 2004): Ozone Depleting Chemical (ODC) Elimination Plan

(October 2004): ODC Survey Update

(July 2007): Air Emissions Survey and Assessment for the USAG Baumholder

(January 2009): Potable Water System Master Plan

(November 2009): Water Conservation Plan

(September 2007), Air Emission Inventory Report for the USAG Baumholder

URS International (2009), Water Conservation Plan for the USAG Baumholder

Appendix B - Definitions

Appendix C - List of Acronyms

Acronyms and Abbreviations

1-84 FA	
2-18 IN	2nd Brigade, 18th Infantry Regiment
3-4 IN	3rd Brigade, 4th Infantry Regiment
21st TSC	21st Theater Sustainment Command
24th BSB	24th Brigade Support Battalion
4-70 AR	4th Battalion, 70th Armor
502d MI Co	502nd Military Intelligence Company
589th SIG Co	589th Signal Company
40th EN	40th Engineers
92d MP Company	92nd Military Police Company
AAFES	Army and Air Force Exchange Service
AFV	Alternative Fueled Vehicle
AP	Affirmative Procurement
AR	Army Regulation
AST	aboveground storage tank
AUL	Authorized Use List
BMP	Best Management Practice
BN	Battalion
BSB	Brigade Support Battalion
CA	Corrective Action
C&D	construction and demolition
CDC	Child Development Center
CEQ	Council on Environmental Quality
CFC	chlorofluorocarbon
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CO	carbon monoxide
CO_2	carbon dioxide
CPG	Comprehensive Procurement Guidelines
CY	calendar year
DA	Department of the Army
DCA	Directorate of Community Activities
DeCA	Defense Commissary Agency
Delta Det, 208th Finance	
DoD	U.S. Department of Defense
DoDD	Department of Defense Dependent
DOL	Directorate of Logistics
DPW	Directorate of Public Works
DRMO	Defense Reutilization and Marketing Office
EO	Environmental Officer

EO	Executive Order
ECAR	Environmental Compliance Assessment Report
ECAS	Environmental Compliance Assessment System
ED	Environmental Division
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
EPAR	Environmental Performance Assessment Report
EPAS	Environmental Performance Assessment System
EPP	Environmentally Preferable Purchasing
EPR	Environmental Program Requirements
EP&S	Engineering Plans and Services
EQ	Environmental Quality
EQCC	Environmental Quality Control Committee
EQR	Environmental Quality Report
ERMS	Environmental Requirements Management System
FEMP	Federal Energy Management Program
FY	fiscal year
gal	gallon(s)
GFGS	German Final Governing Standards
gpm	gallons per minute
GPP	Green Procurement Program
GSA	General Services Administration
HEL	Heating Oil Extra Light (fuel oil)
HM	hazardous material(s)
HMCC	Hazardous Materials Control Center
HMMS	Hazardous Materials Management System
hp	horsepower
HQ	Headquarters
HSG	housing
HMMS	Hazardous Material Management System
HMSP	Hazardous Material Storage Point
HVAC	Heating, Ventilation, Air Conditioning
HW	hazardous waste
HWAP	Hazardous Waste Accumulation Point
HWSA	Hazardous Waste Storage Area
ICAP	Installation Corrective Action Plan
IFMS	Interagency Fleet Management System
IMCOM-Europe	Installation Management Command – Europe Region Office
IMPAC	International Merchants Purchase Authorization Card
IN	Infantry
ISR	Installation Status Report
kg	kilogram(s)

kW	kilowatt
kWh	kilowatt hour
lpm	liter(s) per minutes
L	liter(s)
m^3	cubic meter(s)
MACOM	Major Command
mg/L	milligrams per liter
mgd	million gallons per day
MoM	Measure of Merit
mpg	miles per gallon
MLC	Mannheim Laboratory Center
mW	megawatt
MWR	Morale, Welfare and Recreation
N/A	not applicable
NATO	North Atlantic Treaty Organization
NCOIC	non-commissioned officer in charge
ND	no data available
NO	nitrogen monoxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides / oxides of nitrogen
NSN	National Stock Number
OCS	Oil Contaminated Solids
ODC	ozone depleting chemical
ODS	ozone depleting substance (equivalent to ODC)
OEBGD	Overseas Environmental Baseline Guidance Document
OIE	Obersteiner-Idaer Elektrizitäts-Aktiengesellschaft
OMA	Operation Maintenance Army
P2	pollution prevention
PAO	Public Affairs Office
PBO	Property Book Office
PCB	polychlorinated biphenyl
PCT	polychlorinated terphenyl
PIH	Plugin hybrid
POC	point of contact
POL	petroleum, oil, and lubricants
POV	personally owned vehicle
PPA	Pollution Prevention Act
ppm	parts per million
PPOA	Pollution Prevention Opportunity Assessment
RMAN	Recovered Materials Advisory Notice
SO_2	sulfur dioxide
SO_3	sulfur trioxide

SO_x	sulfur oxides / oxides of sulfur
SOP	Standard Operating Procedure
SORT	Separate or Recycle Trash
SSA	Supply Support Activities
SSSC	Self Service Supply Centers
STEP	Status Tool for Environmental Program
SWAR	Solid Waste Annual Report
SWARS	Solid Waste Annual Reporting System
SWPPP	Storm Water Pollution Prevention Plan
TBD	To be determinate
TMP	Transportation Motor Pool
U.S.C.	United States Code
USAEC	U.S. Army Environmental Center
USAFE Det 2 1st ASOS	
USAG	U.S. Army Garrison
USAREUR	U.S. Army Europe
USAPHC	U.S. Army Public Health Command
UST	underground storage tank
VOC	volatile organic compound
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Appendix D - USAG Baumholder Environmental Policy Statement

DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON BAUMHOLDER
UNIT 23746
APO AE 09034-0003

REPLY TO
ATTENTION OF

14 JUL 2010

IMEU-BMH-ZA

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Policy Letter 3-1, Sustainable Environmental Management System (SEMS)

1. References:

a. Executive Order 13423, 24 January 2007, subject: Strengthening Federal Environmental, Energy, and Transportation Management.

b. Memorandum ACSIM, DAIM-ZA, 10 July 2003, subject: Army Environmental Management System Policy.

c. Memorandum DAIM-ED-C, 6 August 2001, subject: New Installation Management Requirements.

2. Purpose: To establish a USAG Baumholder Sustainable Environmental Management System (SEMS) policy.

3. Applicability: This Environmental Policy applies to all civilian and military personnel working for or on behalf of the USAG Baumholder, to include host and tenant organization, residents, and contractors.

4. Policy: The US Army Garrison (USAG) Baumholder's mission is to conduct garrison operations daily, providing installation management programs and services for Soldiers, their Family members, and civilians. We are dedicated to continued improvement of our processes and to reduce environmental impacts through pollution prevention, waste reduction, restoration activities, and efficient resource use to ensure environmental compliance. In accomplishing our mission, we commit to:

a. Incorporate environmental commitments into applicable policies, programs, and contracts.

b. Build environmental budgets that address current and future requirements.

c. Encourage an environmental awareness culture across the garrison.

d. Comply with all applicable environmental policies, laws and regulations.

IMEU-BMH-ZA
SUBJECT: Policy Letter 3-1, Sustainable Environmental Management System (SEMS)

e. Continually assess activities, products, and services to determine their effect on the environment. Identify significant environmental impacts ensuring their consideration when establishing objectives and targets in our environmental management programs.

f. Documenting, implementing, and maintaining an efficient and effective SEMS that is communicated to everyone working for or on behalf of the organization.

g. Achieve continuous improvements in environmental performance.

h. Strive to sustain a fully conformant ISO 14001 SEMS.

i. Continue partnerships with Host Nation to further common environmental objectives.

5. The Baumholder Military Community is committed to the highest standards of environmental protection. We will operate in a manner that is compatible with the long-term sustainability of the ecosystems that we affect while maintaining environmental compliance. We believe that environmental stewardship is an essential component of sound military performance and is the responsibility of all personnel.

6. Supervisors and commanders will ensure that this policy is communicated in directorate shops, work areas, and offices. This policy is also available on the USAG Baumholder website at http://www.baumholder.army.mil/sites/directorates/pw.asp.

7. Points of contact for this policy letter are Mr. Dominic Mutinda, Chief, Environmental Division, DPW, DSN 485-6146, E-mail: Dominic.Mutinda@eur.army.mil or Ms. C.J. Black, EMSMR, PAIO Office, DSN 485-6166, E-mail: Coleen.Black@eur.army.mil.

SAM R. McADOO
LTC, SC
Commanding

DISTRIBUTION:
BMH-A

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Appendix E - Tables and Figures

Tables

Figures

0. POLLUTION PREVENTION PROGRAM AREAS TABLES AND FIGURES

HAZARDOUS MATERIALS (HM)

Table 0-1 Motor pools - Overall Hazardous Material List according to the SSA

NSN	*Description*	*Remarks*
6830-01-512-8735	Nitrogen, Technical	Gas
6830-01-512-8721	Carbon Dioxide, Technical	Gas
6830-01-512-8797	Argon, Technical	Gas
6830-01-512-8997	Helium, Technical	Gas
6830-01-512-9014	Hydrogen, Technical	Gas
2910-00-646-9727	Cylinder, Engine Starter	Gas
7930-01-411-9794	Dust Remover Compress	Gas
9150-01-439-0756	Lubrication Oil, Air	
9150-00-944-8953	Grease, Aircraft GP WD	
9150-01-496-1946	Lubrication Oil, Eng.	
9150-01-053-6688	Cleaner, Lubricant A	
9150-01-197-7692	Grease, Automotive A	
6850-01-464-9137	Antifreeze	
9150-01-035-5393	Lubrication Oil, GEA	
9150-00-657-4959	Hydraulic Fluid, AUT	
6140-01-446-9498	Battery, Storage	

Table 0-2 SSSC - Hazardous Material Consumption 2009 - 2010

NSN	*Description*	*Amount*	*Unit*	*Critical ingredients*	*Attributes*
020-2806	COR.FLUID	176	EA		
024-6988	SUPER GLUE	107	EA		
7930-00-184-9423	GLASS CLEANER	13	EA		F
7930-01-306-8369	SIMPLE GREEN	24	BT From October 2009	2-Butoxyethanol	Xn, Xi
6840-01-342-4143	PINE OIL	18	BT		F
359-9206	DEODORANT	14	EA		
359-9211	SCREEN CLEANER	22	BT		
359-9214	SCALE A WAY	3	BT		
7930-01-359-9229	SCUM CLEANER	5	BT		Xi
7930-01-360-8019	CAL SUD	18	BT		
363-2818	BLASTOFF	21	BT		
368-4787	ZEP AIR MIST	18	CN		
368-4789	ZEP AIR MIST	30	CN		
381-3491	LEMON PLEDGE	25	CN		
7930-01-381-3499	WINDEX	296	BT	Isopropanol	F
398-2473	DUST REMOVER	267	CN		
413-9291	ADHESIVE SPRAY	18	CN		

NSN	*Description*	*Amount*	*Unit*	*Critical ingredients*	*Attributes*
7930-01-418-1499	CARPET & ROOM DEODORIZER	10	CN		Xi
418-9008	WD 40	96	CN		
419-5178	TOWLETTES	NUMBER CHANGE/ NO RECORDS			
429-5864	ZEP AIR MIST	39	CN		
8030-01-438-4109	CLEANER ARMOR ALL	21	BT		Xi
7930-00-459-2247	OVEN CLEANER	201	CN	Sodium hydroxide, lime potash	C, F
461-8589	GLUE PEN	41	EA		
7930-01-469-2433	SUPER DEGREASER STARPOWER	31	BT		Xi
6840-00-584-3129	PINE OIL	44	BT		F
721-6055	DEODORANT	57	CN		
826-4798	BATTERY	309	PG		
835-7210	BATTERY	85	PG		
7930-00-880-4454	DISHWASH COMP	611	BT	Benzene sulfonic acid	Xi
6810-NP-888-2116	BLEACH	239	CN	Sodium hydroxide, sodium carbonate, sodium phosphate	Xi, C

NSN	*Description*	*Amount*	*Unit*	*Critical ingredients*	*Attributes*
900-2139	BATTERY	58	PG		
6850-00-926-2275	WINDSHIELD CL	58	BT	Methanol	T, F
7930-00-926-5280	DETERGENT	94	BT		F
985-7845	BATTERY	524	PG		
985-7846	BATTERY	61	PG		
ECOLAB					
7930-01-152-7072	DISHWASHING DETERGENT RED BOTTLE 9#BOTTLE	390	BT	Ethylene glycol	Xn
7930-01-177-5119	DISHWASHING DETERGENT BLUE BOTTLE SOLITAIRE	163	BT	Ethylene glycol	Xn
888-4540	RINSE CLEAR	98	BT		
888-4950	DISHW. TUMPRA SUPRA	38	BT		
7930-01-AN4-0145	SPRAY CLEANER	233	CN		F
7930-01-AN4-0230	GREASETRIP	78	BT	Nitric acid	C
7930-01-AN4-0695	TAXAT PROFI	6	BG		Xi

NSN	*Description*	*Amount*	*Unit*	*Critical ingredients*	*Attributes*
V04-2088	STAINLESS STEEL POLISH CL.	178	CN		
FLORE CHEMIE					
888-2113	WIPES TOWLETTES	1	BG		
888-7552	SMELLEX	24	BT from October 2009		
7930-01-AN4-0052	ACRYLY SUPER	0		Butyldiglycol	Xi
7930-01-AN4-0127	LISAN	7	BT FROM SEP. 2009		
AN4-0128	FLORE PERFEKT	22	BT		
7930-01-AN4-0140	CLEAR DRY EC	0			
7930-01-AN4-0143	LIMEX	0		Phosphoric acid	C
AN4-0221	WINDOW CLEANER	1	BT		
AN4-0224	FLUESAN	659	BT		
7930-01-AN4-0225	FLAMIL 75	233	BT	Sodium hydroxide	C
7930-01-AN4-0227	ZINK SPRAY	0			F
AN4-0413	AIR FRESHENER	19	CN		
7930-01-AN4-0691	MULTI PURP CL	26	BT		Xi
7930-01-AN4-0692	OVEN&GRILL CL	2	BT	Sodium hydroxide	C
6810-01-GSA-0005	FLAMIL EIS FREI	9	CO	Calcium chloride	Xi

Table 0-3 DPW Warehouse - Hazardous Material Inventory, according to NSNs

NSN	*Description*	*Remarks*
5610-00-V81-0565	ASPHALT,BITUMEN-VORANSTR10LTR	
5610-00-V81-0583	CEMENT,PORTLD GRAY 25 KG	
5610-00-V81-0651	FILLER,CER.TILE WHITE,5KG	
5610-00-V81-0654	FILLER,PLAST.INT.GYP.0.5K	
5610-00-V81-0656	FILLER,PLASTER.GYP.5 KG	
5610-00-V81-0703	CEMENT,MIX.POWDER,RACOFIX	
5610-00-V81-0733	MORTAR,MASONRY/PLASTERING	
5610-00-V81-4443	MORTAR,CER.TILES,GRAU,PCI-FT	
5610-00-V81-4448	FILLER,CER. TILES,GREY,5KG	
5610-00-V81-8809	ASPHALT PLASTIKOL-1 AIB	
5610-12-RWF-1257	COMPOUND,QUARZGRUND,WEISS	
5610-12-RWF-5011	MORTAR,GYPS.KNAUF ROTBAND-INTE	
5610-12-RWF-5014	CEMENT,PREMIX.FLOOR,0-8MM	
5610-12-RWF-5020	MORTAR,MARMORIT,UP 210W	
5610-12-RWF-5021	MORTAR,MARMORIT, SM 700	
5610-12-RWF-5025	FILLER,GYPSUM,UNIFLOTT,KNAUF	
5610-12-RWF-5026	MORTAR,MARMORIT,LUP-222	
5610-12-RWF-5029	MORTAR,MARMORIT,SP-260;3MM	
5610-12-RWF-5041	MORTAR,MARMORIT UP 310	
5610-12-RWF-5045	MORTAR,GRAU,PCI-FLEXMOERTEL	
5610-12-RWF-5055	MORTAR, PCI, MANHATTAN # 18	
5610-12-RWF-5059	MORTAR(REPAIR) PCI REPAFIX	
6810-12-RWF-1236	SODIUM CHLORIDE,25 KG	
6830-00-584-3041	PROPANE,95% PURE,400 GR.	

NSN	*Description*	*Remarks*
6850-00-973-9091	PENETRATING FLUID,CARAMBA,LIQU	
6850-00-V81-3215	LUBRICATING AND RUST DISSOLV.	
6850-00-V81-3216	PENETRATING OIL FOOD PLANT	
8010-00-160-5800	REMOVER PAINT ORGANIC SOLV	
8010-00-161-7425	PRIMER GRUNDIERFARBE	
8010-00-162-5289	THINNER,DOPE,NITRATE,3LI	
8010-00-246-6443	TURPENTINE,GUM SPIRITS,1G	
8010-00-290-6983	LACQUER, SPRAY CAN, WHITE	
8010-00-515-2487	LACQUER, ZWEIHORN, CLEAR	
8010-00-527-2045	ENAMEL,YELLOW #13538	
8010-00-582-5382	LACQUER BLACK JET 16 OZ CAN	
8010-00-584-3149	LACQUER,SPRAY,OLIVE DRAP	
8010-00-721-9750	LACQUER TY I/II LIGHTGRAY 1PT	
8010-00-900-2938	PAINT,TRAFFIC,WHITE,NON-REFLEC	
8010-00-900-3648	PAINT TRAFFIC YELLOW 5 GL CAN	
8010-00-V81-4055	HARDENER LACQUER SYNTHET. CLOU	
8010-12-RWF-1519	THINNER,CLEAR,F/TRAFFIC PAINT	
8030-00-V81-4509	CALKING SILI.WEISS,320ML,NOT P	
8030-00-V81-4511	CALKING SILI.SANDGRAU,320ML,	
8030-00-V81-4515	CALKING,SILI.TRANSP.310ML	
8030-00-V81-4519	FILLING,FLOOR,AUSGLEICHSMASSE	
8030-00-V81-4520	CORROSION PREV COMP COLD 400ML	
8030-00-V81-4550	SEALING CPD,JOINT/THREAD	
8030-00-V81-4584	CORROSION PREV COMP TYPE CPC	
8030-00-V81-4599	CALKING COMPOUND, BROWN, PAS	

NSN	Description	Remarks
8030-00-V81-4602	WOOD PRESE,LASUR,NUSSBAUM	
8030-00-V81-4613	SEALING COMP.MONTAGESCHAUM	
8030-00-V81-4614	WOOD PRESER.#931 NUSSBAUM	
8030-00-V81-4618	SEALING COMP.TRANSP.100ML	
8030-00-V81-4619	SEALING COMP.WEISS,200ML	
8030-12-RWF-5004	CLEANER,ROTANIUM SURFACE	
8030-12-RWF-5005	COMP.SEAL.ROTABOND,WHITE	
8030-12-RWF-5006	COMP.SEAL.ROTABOND,GRAY	
8030-12-RWF-5007	COMP.SEAL.ROTABOND,BLACK	
8030-12-RWF-5008	COMP.SEAL.ROTABOND,BROWN	
8030-12-RWF-5011	CALKING,SILI.BEIGE,310 ML	
8030-12-RWF-5023	CALKING COMP. MANHATTAN	
8040-00-V81-4911	ADHESIVE,PATTEX-COMPACT	
8040-00-V81-4940	ADHESIVE, FLOOR COVERING, SYNT	
8040-12-173-2029	ADHESIVE RUBBER SYNTH. 125GR	
9150-00-V01-6451	CUTTING FLUID METAL WORK	
9150-00-V81-6007	LUBRICANT, SILICON, MULTI.	
9150-00-V81-6009	LUBRICANT MULTIPURPOSE	

HAZARDOUS WASTE (HW)

Table 0-4 USAG Baumholder Hazardous Waste Streams Shipped in CY 2003, Sorted by EWC

EWC	Description	Annual waste generated 2003 / kg	Annual costs 2003 / $	Percentage by weight	Percentage by costs	Average
06 01 02*	CLEANING COMPOUNDS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUNDS, METAL CLEANERS, AND WAX	5,158.00	3,202.96	1.19	1.42	1.30
06 02 99	CHLORINE CONTAINING COMPOUNDS, LIQUID LAUNDRY BLEACH	466.00	823.63	0.11	0.37	0.24
06 04 04*	MERCURY & MERC. CONTAINING COMPOUNDS, VAPOR LAMPS, DENTAL AMALGAM	11.00	41.69	0.00	0.02	0.01
07 06 99	TALCUM POWDER	46.00	44.52	0.01	0.02	0.02
07 07 04*	DIETHYLENETRIAME	19,169.00	10,504.36	4.42	4.66	4.54
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	2,636.00	2,524.19	0.61	1.12	0.86
08 01 11*	PAINTS, NON-HALOGENATED	26,385.00	13,424.00	6.08	5.95	6.01
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	99.00	44.71	0.02	0.02	0.02
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	251.00	157.88	0.06	0.07	0.06
08 04 10	PUTTIES/FILLERS NON-HALOGENATED & HALOGENATED	1,491.00	1,154.32	0.34	0.51	0.43

EWC	Description	Annual waste generated 2003 / kg	Annual costs 2003 / $	Percentage by weight	Percentage by costs	Average
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	1,271.00	502.25	0.29	0.22	0.26
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	6,066.00	2,739.49	1.40	1.21	1.31
13 02 05*	WASTE OILS/FUELS	155,865.00	2,894.71	35.91	1.28	18.60
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	1,581.00	777.75	0.36	0.34	0.35
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	28,690.00	11,300.82	6.61	5.01	5.81
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	36,880.00	13,383.89	8.50	5.93	7.21
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	3,260.00	999.03	0.75	0.44	0.60
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	4,730.00	1,335.07	1.09	0.59	0.84
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	9,964.00	2,698.50	2.30	1.20	1.75
16 02 11*	REFRIGERATORS, SMALL 90X70X60CM	130.00	3,963.71	0.03	1.76	0.89
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	42,661.00	93,307.59	9.83	41.35	25.59
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	3,247.00	3,696.89	0.75	1.64	1.19

EWC	Description	Annual waste generated 2003 / kg	Annual costs 2003 / $	Percentage by weight	Percentage by costs	Average
16 05 07*	CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	3,297.00	3,689.56	0.76	1.64	1.20
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	5,304.00	0.00	1.22	0.00	0.61
16 06 02*	BATTERIES, NICAD	1,655.00	987.66	0.38	0.44	0.41
16 06 04	BATTERIES, DRYCELL MIXED	9,862.00	4,178.24	2.27	1.85	2.06
16 06 06*	BATTERY ACID	3,919.00	1,675.06	0.90	0.74	0.82
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	4,420.00	962.42	1.02	0.43	0.72
17 03 03*	TAR/BITUMENT/ASPHALT	53,450.00	16,358.89	12.31	7.25	9.78
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, LIQUID	443.00	407.27	0.10	0.18	0.14
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	1,577.00	1,246.81	0.36	0.55	0.46
20 01 35*	REFRIGERATORS, (PARTS)<=250 CM HIGH	50.00	26,612.90	0.01	11.79	5.90
	Total	**434,034.00**	**225,640.77**			

Table 0-5 USAG Baumholder Hazardous Waste Streams Shipped in CY2004, Sorted by EWC

EWC	*Description*	*Annual waste generated 2004 / kg*	*Annual costs 2004 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
07 06 08*	DETERGENTS AND SOAPS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUND, METAL CLEANERS AND WAX	1,455.00	947.43	0.70	1.08	0.89
07 07 04*	DIETHYLENETRIAME	1,091.00	878.12	0.53	1.00	0.76
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	2,210.00	2,914.09	1.07	3.32	2.19
08 01 11*	PAINTS, NON-HALOGENATED	8,107.00	5,351.91	3.93	6.09	5.01
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	54.00	35.16	0.03	0.04	0.03
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	476.00	442.43	0.23	0.50	0.37
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	1,898.00	1,100.27	0.92	1.25	1.09
13 02 05*	WASTE OILS/FUELS	34,225.00	622.15	16.57	0.71	8.64
15 01 10*	EMPTY PLASTIC CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	10,110.00	4,959.93	4.90	5.64	5.27
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	8,160.00	4,372.38	3.95	4.98	4.46
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	630.00	268.90	0.31	0.31	0.31
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	2,679.00	1,056.08	1.30	1.20	1.25

EWC	Description	Annual waste generated 2004 / kg	Annual costs 2004 / $	Percentage by weight	Percentage by costs	Average
16 02 11*	REFRIGERATORS, LARGE200X100X100CM	65.00	3,108.73	0.03	3.54	1.78
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	4,904.00	16,203.64	2.37	18.44	10.41
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	288.00	476.45	0.14	0.54	0.34
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	1,659.00	2,015.09	0.80	2.29	1.55
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	60,903.00	0.00	29.49	0.00	14.75
16 06 02*	BATTERIES, NICAD	10,213.00	8,867.76	4.95	10.09	7.52
16 06 03*	BATTERIES, MERCURY	50.00	286.59	0.02	0.33	0.18
16 06 04	BATTERIES, MAGNESIUM	2,081.00	1,391.56	1.01	1.58	1.30
16 06 06*	BATTERY ACID	21,829.00	13,834.91	10.57	15.75	13.16
17 03 03*	TAR/BITUMENT/ASPHALT	30,650.00	11,811.77	14.84	13.44	14.14
18 01 07	CHEMICAL DEFENSE EQUIPMENT	8.00	17.67	0.00	0.02	0.01
18 01 09	MEDICINE, UNCONTROLLED	43.00	17.00	0.02	0.02	0.02
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, SOLID	880.00	1,292.35	0.43	1.47	0.95
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	1,564.00	1,518.70	0.76	1.73	1.24
	Total	**206,512.00**	**87,866.65**			

Table 0-6 USAG Baumholder Hazardous Waste Streams Shipped in CY2005, Sorted by EWC

EWC	*Description*	*Annual waste generated 2005 / kg*	*Annual costs 2005 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
06 01 02*	CLEANING COMPOUNDS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUNDS, METAL CLEANERS, AND WAX	613.00	603.95	0.17	0.71	0.44
06 02 05*	BASES/MIX OF BASES LIQUID OR SOLID	103.00	109.87	0.03	0.13	0.08
06 13 02*	HEAVY METAL CONT. SOLID, ACTIVATED CARBON, SAND BLAST, ETC.	1,460.00	1,070.67	0.42	1.25	0.83
07 07 04*	DIETHYLENETRIAME	2,006.00	1,765.28	0.57	2.06	1.32
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	1,879.00	2,698.62	0.54	3.15	1.84
08 01 11*	PAINTS, NON-HALOGENATED	8,282.00	6,025.72	2.36	7.04	4.70
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	129.00	96.32	0.04	0.11	0.07
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	589.00	592.12	0.17	0.69	0.43
08 04 10	PUTTIES/FILLERS NON-HALOGENATED & HALOGENATED	415.00	531.20	0.12	0.62	0.37
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	260.00	169.87	0.07	0.20	0.14
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	2,689.00	1,866.86	0.77	2.18	1.47
13 02 05*	WASTE OILS	119,047.00	2,164.62	33.91	2.53	18.22
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	348.00	262.07	0.10	0.31	0.20

EWC	Description	Annual waste generated 2005 / kg	Annual costs 2005 / $	Percentage by weight	Percentage by costs	Average
15 01 10*	EMPTY PLASTIC CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	18,181.00	10,864.65	5.18	12.69	8.94
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	22,020.00	12,733.78	6.27	14.88	10.57
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	2,320.00	1,175.47	0.66	1.37	1.02
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	1,791.00	783.70	0.51	0.92	0.71
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	16,572.00	6,916.60	4.72	8.08	6.40
16 02 09*	PCB CONT. WASTES50-499 PPM, TRANSFORMERS, CAPACITORS, SWITCHES, SOIL, ABSORBENT, DEBRIS, TEXTILES	19.00	39.88	0.01	0.05	0.03
16 02 11*	REFRIGERATORS, LARGE200X100X100CM	90.00	4,587.33	0.03	5.36	2.69
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	968.00	1,693.00	0.28	1.98	1.13
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	2,785.00	3,981.24	0.79	4.65	2.72
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	96,187.00	0.00	27.40	0.00	13.70
16 06 02*	BATTERIES, NICAD	1,122.00	1,065.60	0.32	1.24	0.78
16 06 04	BATTERIES, DRYCELL MIXED	2,613.00	1,749.99	0.74	2.04	1.39
16 06 06*	BATTERY ACID	4,475.00	3,162.33	1.27	3.69	2.48

EWC	*Description*	*Annual waste generated 2005 / kg*	*Annual costs 2005 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
17 01 06*	STRUCTURAL DEBRIS, UNSEGRAGATED WOOD, BRICKS, CONCRETE, INSULATION MATERIALS, ETC_____	4,360.00	2,209.07	1.24	2.58	1.91
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	12,210.00	4,166.26	3.48	4.87	4.17
17 03 03*	TAR/BITUMENT/ASPHALT	26,044.00	10,856.40	7.42	12.68	10.05
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, LIQUID	152.00	213.93	0.04	0.25	0.15
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	1,359.00	1,448.59	0.39	1.69	1.04
	Total	**351,088.00**	**85,604.99**			

Table 0-7 USAG Baumholder Hazardous Waste Streams Shipped in CY2006, Sorted by EWC

EWC	*Description*	*Annual waste generated 2006 / kg*	*Annual costs 2006 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
06 01 02*	CLEANING COMPOUNDS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUNDS, METAL CLEANERS, AND WAX	283.00	269.02	0.13	0.38	0.26
06 02 99	CHLORINE CONTAINING COMPOUNDS, LIQUID LAUNDRY BLEACH	85.00	159.51	0.04	0.23	0.13
06 04 04*	MERCURY & MERC. CONTAINING COMPOUNDS, VAPOR LAMPS, DENTAL AMALGAM	5.00	29.01	0.00	0.04	0.02
06 13 02*	HEAVY METAL CONT. SOLID, ACTIVATED CARBON, SAND BLAST, ETC.	3,664.00	2,487.90	1.74	3.53	2.63
07 06 08*	DETERGENTS AND SOAPS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUND, METAL CLEANERS AND WAX	487.00	336.69	0.23	0.48	0.35
07 06 99	TALCUM POWDER	38.00	56.29	0.02	0.08	0.05
07 07 04*	DIETHYLENETRIAME	238.00	193.93	0.11	0.27	0.19
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	1,019.00	1,383.83	0.48	1.96	1.22
08 01 11*	PAINTS, NON-HALOGENATED	5,768.00	3,987.75	2.74	5.65	4.20
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	96.00	66.37	0.05	0.09	0.07
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	627.00	603.77	0.30	0.86	0.58
08 04 10	PUTTIES/FILLERS NON-HALOGENATED & HALOGENATED	312.00	369.78	0.15	0.52	0.34

EWC	Description	Annual waste generated 2006 / kg	Annual costs 2006 / $	Percentage by weight	Percentage by costs	Average
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	415.00	251.05	0.20	0.36	0.28
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	1,451.00	1,003.16	0.69	1.42	1.06
13 02 05*	WASTE OILS	51,422.00	888.78	24.43	1.26	12.84
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	281.00	211.62	0.13	0.30	0.22
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	7,230.00	4,105.92	3.43	5.82	4.63
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	12,000.00	6,666.67	5.70	9.45	7.57
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	2,538.00	1,190.66	1.21	1.69	1.45
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	586.00	253.21	0.28	0.36	0.32
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	4,264.00	1,737.18	2.03	2.46	2.24
16 02 11*	REFRIGERATORS, SMALL 90X70X60CM	27.00	1,253.70	0.01	1.78	0.89
16 05 04*	CYLINDERS, GAS, READY FOR TRANSPORT	3,315.00	11,108.95	1.57	15.74	8.66
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	647.00	1,118.27	0.31	1.58	0.95

EWC	*Description*	*Annual waste generated 2006 / kg*	*Annual costs 2006 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	2,853.00	3,920.71	1.36	5.56	3.46
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	58,060.00	0.00	27.58	0.00	13.79
16 06 04	BATTERIES, DRYCELL MIXED	2,658.00	1,695.11	1.26	2.40	1.83
16 06 06*	BATTERY ACID	12,974.00	8,489.16	6.16	12.03	9.10
17 01 06*	STRUCTURAL DEBRIS, UNSEGRAGATED WOOD, BRICKS, CONCRETE, INSULATION MATERIALS, ETC	890.00	417.53	0.42	0.59	0.51
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	5,760.00	1,920.00	2.74	2.72	2.73
17 03 03*	TAR/BITUMENT/ASPHALT	29,070.00	11,843.34	13.81	16.78	15.30
18 01 07	CHEMICAL DEFENSE EQUIPMENT	18.00	42.22	0.01	0.06	0.03
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, SOLID	144.00	213.56	0.07	0.30	0.19
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	1,207.00	1,221.89	0.57	1.73	1.15
	Total	**210,493.00**	**70,576.78**			

Table 0-8 USAG Baumholder Hazardous Waste Streams Shipped in CY2007, Sorted by EWC

EWC	*Description*	*Annual waste generated 2007 / kg*	*Annual costs 2007 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
06 01 02*	CLEANING COMPOUNDS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUNDS, METAL CLEANERS, AND WAX	267.00	253.81	0.07	0.43	0.25
06 13 02*	HEAVY METAL CONT. SOLID, ACTIVATED CARBON, SAND BLAST, ETC.	2,850.00	1,935.19	0.80	3.28	2.04
07 06 08*	DETERGENTS AND SOAPS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUND, METAL CLEANERS AND WAX	281.00	194.27	0.08	0.33	0.20
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	1,227.00	2,881.06	0.34	4.88	2.61
08 01 11*	PAINTS, NON-HALOGENATED	4,699.00	3,183.69	1.31	5.40	3.35
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	147.00	49.66	0.04	0.08	0.06
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	558.00	537.34	0.16	0.91	0.53
08 04 10	PUTTIES/FILLERS NON-HALOGENATED & HALOGENATED	65.00	77.04	0.02	0.13	0.07
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	424.00	256.49	0.12	0.43	0.28
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	1,718.00	1,165.20	0.48	1.98	1.23
13 02 05*	WASTE OILS	132,667.00	2,371.50	37.01	4.02	20.52
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	2,193.00	1,629.23	0.61	2.76	1.69

EWC	Description	Annual waste generated 2007 / kg	Annual costs 2007 / $	Percentage by weight	Percentage by costs	Average
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	11,560.00	7,095.74	3.23	12.03	7.63
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	22,650.00	12,583.33	6.32	21.33	13.83
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	1,038.00	486.97	0.29	0.83	0.56
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	798.00	344.82	0.22	0.58	0.40
16 01 13*	DIETHYLENE GLYCOL, INCL BUT NOT LIMITED TO BRAKE FLUID	1,041.00	771.11	0.29	1.31	0.80
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	12,723.00	5,230.39	3.55	8.87	6.21
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	67.00	232.43	0.02	0.39	0.21
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	802.00	1,376.10	0.22	2.33	1.28
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	1,639.00	2,375.42	0.46	4.03	2.24
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	140,520.00	0.00	39.21	0.00	19.60
16 06 02*	BATTERIES, NICAD	655.00	598.40	0.18	1.01	0.60
16 06 04	BATTERIES, DRYCELL MIXED	1,623.00	1,115.01	0.45	1.89	1.17
16 06 06*	BATTERY ACID	5,900.00	3,860.49	1.65	6.54	4.10
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	8,480.00	3,786.39	2.37	6.42	4.39

EWC	*Description*	*Annual waste generated 2007 / kg*	*Annual costs 2007 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, SOLID	828.00	1,172.39	0.23	1.99	1.11
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	935.00	1,115.26	0.26	1.89	1.08
	Total	**358,421.00**	**58,987.37**			

Table 0-9 USAG Baumholder Hazardous Waste Streams Shipped in CY2008, Sorted by EWC

EWC	*Description*	*Annual waste generated 2008 / kg*	*Annual costs 2008 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
06 02 99	CHLORINE CONTAINING COMPOUNDS, LIQUID LAUNDRY BLEACH	68.00	111.56	0.03	0.06	0.04
06 04 04*	MERCURY & MERC. CONTAINING COMPOUNDS, VAPOR LAMPS, DENTAL AMALGAM	11.00	85.94	0.00	0.04	0.02
06 13 02*	HEAVY METAL CONT. SOLID, ACTIVATED CARBON, SAND BLAST, ETC.	1,839.00	1,443.40	0.71	0.75	0.73
07 06 08*	DETERGENTS AND SOAPS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUND, METAL CLEANERS AND WAX	1,808.00	1,345.76	0.69	0.70	0.70
07 07 04*	DIETHYLENETRIAME	275.00	433.98	0.11	0.23	0.17
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	902.00	4,444.97	0.35	2.31	1.33
08 01 11*	PAINTS, NON-HALOGENATED	5,309.00	3,497.82	2.04	1.81	1.93
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	440.00	138.40	0.17	0.07	0.12
08 04 10	PUTTIES/FILLERS NON-HALOGENATED & HALOGENATED	236.00	310.36	0.09	0.16	0.13
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	69.00	38.75	0.03	0.02	0.02
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	4,426.00	2,707.45	1.70	1.40	1.55
13 02 05*	WASTE USED OILS, PETROEUM AND SYNTHETIC	40,820.00	1,141.96	15.66	0.59	8.13

EWC	Description	Annual waste generated 2008 / kg	Annual costs 2008 / $	Percentage by weight	Percentage by costs	Average
14 06 02*	ALCOHOL, METHANOL, ISOPROPYL, ETHANOL	1,331.00	1,331.00	0.51	0.69	0.60
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	4,640.00	3,079.25	1.78	1.60	1.69
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	18,730.00	15,846.84	7.19	8.22	7.70
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	32,960.00	21,162.14	12.65	10.98	11.81
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	3,770.00	2,442.73	1.45	1.27	1.36
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	8,948.00	5,234.17	3.43	2.72	3.07
16 01 13*	DIETHYLENE GLYCOL, INCL BUT NOT LIMITED TO BRAKE FLUID	2,230.00	3,812.08	0.86	1.98	1.42
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	34,044.00	15,715.06	13.06	8.15	10.61
16 02 11*	REFRIGERATORS, LARGE200X100X100CM	49.00	2,554.81	0.02	1.33	0.67
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	14,734.00	58,724.99	5.65	30.46	18.06
16 05 05	SPRAY CANS, NO PESTICIDES OR POLYURETHANE FOAM	1,902.00	3,071.75	0.73	1.59	1.16
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	2,280.00	4,332.70	0.87	2.25	1.56

EWC	*Description*	*Annual waste generated 2008 / kg*	*Annual costs 2008 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	24,363.00	0.00	9.35	0.00	4.67
16 06 04	BATTERIES, LITHIUM	2,587.00	2,838.28	0.99	1.47	1.23
17 01 06*	STRUCTURAL DEBRIS, UNSEGRAGATED WOOD, BRICKS, CONCRETE, INSULATION MATERIALS, ETC	1,790.00	931.78	0.69	0.48	0.59
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	15,720.00	10,593.71	6.03	5.50	5.76
17 03 03*	TAR/BITUMENT/ASPHALT	23,240.00	13,596.71	8.92	7.05	7.99
18 01 09	MEDICINE, UNCONTROLLED	282.00	135.21	0.11	0.07	0.09
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, LIQUID	181.00	265.84	0.07	0.14	0.10
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	1,396.00	2,258.53	0.54	1.17	0.85
	Total	**260,597.00**	**192,772.70**			

Table 0-10 USAG Baumholder Hazardous Waste Streams Shipped in CY2009, Sorted by EWC

EWC	*Description*	*Annual waste generated 2009 / kg*	*Annual costs 2009 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
01 04 07*	FLAMELESS RATION HEATERS, MAY CONTAIN MAGNESIUM OR WATER REACTIVE CHEMICALS	14.00	66.28	0.01	0.11	0.06
06 01 06*	ACIDS INORGANIC, NITRIC, PHOSPORIC, SULFURIC, HYDROCHLORIC	77.00	85.42	0.07	0.14	0.10
06 13 02*	HEAVY METAL CONT. SOLID, ACTIVATED CARBON, SAND BLAST, ETC.	50.00	42.97	0.04	0.07	0.06
07 06 08*	DETERGENTS AND SOAPS, SOLIDS & LIQUIDS POLISH, RUBBING COMPOUND, METAL CLEANERS AND WAX	1,889.00	1,347.51	1.63	2.14	1.88
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	898.00	4,629.80	0.78	7.35	4.06
08 01 11*	PAINTS, NON-HALOGENATED	7,188.00	4,791.78	6.20	7.60	6.90
08 01 99	PAINT RELATED WASTES, BRUSHES, EMPTY METAL/PLASTIC CONTAINERS, TEXTILES	135.00	52.73	0.12	0.08	0.10
08 03 09	PRINTING PRODUCTS, TONERS AND INKS	873.00	270.91	0.75	0.43	0.59
08 04 10	ADHESIVES, GLUES, RESINS, HALOGENATED & NON-HALOGENATED	197.00	127.63	0.17	0.20	0.19
09 01 01*	PHOTOGRAPHIC PRODUCTS HAL&NON-HAL, FIXERS, BLEACHES, DEVELOPERS	384.00	219.58	0.33	0.35	0.34
12 01 12*	GREASE, AUTOMOTIVE LIMITED CONTAMINANTS	3,351.00	2,114.47	2.89	3.35	3.12

EWC	Description	Annual waste generated 2009 / kg	Annual costs 2009 / $	Percentage by weight	Percentage by costs	Average
13 02 05*	WASTE USED OILS, PETROEUM AND SYNTHETIC	35,250.00	1,002.39	30.42	1.59	16.01
14 06 03*	SOLVENTS NON-HAL, PAINT STRIPPERS, THINNERS, DRY-CLNG	1,401.00	920.37	1.21	1.46	1.33
15 01 10*	EMPTY PLASTIC CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	9,830.00	8,414.71	8.48	13.35	10.92
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	9,100.00	5,735.61	7.85	9.10	8.48
16 01 07*	FILTERS CONTAMINATED, FUEL AND OIL	1,480.00	965.22	1.28	1.53	1.40
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	1,562.00	851.77	1.35	1.35	1.35
16 01 13*	DIETHYLENE GLYCOL, INCL BUT NOT LIMITED TO BRAKE FLUID	1,167.00	1,872.13	1.01	2.97	1.99
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	3,776.00	1,750.30	3.26	2.78	3.02
16 02 11*	REFRIGERATORS, LARGE200X100X100CM	25.00	1,342.23	0.02	2.13	1.08
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	1,037.00	4,460.59	0.90	7.08	3.99
16 05 05	POLYURETHANE FOAM, AEROSOL OR SOLID	712.00	1,240.71	0.61	1.97	1.29
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	3,820.00	6,519.42	3.30	10.34	6.82

EWC	*Description*	*Annual waste generated 2009 / kg*	*Annual costs 2009 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	12,600.00	0.00	10.88	0.00	5.44
16 06 02*	BATTERIES, NICAD	645.00	715.55	0.56	1.14	0.85
16 06 04	BATTERIES, DRYCELL MIXED	2,660.00	2,807.50	2.30	4.45	3.38
17 01 06*	STRUCTURAL DEBRIS, UNSEGRAGATED WOOD, BRICKS, CONCRETE, INSULATION MATERIALS, ETC_____	1,460.00	781.41	1.26	1.24	1.25
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	7,860.00	5,177.32	6.78	8.21	7.50
17 03 03*	TAR/BITUMENT/ASPHALT	5,180.00	2,822.72	4.47	4.48	4.47
20 01 19*	PESTICIDES/HERBICIDES/FUNGICIDES/INSECTICIDES, LIQUID	331.00	471.69	0.29	0.75	0.52
20 01 21*	LIGHT TUBES & LAMPS, FLUORESCENT AND SODIUM VAPOR	909.00	1,427.10	0.78	2.26	1.52
	Total	**115,861.00**	**63,027.82**			

Table 0-11 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2003, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2003 / kg*	*Annual disposal costs 2003 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	42,661.00	93,307.59	9.83	41.35	25.59
13 02 05*	WASTE OILS/FUELS	155,865.00	2,894.71	35.91	1.28	18.60
17 03 03*	TAR/BITUMENT/ASPHALT	53,450.00	16,358.89	12.31	7.25	9.78
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	36,880.00	13,383.89	8.50	5.93	7.21
08 01 11*	PAINTS, NON-HALOGENATED	26,385.00	13,424.00	6.08	5.95	6.01
20 01 35*	REFRIGERATORS, (PARTS)<=250 CM HIGH	50.00	26,612.90	0.01	11.79	5.90
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	28,690.00	11,300.82	6.61	5.01	5.81
07 07 04*	DIETHYLENETRIAME	19,169.00	10,504.36	4.42	4.66	4.54
16 06 04	BATTERIES, DRYCELL MIXED	9,862.00	4,178.24	2.27	1.85	2.06
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	9,964.00	2,698.50	2.30	1.20	1.75
Remainder				**11.76**	**13.73**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-12 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2004, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2004 / kg*	*Annual disposal costs 2004 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 06 01*	Lead batteries	60,903	0.0	30.01	0.00	15.01
17 03 03*	Coal tar and tarred products	30,650	11,811.8	15.10	14.40	14.75
16 06 06*	Separately collected electrolyte from batteries and accumulators	21,829	13,834.9	10.76	16.87	13.81
16 05 04*	Gases in pressure containers (including halons) containing dangerous substances	4,904	16,203.6	2.42	19.76	11.09
13 02 05*	Mineral-based non-chlorinated engine, gear and lubricant oils	34,225	622.1	16.87	0.76	8.81
16 06 02*	Ni-Cd batteries	10,213	8,867.8	5.03	10.81	7.92
08 01 11*	Waste paint and varnish containing organic solvents or other dangerous substances	8,107	5,351.9	4.00	6.53	5.26
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing	8,160	4,372.4	4.02	5.33	4.68
15 01 10*	Packaging containing residues of or contaminated by dangerous substances	6,810	3,725.4	3.36	4.54	3.95
07 07 99	Wastes not otherwise specified	2,210	2,914.1	1.09	3.55	2.32
Remainder				**8.30**	**20.22**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-13 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2005, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2005 / kg*	*Annual disposal costs 2005 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
13 02 05*	WASTE OILS	119,047.00	2,164.62	33.91	2.53	18.22
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	96,187.00	0.00	27.40	0.00	13.70
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	22,020.00	12,733.78	6.27	14.88	10.57
17 03 03*	TAR/BITUMENT/ASPHALT	26,044.00	10,856.40	7.42	12.68	10.05
15 01 10*	EMPTY PLASTIC CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	18,181.00	10,864.65	5.18	12.69	8.94
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	16,572.00	6,916.60	4.72	8.08	6.40
08 01 11*	PAINTS, NON-HALOGENATED	8,282.00	6,025.72	2.36	7.04	4.70
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	12,210.00	4,166.26	3.48	4.87	4.17
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	2,785.00	3,981.24	0.79	4.65	2.72
16 02 11*	REFRIGERATORS, LARGE200X100X100CM	90.00	4,587.33	0.03	5.36	2.69
Remainder				**8.45**	**27.23**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-14 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2006, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2006 / kg*	*Annual disposal costs 2006 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
17 03 03*	TAR/BITUMENT/ASPHALT	29,070.00	11,843.34	13.81	16.78	15.30
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	58,060.00	0.00	27.58	0.00	13.79
13 02 05*	WASTE OILS	51,422.00	888.78	24.43	1.26	12.84
16 06 06*	BATTERY ACID	12,974.00	8,489.16	6.16	12.03	9.10
16 05 04*	CYLINDERS, GAS, READY FOR TRANSPORT	3,315.00	11,108.95	1.57	15.74	8.66
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	12,000.00	6,666.67	5.70	9.45	7.57
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	7,230.00	4,105.92	3.43	5.82	4.63
08 01 11*	PAINTS, NON-HALOGENATED	5,768.00	3,987.75	2.74	5.65	4.20
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	2,853.00	3,920.71	1.36	5.56	3.46
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	5,760.00	1,920.00	2.74	2.72	2.73
Remainder				**10.47**	**25.00**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-15 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2007, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2007 / kg*	*Annual disposal costs 2007 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
13 02 05*	WASTE OILS	132,667.00	2,371.50	37.01	4.02	20.52
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	140,520.00	0.00	39.21	0.00	19.60
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	22,650.00	12,583.33	6.32	21.33	13.83
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	11,560.00	7,095.74	3.23	12.03	7.63
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	12,723.00	5,230.39	3.55	8.87	6.21
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	8,480.00	3,786.39	2.37	6.42	4.39
16 06 06*	BATTERY ACID	5,900.00	3,860.49	1.65	6.54	4.10
08 01 11*	PAINTS, NON-HALOGENATED	4,699.00	3,183.69	1.31	5.40	3.35
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	1,227.00	2,881.06	0.34	4.88	2.61
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	1,639.00	2,375.42	0.46	4.03	2.24
Remainder				**4.56**	**26.48**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-16 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2008, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2004 / kg*	*Annual disposal costs 2004 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	14,734.00	58,724.99	5.65	30.46	18.06
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	32,960.00	21,162.14	12.65	10.98	11.81
16 01 15	ANTIFREEZE, CONTAMINATED WITH DIRT, OIL, FUEL	34,044.00	15,715.06	13.06	8.15	10.61
13 02 05*	WASTE USED OILS, PETROEUM AND SYNTHETIC	40,820.00	1,141.96	15.66	0.59	8.13
17 03 03*	TAR/BITUMENT/ASPHALT	23,240.00	13,596.71	8.92	7.05	7.99
15 01 10*	EMPTY METAL CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	18,730.00	15,846.84	7.19	8.22	7.70
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	15,720.00	10,593.71	6.03	5.50	5.76
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	24,363.00	0.00	9.35	0.00	4.67
00 00 00	ACIDS INORGANIC, NITRIC, PHOSPORIC, SULFURIC, HYDROCHLORIC	9,217.00	9,144.77	3.54	4.74	4.14
16 01 11*	ASBESTOS & BEARING ITEMS, BRAKE SHOES, SAFES, AND FILE CABINETS	8,948.00	5,234.17	3.43	2.72	3.07
Remainder				**14.51**	**21.59**	

Grey marked waste streams are not considered in the "Top Ten" list for

Table 0-17 "Top 10" of Hazardous Waste Disposal by HWSA at USAG Baumholder in CY2009, Sorted by Average over Mass and Costs Percentage

EWC	*Description*	*Annual waste generated 2009 / kg*	*Annual disposal costs 2009 / $*	*Percentage by weight*	*Percentage by costs*	*Average*
13 02 05*	WASTE USED OILS, PETROEUM AND SYNTHETIC	35,250.00	1,002.39	30.42	1.59	16.01
15 01 10*	EMPTY PLASTIC CANS <50CM, CONTAINED OIL, PAINTS, AND ACIDS	9,830.00	8,414.71	8.48	13.35	10.92
15 02 02*	POL CONTAMINATED SOLIDS, RAGS, ABSORBENT, PLASTIC CONTAINER, ACTIVATED CARBON FILTERS	9,100.00	5,735.61	7.85	9.10	8.48
17 02 04*	WOOD TREATED WITH CREOSOTE, PCP, PESTICIDES, AND PAINT	7,860.00	5,177.32	6.78	8.21	7.50
08 01 11*	PAINTS, NON-HALOGENATED	7,188.00	4,791.78	6.20	7.60	6.90
16 05 07*	FIRE EXTINGUISHING RESIDUES, LIQUID OR SOLID AND CHLORINE CONTAINING COMPOUNDS, SOLID CALCIUM HYPOCHLORITE, STB, CHLOR. LIME	3,820.00	6,519.42	3.30	10.34	6.82
16 06 01*	BATTERIES, LEAD ACID, DRAINED AND UNDRAINED	12,600.00	0.00	10.88	0.00	5.44
17 03 03*	TAR/BITUMENT/ASPHALT	5,180.00	2,822.72	4.47	4.48	4.47
07 07 99	LAB PAKS, PACKAGING & DISPOSAL, ORGANIC & INORGANIC CHEM&REAGENTS	898.00	4,629.80	0.78	7.35	4.06
16 05 04*	CARTRIDGES, PROPANE, DIESEL, ETHER	1,037.00	4,460.59	0.90	7.08	3.99
Remainder				**19.94**	**30.90**	

Grey marked waste streams are not considered in the "Top Ten" list for

Figure 0-A Waste Oil Disposal by HWSA at USAG Baumholder CY2002 - CY2009

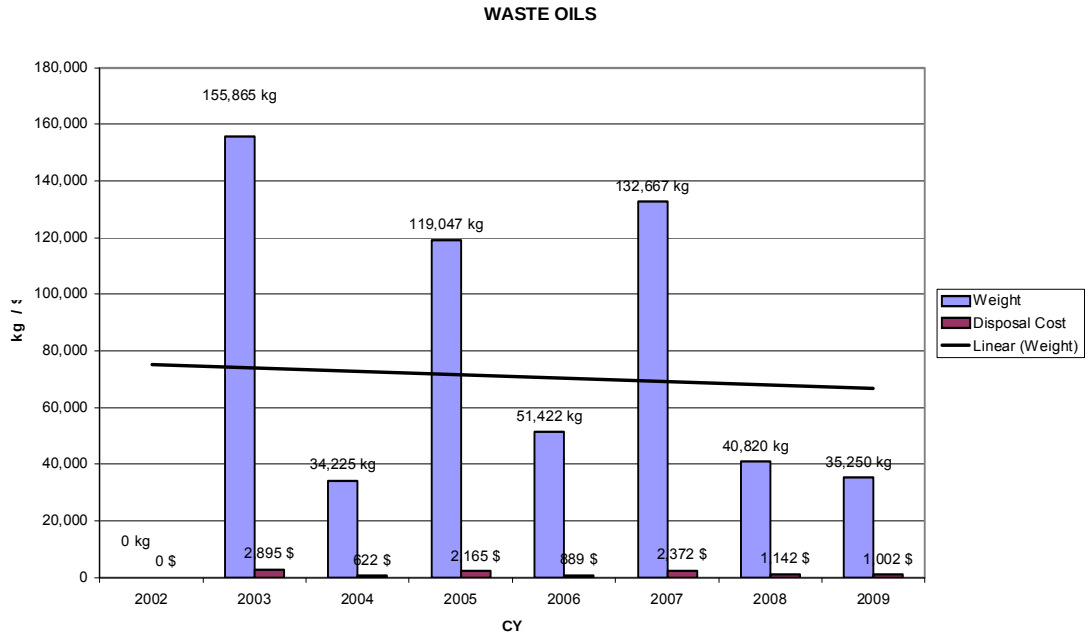


Figure 0-B Cartridges Disposal by HWSA at USAG Baumholder CY2002 - CY2009

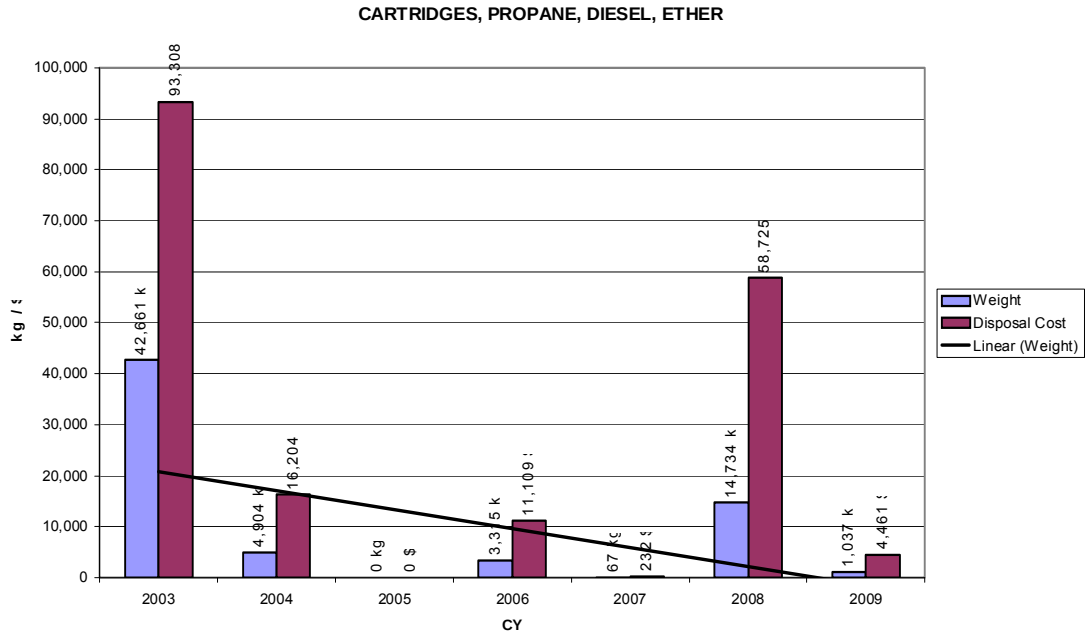


Figure 0-C POL contaminated Solids Disposal by HWSA at USAG Baumholder CY2002 - CY2009

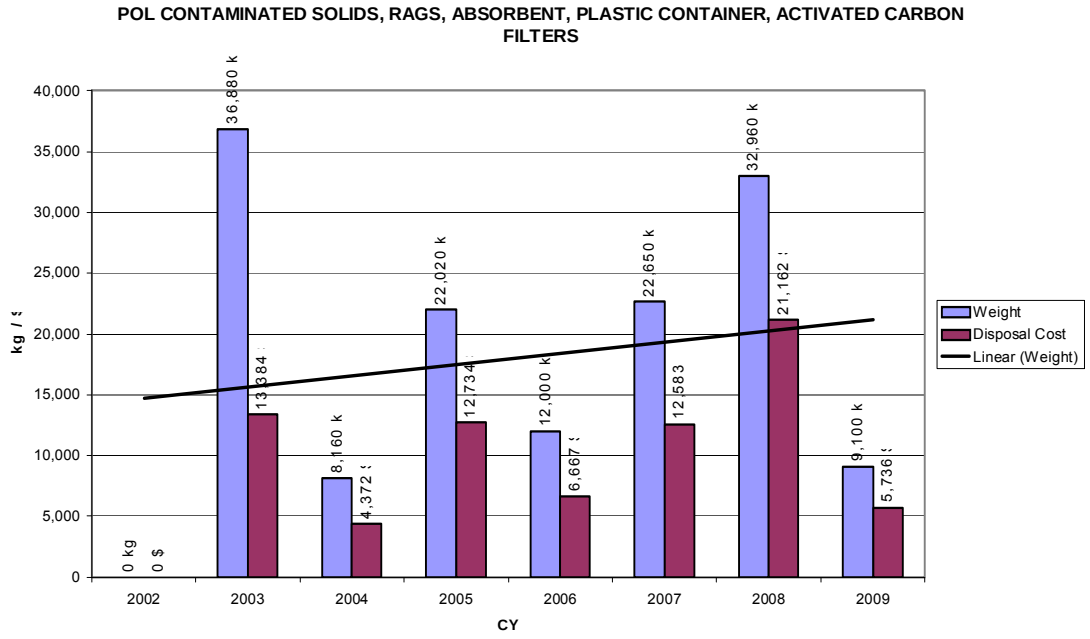


Figure 0-D Tar/Bitumen/Asphalt Disposal by HWSA at USAG Baumholder CY2002 - CY2009

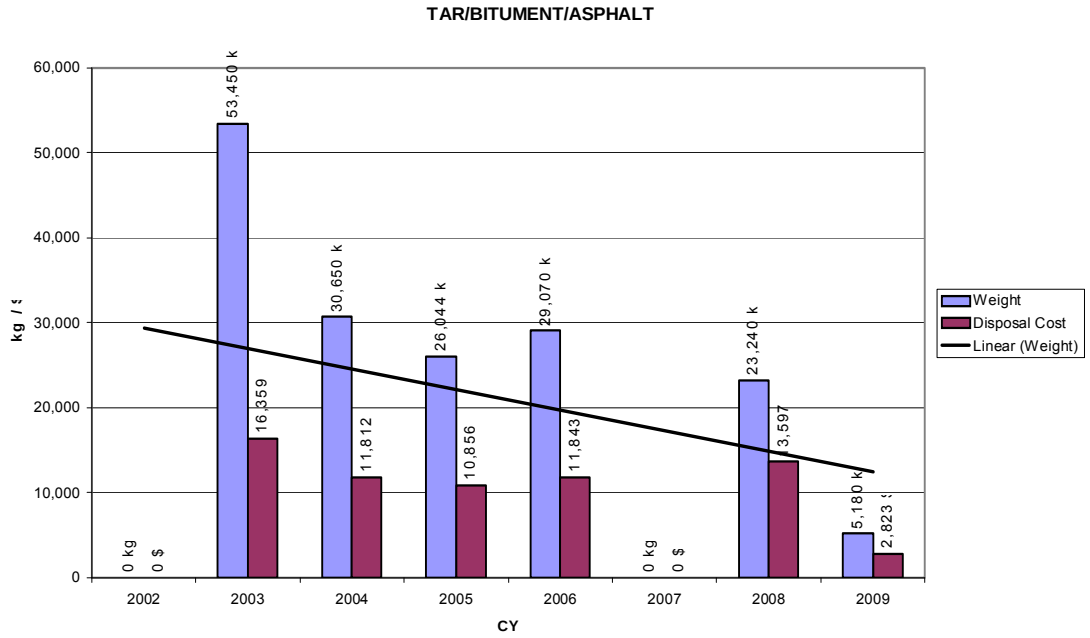


Figure 0-E Empty Cans and Drums, Contained Oil, Paint, and Acids Disposal by HWSA at USAG Baumholder CY2002 - CY2009

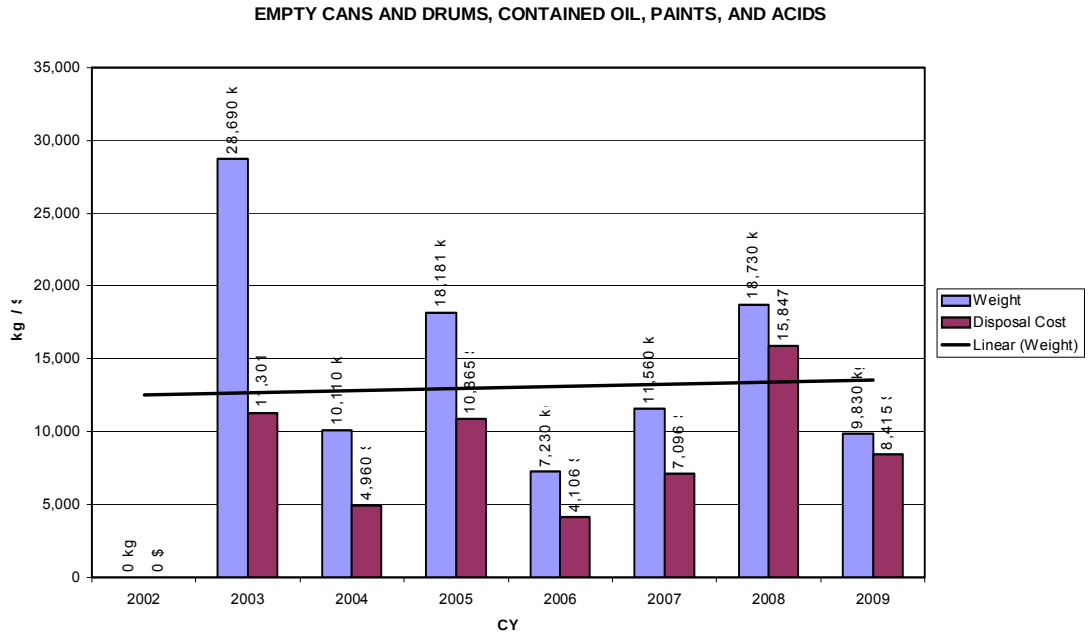


Figure 0-F Paints, non halogenated Disposal by HWSA at USAG Baumholder CY2002 - CY2009

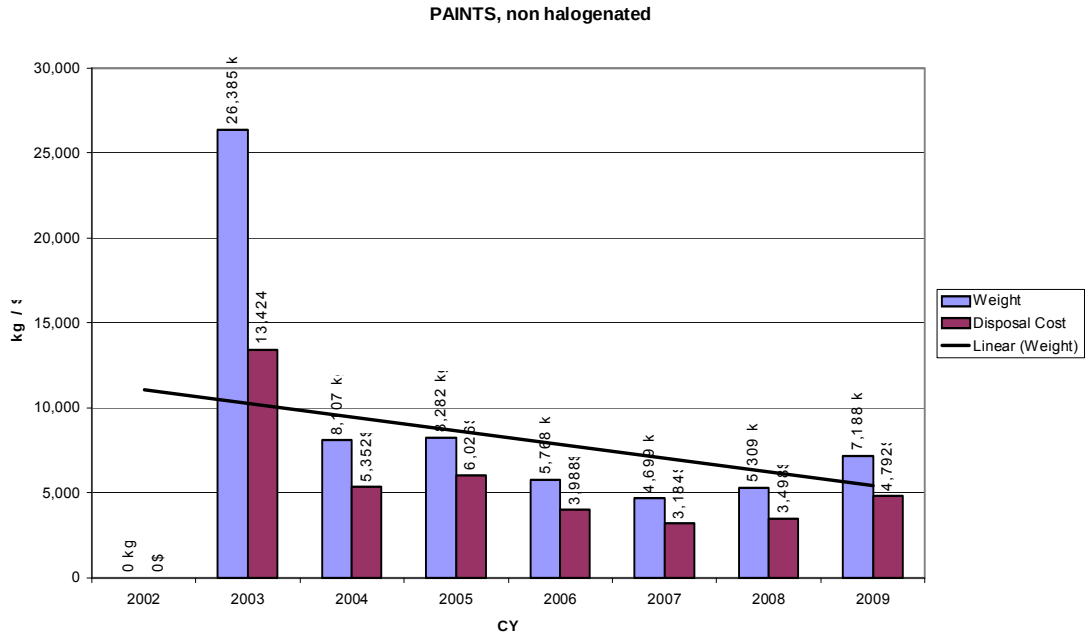


Figure 0-G Waste Antifreeze Disposal by HWSA at USAG Baumholder CY2002 - CY2009

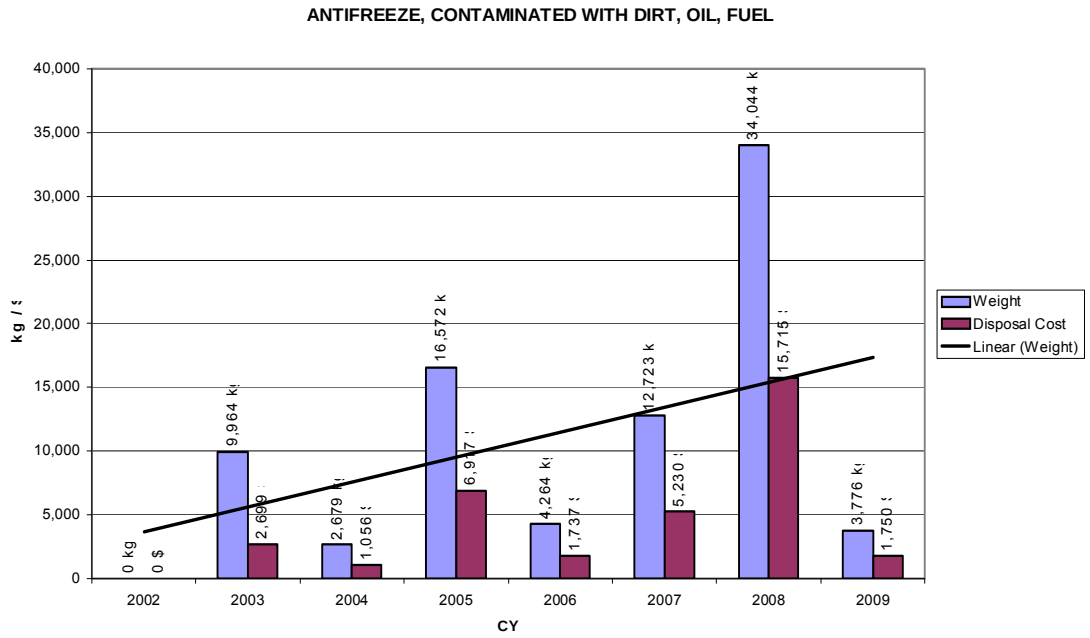


Figure 0-H Treated Wood Disposal by HWSA at USAG Baumholder CY2002 - CY2009

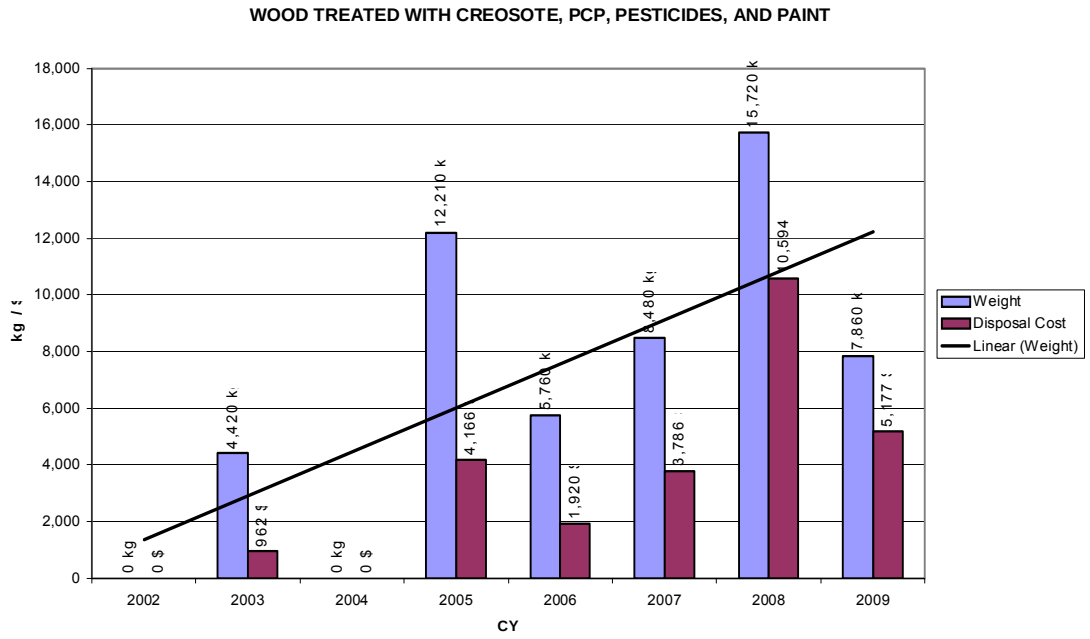


Figure 0-I Fire Extinguisher Residues Disposal by HWSA at USAG Baumholder CY2002 - CY2009

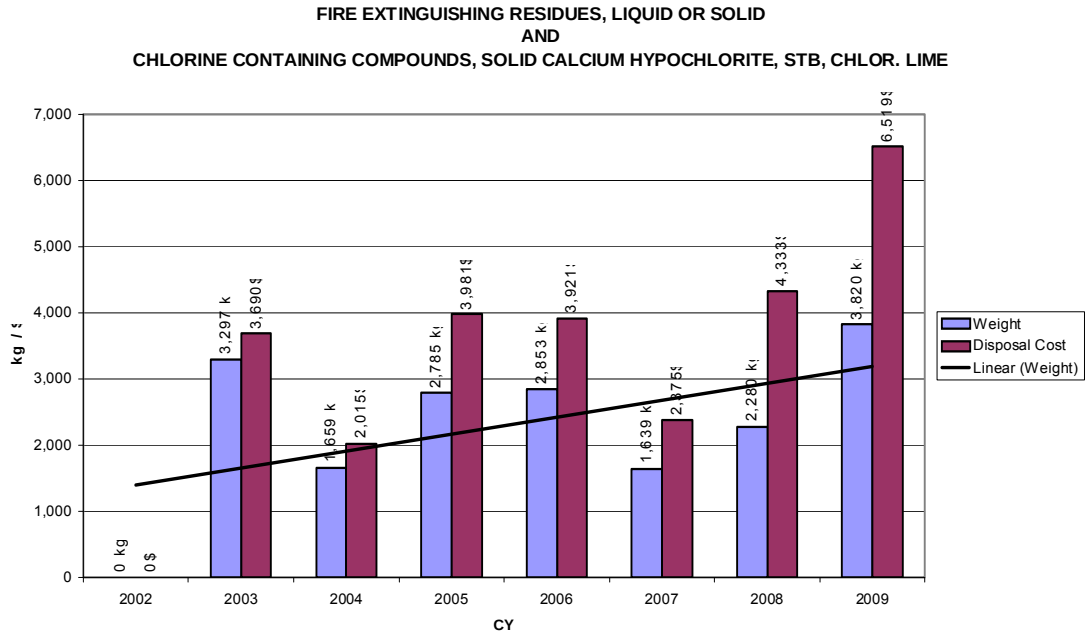
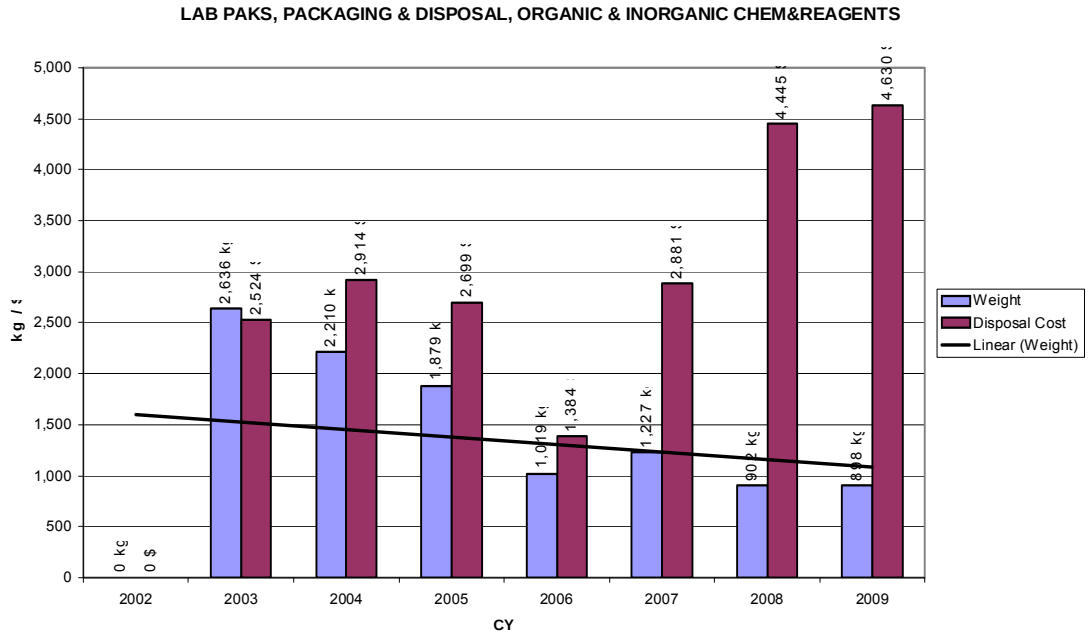


Figure 0-J Laboratory Packages Disposal by HWSA at USAG Baumholder CY2002 - CY2009



SOLID WASTE

Figure 0-K Residual Waste Disposal at the USAG Baumholder, CY 2006 – CY2009

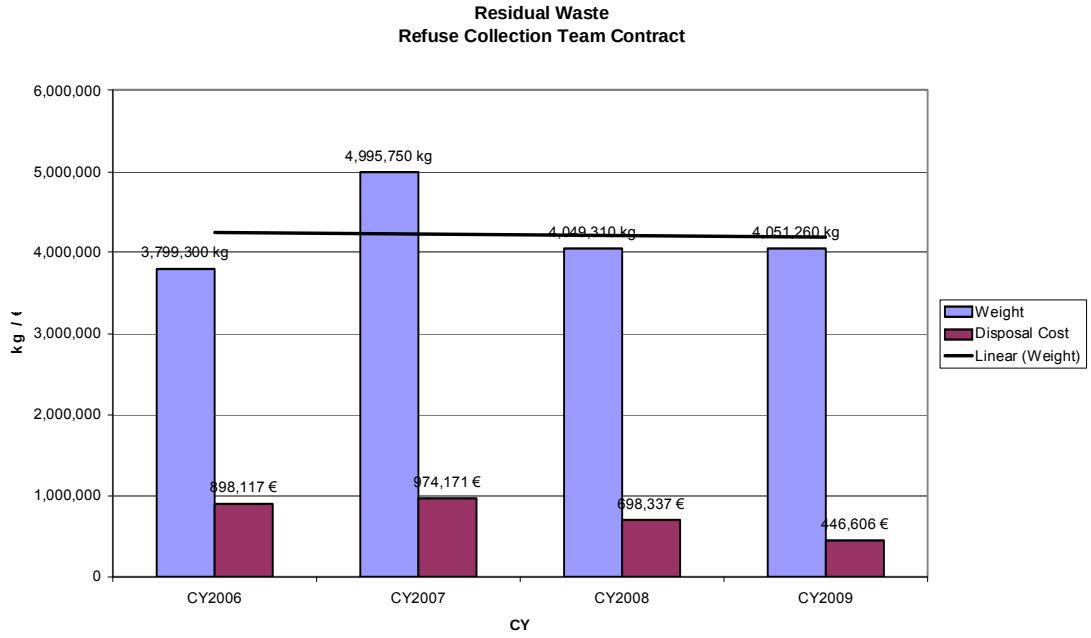


Figure 0-L Waste Wood Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

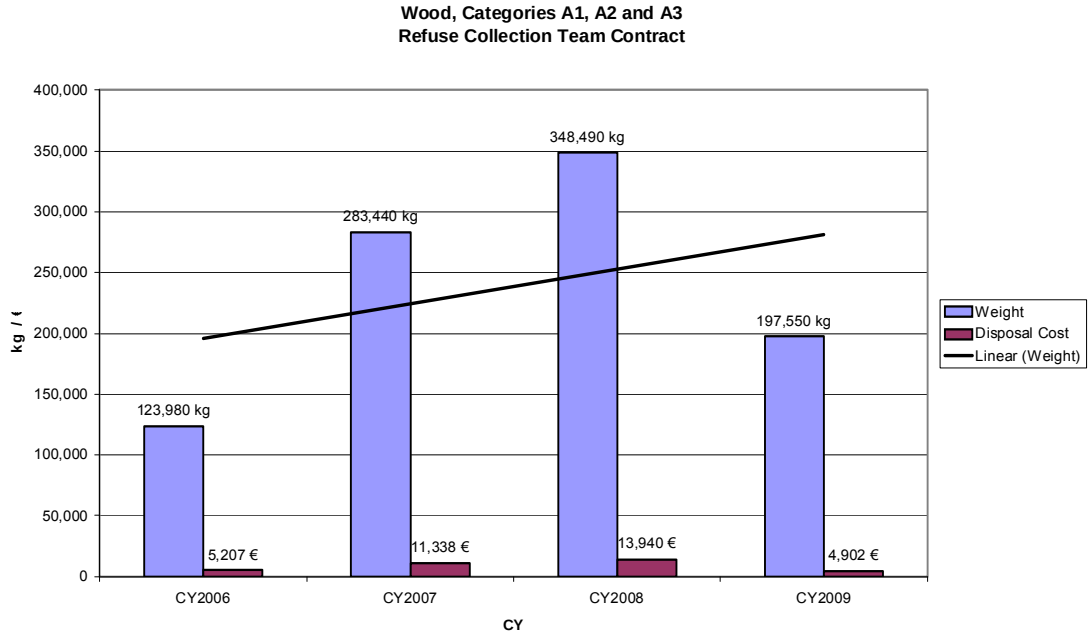


Figure 0-M Bulky Waste Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

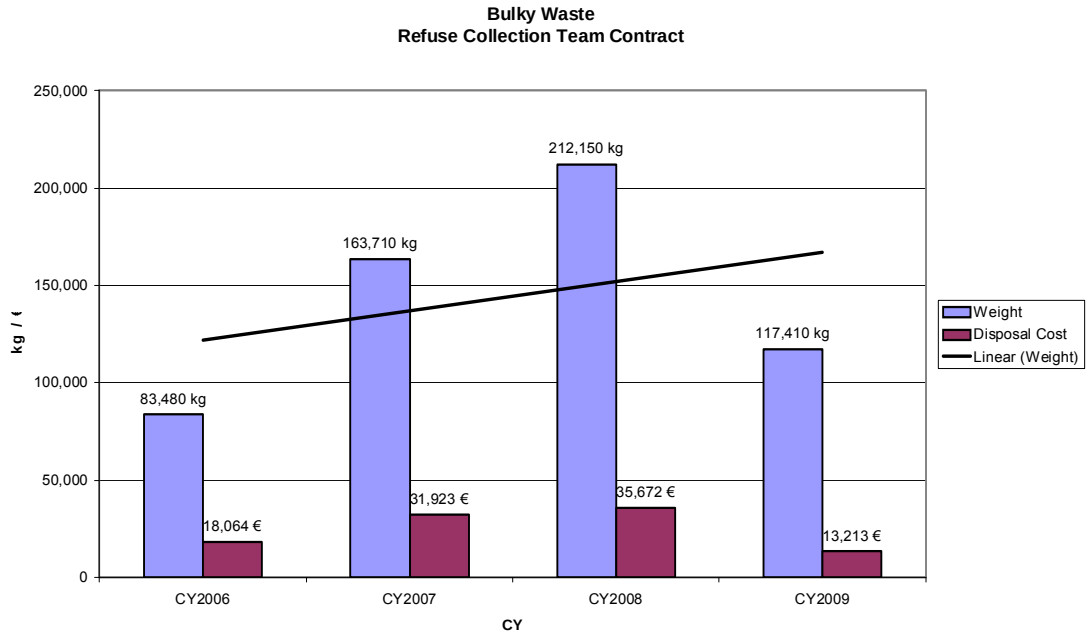


Figure 0-N Scrap Metal disposal managed by the Refuse Collection Team, CY 2006 – CY2009

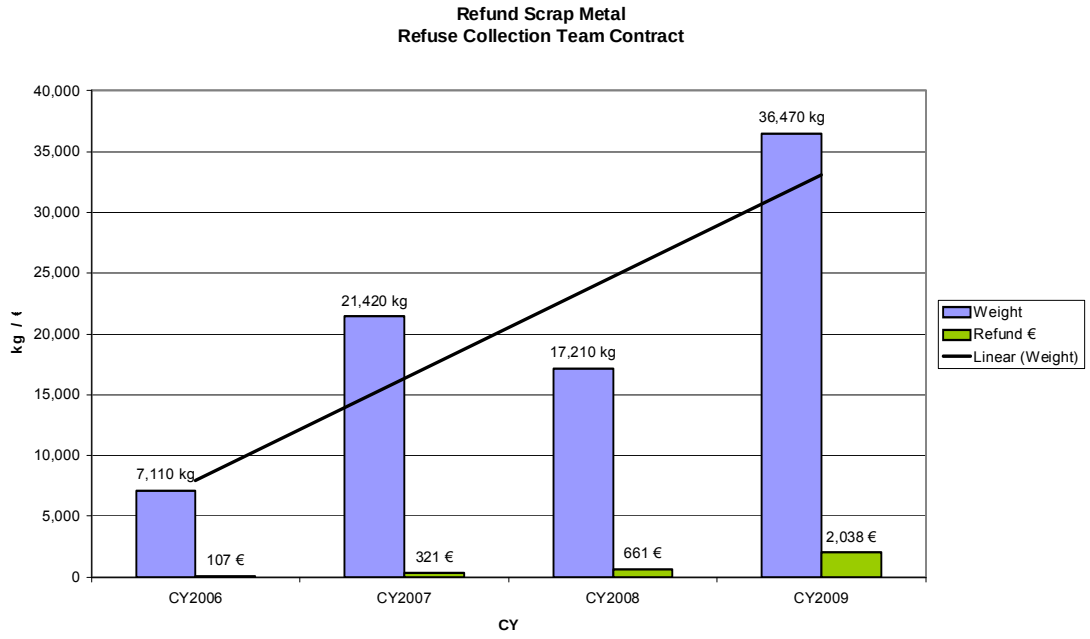


Figure 0-O Plastic Foil / Styrofoam Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

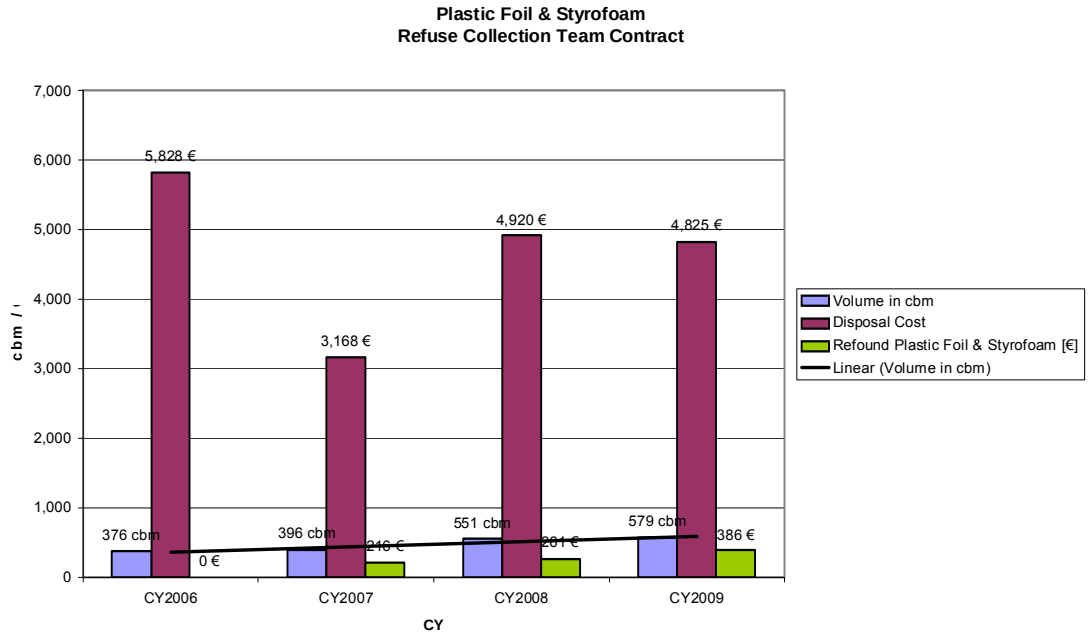


Figure 0-P Electronic Waste Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

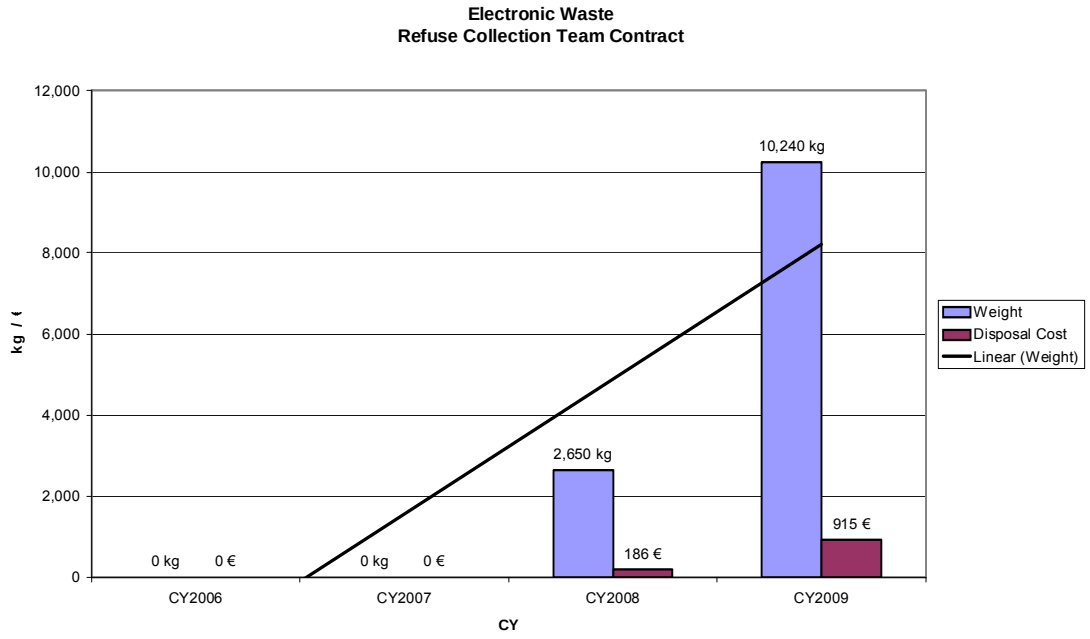


Figure 0-Q End-of-Life-Tires Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

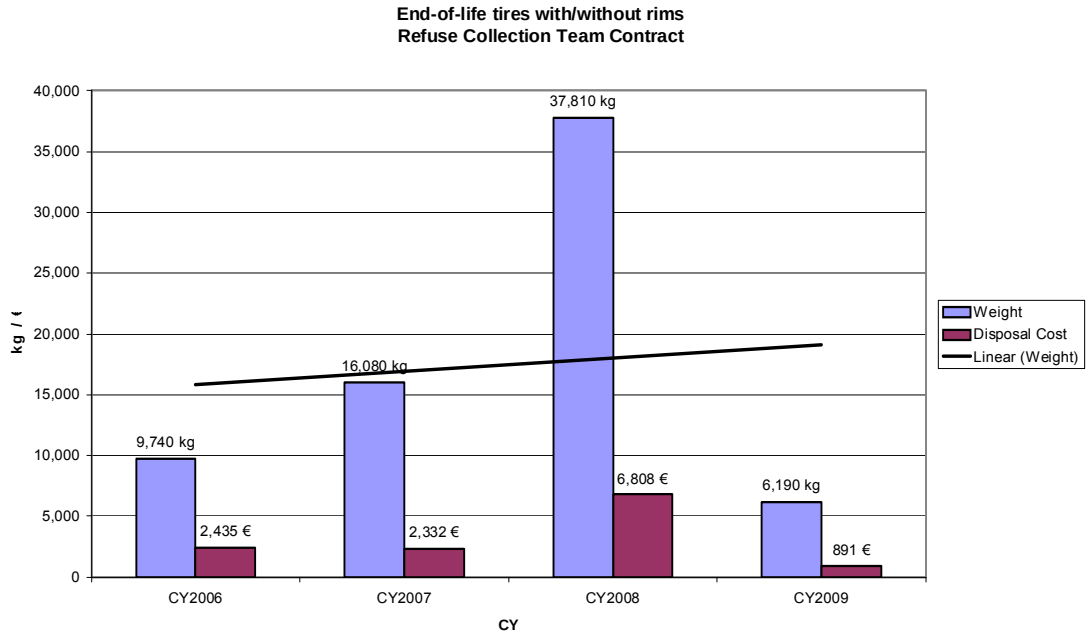


Figure 0-R Electrical Appliances Disposal managed by the Refuse Collection Team, CY 2006 – CY2009

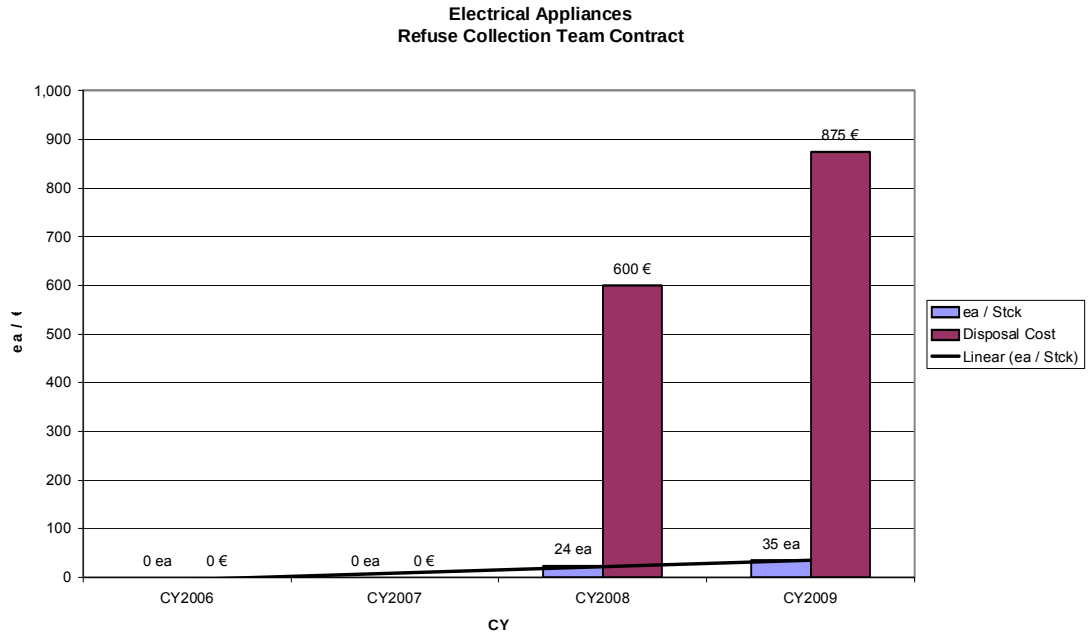


Figure 0-S Cardboard managed by the Refuse Collection Team, CY 2006 – CY2009

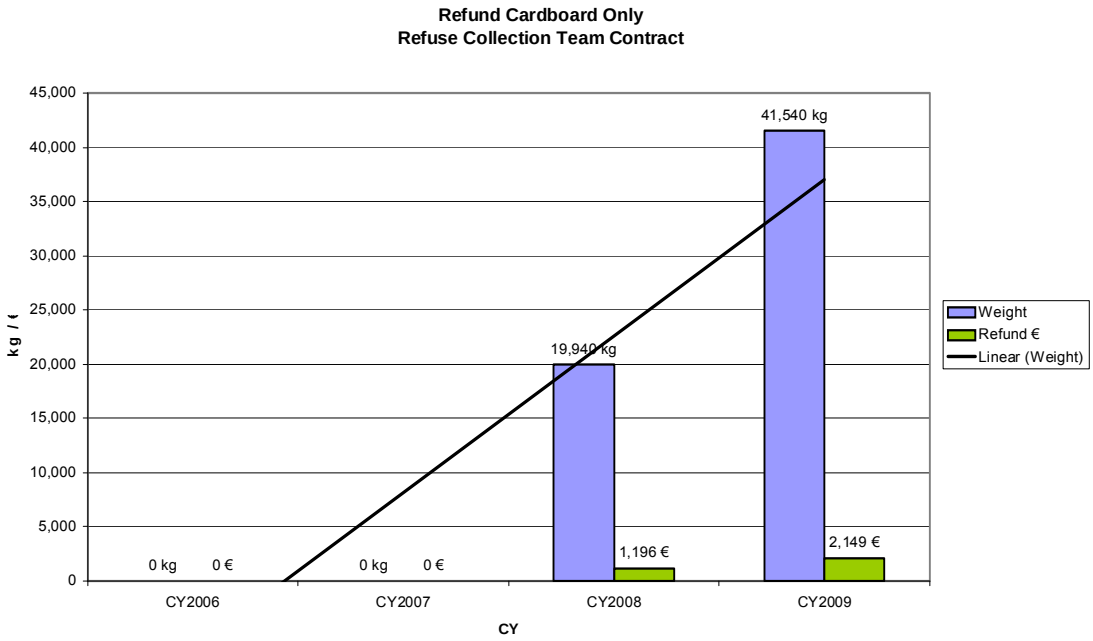


Figure 0-T Food Waste disposal managed by the Sort Manager, CY 2006 – CY2009

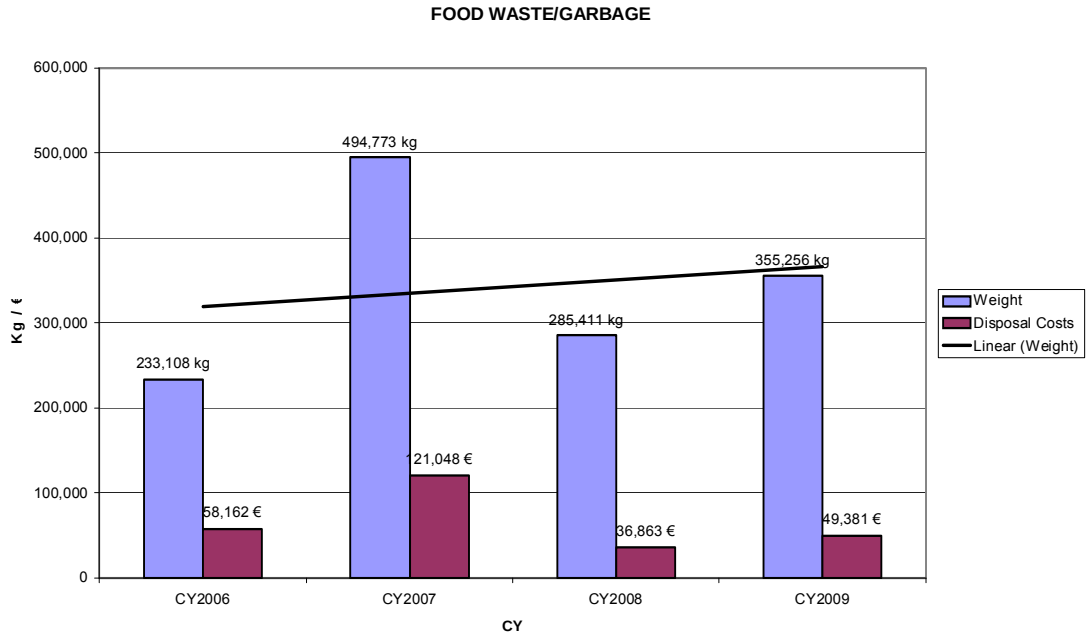


Figure 0-U Glass disposal managed by the Sort Manager, CY 2006 – CY2009

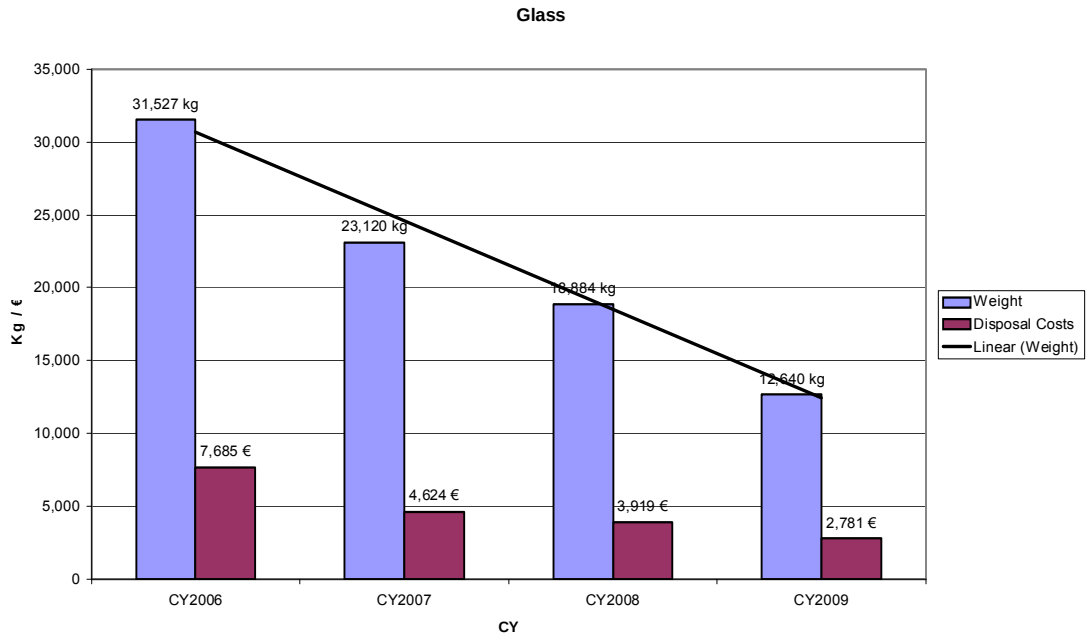


Figure 0-V Scrap Metal disposal managed by MWR, CY 2006 – CY2009

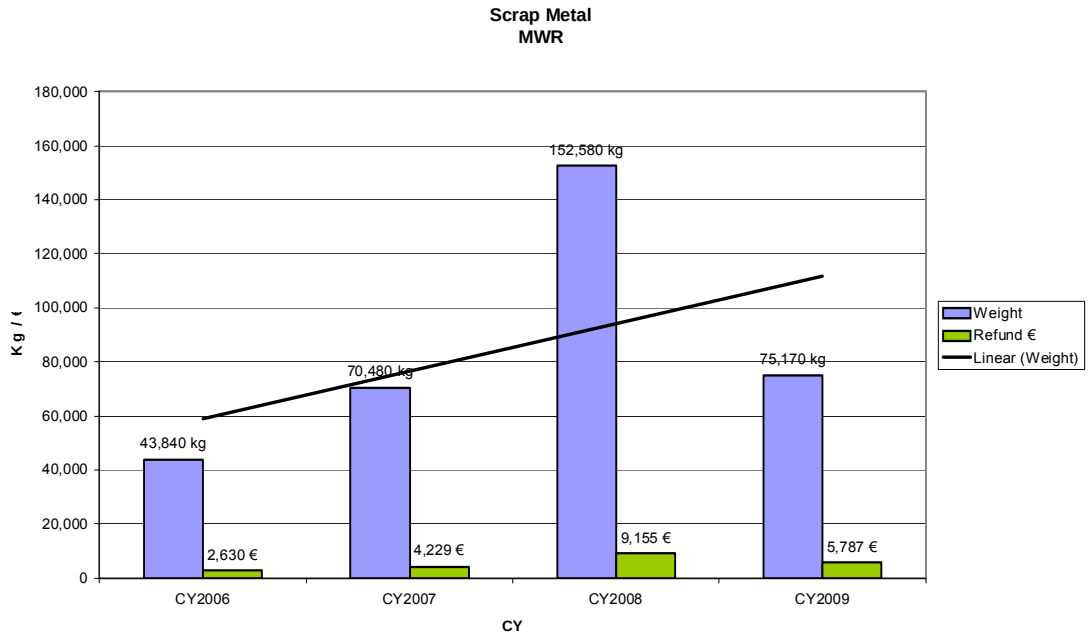


Figure 0-W Aluminum disposal managed by MWR, CY 2006 – CY2009

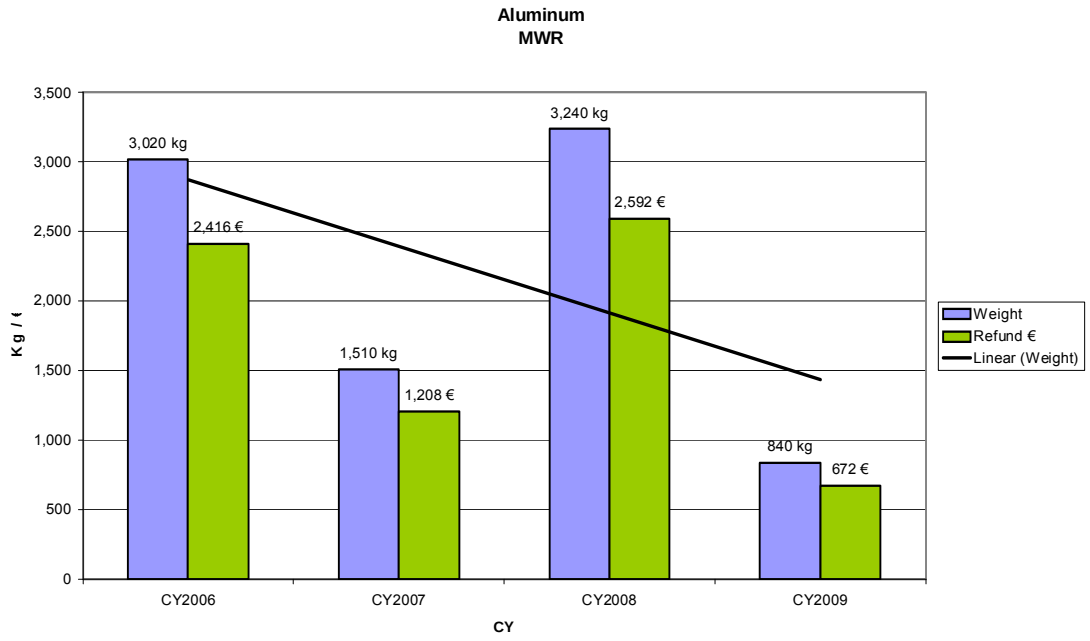
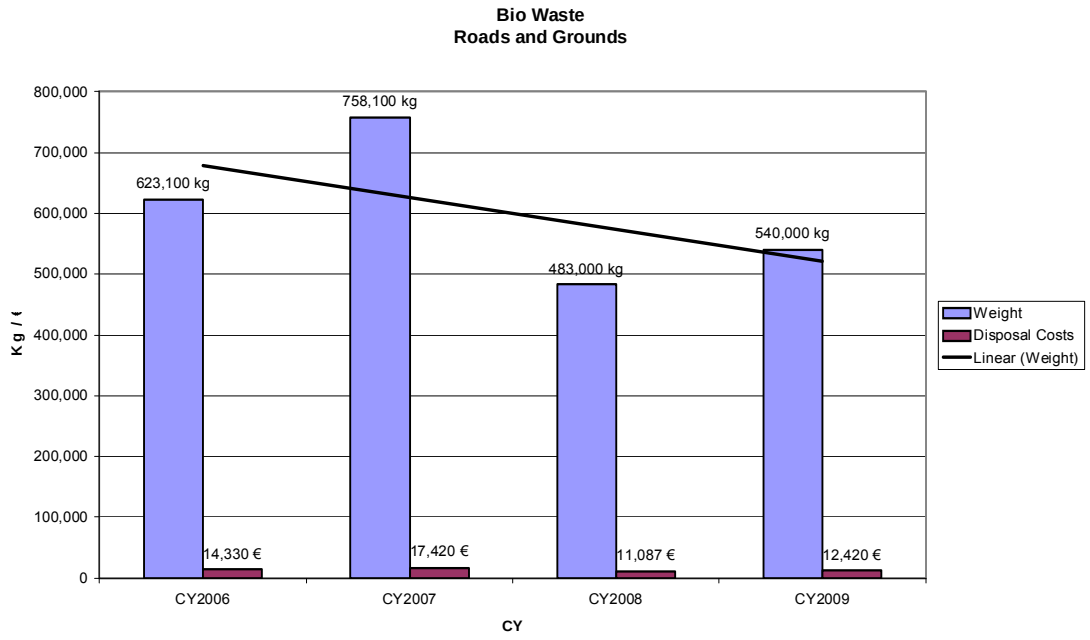


Figure 0-X Bio Waste disposal managed by Roads and Grounds, CY 2006 – CY2009



AIR EMISSIONS

Table 0-18 Air Emissions Measurement Data for Oil-Fired Heating Units

					Number	Rated Capacity per			Type	Hours of	Annual Fuel	Heat Input	Waste Gas	Waste Gas	Sulfur
					of	Building (KW)		Year of	of	Operation	Consumption	of Oil	Flow Rate	Flow Rate	Content (f)
POC No.	Source No.	Installation	Building	Unit	Units	Input	Output (a)	Constr.	Fuel	per year	(L/yr)	MMBtu/hr)	dscf/min) (b)	(m3/yr) (c)	(Weight-%)
FGS Mass Flow Emission Limit															
32	1	Smith Barracks	8102	DPW	1	33	20	1997	Heating oil	5,840	994	0.01	1.1	10,744	0.277
32	2	Smith Barracks	8161	DPW	1	17	10	2003	Heating oil	5,840	6,407	0.04	7	69,255	0.277
32	3	Smith Barracks	8163	DPW	1	63	37	1992	Heating oil	5,840	13,678	0.09	14.9	147,849	0.277
32	4	Smith Barracks	8177	DPW	1	33	20	1998	Heating oil	5,840	16,191	0.1	17.6	175,013	0.277
32	5	Smith Barracks	8248	DPW	1	50	30	1996	Heating oil	5,840	8,315	0.05	9.1	89,879	0.277
32	6	Smith Barracks	8256	DPW	1	151	90	1975	Heating oil	8,760	118,416	0.5	86.1	1,279,990	0.277
32	7	Smith Barracks	8262	DPW	1	151	90	1979	Heating oil	5,840	29,063	0.18	31.7	314,150	0.277
32	8	Smith Barracks	8271	DPW	1	40	24	1997	Heating oil	5,840	8,412	0.05	9.2	90,928	0.277
32	9	Smith Barracks	8280	DPW	1	130	77	1988	Heating oil	8,760	30,701	0.13	22.3	331,855	0.277
32	10	Smith Barracks	8312	DPW	1	170	101	1994	Heating oil	5,840	46,630	0.3	50.8	504,036	0.277
32	11	Smith Barracks	8349	DPW	1	33	20	1998	Heating oil	5,840	14,032	0.09	15.3	151,676	0.277
32	12	Smith Barracks	8354	DPW	1	33	20	1998	Heating oil	5,840	12,591	0.08	13.7	136,099	0.277
32	13	Smith Barracks	8410	DPW	1	175	104	1995	Heating oil	5,840	46,826	0.3	51	506,155	0.277
32	14	Smith Barracks	8413	DPW	1	285	170	1987	Heating oil	8,760	60,834	0.26	44.2	657,571	0.277
32	15	Smith Barracks	8421	DPW	1	50	30	2003	Heating oil	5,840	9,162	0.06	10	99,034	0.277
32	16	Smith Barracks	8428	DPW	1	405	241	2004	Heating oil	5,840	56,341	0.36	61.4	609,005	0.277
32	17	Smith Barracks	8447	DPW	1	220	131	2005	Heating oil	5,840	3,416	0.02	3.7	36,924	0.277
32	18	Smith Barracks	8451	DPW	1	380	226	1998	Heating oil	5,840	53,418	0.34	58.2	577,409	0.277
32	19	Smith Barracks	8460	DPW	1	170	101	1999	Heating oil	5,840	85,367	0.54	93.1	922,754	0.277
32	20	Smith Barracks	8461	DPW	1	270	161	1998	Heating oil	5,840	37,645	0.24	41	406,915	0.277
32	21	Smith Barracks	8475	DPW	1	250	149	1985	Heating oil	8,760	48,734	0.21	35.4	526,779	0.277
32	22	Smith Barracks	8479	DPW	1	17	10	1988	Heating oil	5,840	4,830	0.03	5.3	52,209	0.277
32	23	Smith Barracks	8486	DPW	1	16	10	1991	Heating oil	5,840	0	0	0	0	0.277
32	24	Smith Barracks	8494	DPW	1	43	26	1992	Heating oil	5,840	13,841	0.09	15.1	149,611	0.277
32	25	Smith Barracks	8520	DPW	1	21	12	1991	Heating oil	5,840	2,037	0.01	2.2	22,018	0.277
32	26	Smith Barracks	8572A	DPW	1	250	149	1994	Heating oil	5,840	23,542	0.15	25.7	254,472	0.277
32	27	Smith Barracks	8572B	DPW	1	225	134	1999	Heating oil	5,840	23,542	0.15	25.7	254,472	0.277
32	28	Smith Barracks	8587	DPW	1	17	10	2001	Heating oil	5,840	1,548	0.01	1.7	16,733	0.277
32	29	Quartermaster	8711	DPW	1	108	64	1986	Heating oil	5,840	18,576	0.12	20.2	200,793	0.277
32	30	Quartermaster	8712	DPW	1	162	96	1997	Heating oil	5,840	39,632	0.25	43.2	428,393	0.277
32	31	Quartermaster	8714	DPW	1	25	15	1995	Heating oil	5,840	3,347	0.02	3.6	36,179	0.277
32	32	Quartermaster	8715A	DPW	1	495	295	1985	Heating oil	5,840	68,383	0.43	74.5	739,170	0.277
32	33	Quartermaster	8715B	DPW	1	80	48	1978	Heating oil	5,840	68,383	0.43	74.5	739,170	0.277
32	34	Quartermaster	8721	DPW	1	250	149	2005	Heating oil	5,840	23,522	0.15	25.6	254,256	0.277
32	35	Quartermaster	8725	DPW	1	15	9	2004	Heating oil	5,840	3,195	0.02	3.5	34,536	0.277
32	36	Quartermaster	8729	DPW	1	200	119	2005	Heating oil	5,840	13,070	0.08	14.2	141,277	0.277
32	37	Quartermaster	8782	DPW	1	70	42	1987	Heating oil	5,840	17,839	0.11	19.4	192,826	0.277
32	38	Quartermaster	8785	DPW	1	149	89	2003	Heating oil	5,840	26,161	0.17	28.5	282,781	0.277
32	39	Quartermaster	8786	DPW	1	149	89	2003	Heating oil	5,840	20,430	0.13	22.3	220,833	0.277
32	40	Quartermaster	8787	DPW	1	17	10	1987	Heating oil	5,840	7,456	0.05	8.1	80,594	0.277
32	41	Wetzel	8895	DPW	2	363	216	1985	Heating oil	8,760	71,153	0.3	51.7	769,112	0.277
32	42	Wetzel	8897	DPW	1	365	217	1996	Heating oil	8,760	114,897	0.49	83.5	1,241,952	0.277
32	43	Pfeffelbach	8980	DPW	1	50	30	1996	Heating oil	8,760	17,120	0.07	12.4	185,055	0.277
32	44	Baumholder Airfield	8996	DPW	1	285	170	1995	Heating oil	5,840	18,871	0.12	20.6	203,982	0.277
32	45	Smith Barracks ASP 4	9184	DPW	2	120	71	1989	Heating oil	5,840	21,377	0.14	23.3	231,070	0.277
32	46	Hoppstaedten	9870	DPW	1	125	74	2001	Heating oil	8,760	66,504	0.28	48.3	718,859	0.277

					Number								Emission Factors (kg/1,000L) (d)		
					of						Form-				
POC No.	Source No.	Installation	Building	Unit	Units	SO2	NOx	CO	PM	VOC	aldehyde	As	Cd	Cr	Cu
Flow Emission Limit															
32	1	Smith Barracks	8102	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	2	Smith Barracks	8161	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	3	Smith Barracks	8163	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	4	Smith Barracks	8177	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	5	Smith Barracks	8248	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	6	Smith Barracks	8256	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	7	Smith Barracks	8262	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	8	Smith Barracks	8271	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	9	Smith Barracks	8280	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	10	Smith Barracks	8312	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	11	Smith Barracks	8349	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	12	Smith Barracks	8354	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	13	Smith Barracks	8410	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	14	Smith Barracks	8413	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	15	Smith Barracks	8421	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	16	Smith Barracks	8428	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	17	Smith Barracks	8447	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	18	Smith Barracks	8451	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	19	Smith Barracks	8460	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	20	Smith Barracks	8461	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	21	Smith Barracks	8475	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	22	Smith Barracks	8479	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	23	Smith Barracks	8486	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	24	Smith Barracks	8494	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	25	Smith Barracks	8520	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	26	Smith Barracks	8572A	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	27	Smith Barracks	8572B	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	28	Smith Barracks	8587	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	29	Quartermaster	8711	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	30	Quartermaster	8712	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	31	Quartermaster	8714	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	32	Quartermaster	8715A	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	33	Quartermaster	8715B	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	34	Quartermaster	8721	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	35	Quartermaster	8725	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	36	Quartermaster	8729	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	37	Quartermaster	8782	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	38	Quartermaster	8785	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	39	Quartermaster	8786	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	40	Quartermaster	8787	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	41	Wetzel	8895	DPW	2	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	42	Wetzel	8897	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	43	Pfeffelbach	8980	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	44	Baumholder Airfield	8996	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	45	Smith Barracks ASP 4	9184	DPW	2	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04
32	46	Hoppstaedten	9870	DPW	1	4.72	2.4	0.6	0.24	0.041	7.32E-03	6.72E-05	5.04E-05	5.04E-05	1.01E-04

					Number							Annual Emissions (kg/yr)			
					of						Form-				
POC No.	Source No.	Installation	Building	Unit	Units	SO2	NOx	CO	PM	VOC	aldehyde	As	Cd	Cr	Cu
Flow Emission Limit															
32	1	Smith Barracks	8102	DPW	1	5	2	1	0.2	0	0.01	7.00E-05	5.00E-05	5.00E-05	1.00E-04
32	2	Smith Barracks	8161	DPW	1	30	15	4	1.5	0.3	0.05	4.00E-04	3.00E-04	3.00E-04	6.00E-04
32	3	Smith Barracks	8163	DPW	1	65	33	8	3	1	0.1	9.20E-04	6.90E-04	6.90E-04	1.00E-03
32	4	Smith Barracks	8177	DPW	1	76.4	38.9	9.7	3.9	0.66	0.12	1.00E-03	8.00E-04	8.00E-04	2.00E-03
32	5	Smith Barracks	8248	DPW	1	39.2	20	5	2	0.34	0.1	5.60E-04	4.20E-04	4.20E-04	8.40E-04
32	6	Smith Barracks	8256	DPW	1	558.9	284	71	28.4	4.83	0.87	8.00E-03	6.00E-03	6.00E-03	1.00E-02
32	7	Smith Barracks	8262	DPW	1	137.2	70	17	7	1.19	0.21	2.00E-03	1.00E-03	1.00E-03	3.00E-03
32	8	Smith Barracks	8271	DPW	1	39.7	20	5	2	0.3	0.06	5.70E-04	4.20E-04	4.20E-04	8.50E-04
32	9	Smith Barracks	8280	DPW	1	144.9	73.7	18.4	7.4	1.25	0.22	2.10E-03	2.00E-03	2.00E-03	3.10E-03
32	10	Smith Barracks	8312	DPW	1	220.1	112	28	11.2	1.9	0.34	3.10E-03	2.00E-03	2.00E-03	5.00E-03
32	11	Smith Barracks	8349	DPW	1	66.2	34	8.4	3	0.57	0.1	9.40E-04	7.10E-04	7.10E-04	1.40E-03
32	12	Smith Barracks	8354	DPW	1	59.4	30	7.6	3	0.51	0.09	8.50E-04	6.30E-04	6.30E-04	1.30E-03
32	13	Smith Barracks	8410	DPW	1	221	112	28.1	11	1.91	0.34	3.10E-03	2.40E-03	2.40E-03	4.70E-03
32	14	Smith Barracks	8413	DPW	1	287.1	146	36.5	15	2.48	0.45	4.10E-03	3.10E-03	3.10E-03	6.10E-03
32	15	Smith Barracks	8421	DPW	1	43.2	22	5.5	2	0.37	0.07	6.20E-04	4.60E-04	4.60E-04	9.20E-04
32	16	Smith Barracks	8428	DPW	1	265.9	135	33.8	14	2.3	0.41	3.80E-03	2.80E-03	2.80E-03	5.70E-03
32	17	Smith Barracks	8447	DPW	1	16.1	8	2	1	0.14	0.03	2.30E-04	1.70E-04	1.70E-04	3.40E-04
32	18	Smith Barracks	8451	DPW	1	252.1	128	32.1	13	2.18	0.39	3.60E-03	2.70E-03	2.70E-03	5.40E-03
32	19	Smith Barracks	8460	DPW	1	402.9	205	51.2	20	3.48	0.62	5.70E-03	4.30E-03	4.30E-03	8.60E-03
32	20	Smith Barracks	8461	DPW	1	177.7	90	22.6	9	1.54	0.28	2.50E-03	1.90E-03	1.90E-03	3.80E-03
32	21	Smith Barracks	8475	DPW	1	230	117	29.2	12	1.99	0.36	3.30E-03	2.50E-03	2.50E-03	4.90E-03
32	22	Smith Barracks	8479	DPW	1	22.8	12	2.9	1	0.2	0.04	3.20E-04	2.40E-04	2.40E-04	4.90E-04
32	23	Smith Barracks	8486	DPW	1	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	24	Smith Barracks	8494	DPW	1	65.3	33	8.3	3	0.56	0.1	9.30E-04	7.00E-04	7.00E-04	1.40E-03
32	25	Smith Barracks	8520	DPW	1	9.6	5	1.2	0	0.08	0.01	1.40E-04	1.00E-04	1.00E-04	2.10E-04
32	26	Smith Barracks	8572A	DPW	1	111.1	57	14.1	6	0.96	0.17	1.60E-03	1.20E-03	1.20E-03	2.40E-03
32	27	Smith Barracks	8572B	DPW	1	111.1	57	14.1	6	0.96	0.17	1.60E-03	1.20E-03	1.20E-03	2.40E-03
32	28	Smith Barracks	8587	DPW	1	7.3	4	0.9	0	0.06	0.01	1.00E-04	7.80E-05	7.80E-05	1.60E-04
32	29	Quartermaster	8711	DPW	1	87.7	45	11.1	4	0.76	0.14	1.20E-03	9.40E-04	9.40E-04	1.90E-03
32	30	Quartermaster	8712	DPW	1	187.1	95	23.8	10	1.62	0.29	2.70E-03	2.00E-03	2.00E-03	4.00E-03
32	31	Quartermaster	8714	DPW	1	15.8	8	2	1	0.14	0.02	2.20E-04	1.70E-04	1.70E-04	3.40E-04
32	32	Quartermaster	8715A	DPW	1	322.8	164	41	16	2.79	0.5	4.60E-03	3.40E-03	3.40E-03	6.90E-03
32	33	Quartermaster	8715B	DPW	1	322.8	164	41	16	2.79	0.5	4.60E-03	3.40E-03	3.40E-03	6.90E-03
32	34	Quartermaster	8721	DPW	1	111	56	14.1	6	0.96	0.17	1.60E-03	1.20E-03	1.20E-03	2.40E-03
32	35	Quartermaster	8725	DPW	1	15.1	8	1.9	1	0.13	0.02	2.10E-04	1.60E-04	1.60E-04	3.20E-04
32	36	Quartermaster	8729	DPW	1	61.7	31	7.8	3	0.53	0.1	8.80E-04	6.60E-04	6.60E-04	1.30E-03
32	37	Quartermaster	8782	DPW	1	84.2	43	10.7	4	0.73	0.13	1.20E-03	9.00E-04	9.00E-04	1.80E-03
32	38	Quartermaster	8785	DPW	1	123.5	63	15.7	6	1.07	0.19	1.80E-03	1.30E-03	1.30E-03	2.60E-03
32	39	Quartermaster	8786	DPW	1	96.4	49	12.3	5	0.83	0.15	1.40E-03	1.00E-03	1.00E-03	2.10E-03
32	40	Quartermaster	8787	DPW	1	35.2	18	4.5	2	0.3	0.05	5.00E-04	3.80E-04	3.80E-04	7.50E-04
32	41	Wetzel	8895	DPW	2	335.8	171	43	17.1	2.9	0.52	4.80E-03	4.00E-03	4.00E-03	7.00E-03
32	42	Wetzel	8897	DPW	1	542	276	69	28	4.7	0.8	7.70E-03	5.80E-03	5.80E-03	1.00E-02
32	43	Pfeffelbach	8980	DPW	1	80.8	41	10.3	4	0.7	0.13	1.20E-03	8.60E-04	8.60E-04	1.70E-03
32	44	Baumholder Airfield	8996	DPW	1	89.1	45	11.3	5	0.77	0.14	1.30E-03	9.50E-04	9.50E-04	1.90E-03
32	45	Smith Barracks ASP 4	9184	DPW	2	100.9	51	13	5.1	0.87	0.16	1.40E-03	1.00E-03	1.00E-03	2.00E-03
32	46	Hoppstaedten	9870	DPW	1	313.9	160	39.9	16	2.71	0.49	4.50E-03	3.40E-03	3.40E-03	6.70E-03

					Number							Estimated Emissions (g/hr)			
					of						Form-				
POC No.	Source No.	Installation	Building	Unit	Units	SO2	NOx	CO	PM	VOC	aldehyde	As	Cd	Cr	Cu
Flow Emission Limit						(e)	(e)	(e)	(e)	3,000	100	5	1	5	25
32	1	Smith Barracks	8102	DPW	1	0.8	0.4	0.1	0	0.01	0	1.10E-05	8.60E-06	8.60E-06	1.70E-05
32	2	Smith Barracks	8161	DPW	1	5.2	2.6	0.7	0.3	0.04	0.01	7.40E-05	5.50E-05	5.50E-05	1.10E-04
32	3	Smith Barracks	8163	DPW	1	11.1	5.6	1.4	0.6	0.1	0.02	1.60E-04	1.20E-04	1.20E-04	2.40E-04
32	4	Smith Barracks	8177	DPW	1	13.1	6.7	1.7	0.7	0.11	0.02	1.90E-04	1.40E-04	1.40E-04	2.80E-04
32	5	Smith Barracks	8248	DPW	1	6.7	3.4	0.9	0.3	0.06	0.01	9.60E-05	7.20E-05	7.20E-05	1.40E-04
32	6	Smith Barracks	8256	DPW	1	63.8	32.4	8.1	3.2	0.55	0.1	9.10E-04	6.80E-04	6.80E-04	1.40E-03
32	7	Smith Barracks	8262	DPW	1	23.5	11.9	3	1.2	0.2	0.04	3.30E-04	2.50E-04	2.50E-04	5.00E-04
32	8	Smith Barracks	8271	DPW	1	6.8	3.5	0.9	0.3	0.06	0.01	9.70E-05	7.30E-05	7.30E-05	1.50E-04
32	9	Smith Barracks	8280	DPW	1	16.5	8.4	2.1	0.8	0.14	0.03	2.40E-04	1.80E-04	1.80E-04	3.50E-04
32	10	Smith Barracks	8312	DPW	1	37.7	19.2	4.8	1.9	0.33	0.06	5.40E-04	4.00E-04	4.00E-04	8.00E-04
32	11	Smith Barracks	8349	DPW	1	11.3	5.8	1.4	0.6	0.1	0.02	1.60E-04	1.20E-04	1.20E-04	2.40E-04
32	12	Smith Barracks	8354	DPW	1	10.2	5.2	1.3	0.5	0.09	0.02	1.40E-04	1.10E-04	1.10E-04	2.20E-04
32	13	Smith Barracks	8410	DPW	1	37.8	19.2	4.8	1.9	0.33	0.06	5.40E-04	4.00E-04	4.00E-04	8.10E-04
32	14	Smith Barracks	8413	DPW	1	32.8	16.7	4.2	1.7	0.28	0.05	4.70E-04	3.50E-04	3.50E-04	7.00E-04
32	15	Smith Barracks	8421	DPW	1	7.4	3.8	0.9	0.4	0.06	0.01	1.10E-04	7.90E-05	7.90E-05	1.60E-04
32	16	Smith Barracks	8428	DPW	1	45.5	23.2	5.8	2.3	0.39	0.07	6.50E-04	4.90E-04	4.90E-04	9.70E-04
32	17	Smith Barracks	8447	DPW	1	2.8	1.4	0.4	0.1	0.02	0	3.90E-05	2.90E-05	2.90E-05	5.90E-05
32	18	Smith Barracks	8451	DPW	1	43.2	22	5.5	2.2	0.37	0.07	6.10E-04	4.60E-04	4.60E-04	9.20E-04
32	19	Smith Barracks	8460	DPW	1	69	35.1	8.8	3.5	0.6	0.11	9.80E-04	7.40E-04	7.40E-04	1.50E-03
32	20	Smith Barracks	8461	DPW	1	30.4	15.5	3.9	1.5	0.26	0.05	4.30E-04	3.20E-04	3.20E-04	6.50E-04
32	21	Smith Barracks	8475	DPW	1	26.3	13.4	3.3	1.3	0.23	0.04	3.70E-04	2.80E-04	2.80E-04	5.60E-04
32	22	Smith Barracks	8479	DPW	1	3.9	2	0.5	0.2	0.03	0.01	5.60E-05	4.20E-05	4.20E-05	8.30E-05
32	23	Smith Barracks	8486	DPW	1	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	24	Smith Barracks	8494	DPW	1	11.2	5.7	1.4	0.6	0.1	0.02	1.60E-04	1.20E-04	1.20E-04	2.40E-04
32	25	Smith Barracks	8520	DPW	1	1.6	0.8	0.2	0.1	0.01	0	2.30E-05	1.80E-05	1.80E-05	3.50E-05
32	26	Smith Barracks	8572A	DPW	1	19	9.7	2.4	1	0.16	0.03	2.70E-04	2.00E-04	2.00E-04	4.10E-04
32	27	Smith Barracks	8572B	DPW	1	19	9.7	2.4	1	0.16	0.03	2.70E-04	2.00E-04	2.00E-04	4.10E-04
32	28	Smith Barracks	8587	DPW	1	1.3	0.6	0.2	0.1	0.01	0	1.80E-05	1.30E-05	1.30E-05	2.70E-05
32	29	Quartermaster	8711	DPW	1	15	7.6	1.9	0.8	0.13	0.02	2.10E-04	1.60E-04	1.60E-04	3.20E-04
32	30	Quartermaster	8712	DPW	1	32	16.3	4.1	1.6	0.28	0.05	4.60E-04	3.40E-04	3.40E-04	6.80E-04
32	31	Quartermaster	8714	DPW	1	2.7	1.4	0.3	0.1	0.02	0	3.90E-05	2.90E-05	2.90E-05	5.80E-05
32	32	Quartermaster	8715A	DPW	1	55.3	28.1	7	2.8	0.48	0.09	7.90E-04	5.90E-04	5.90E-04	1.20E-03
32	33	Quartermaster	8715B	DPW	1	55.3	28.1	7	2.8	0.48	0.09	7.90E-04	5.90E-04	5.90E-04	1.20E-03
32	34	Quartermaster	8721	DPW	1	19	9.7	2.4	1	0.16	0.03	2.70E-04	2.00E-04	2.00E-04	4.10E-04
32	35	Quartermaster	8725	DPW	1	2.6	1.3	0.3	0.1	0.02	0	3.70E-05	2.80E-05	2.80E-05	5.50E-05
32	36	Quartermaster	8729	DPW	1	10.6	5.4	1.3	0.5	0.09	0.02	1.50E-04	1.10E-04	1.10E-04	2.30E-04
32	37	Quartermaster	8782	DPW	1	14.4	7.3	1.8	0.7	0.12	0.02	2.10E-04	1.50E-04	1.50E-04	3.10E-04
32	38	Quartermaster	8785	DPW	1	21.1	10.8	2.7	1.1	0.18	0.03	3.00E-04	2.30E-04	2.30E-04	4.50E-04
32	39	Quartermaster	8786	DPW	1	16.5	8.4	2.1	0.8	0.14	0.03	2.40E-04	1.80E-04	1.80E-04	3.50E-04
32	40	Quartermaster	8787	DPW	1	6	3.1	0.8	0.3	0.05	0.01	8.60E-05	6.40E-05	6.40E-05	1.30E-04
32	41	Wetzel	8895	DPW	2	38.3	19.5	4.9	1.9	0.33	0.06	5.50E-04	4.10E-04	4.10E-04	8.20E-04
32	42	Wetzel	8897	DPW	1	61.9	31.5	7.9	3.1	0.54	0.1	8.80E-04	6.60E-04	6.60E-04	1.30E-03
32	43	Pfeffelbach	8980	DPW	1	9.2	4.7	1.2	0.5	0.08	0.01	1.30E-04	9.80E-05	9.80E-05	2.00E-04
32	44	Baumholder Airfield	8996	DPW	1	15.3	7.8	1.9	0.8	0.13	0.02	2.20E-04	1.60E-04	1.60E-04	3.30E-04
32	45	Smith Barracks ASP 4	9184	DPW	2	17.3	8.8	2.2	0.9	0.15	0.03	2.50E-04	1.80E-04	1.80E-04	3.70E-04
32	46	Hoppstaedten	9870	DPW	1	35.8	18.2	4.6	1.8	0.31	0.06	5.10E-04	3.80E-04	3.80E-04	7.70E-04

					Number				
					of	Measured	Data (firm):		
POC No.	Source No.	Installation	Building	Unit	Units	Opacity	Oil Deriva	Heat Loss	Date
	FGS Mass Flow Emission Limit					1	None	11% (g)	
32	1	Smith Barracks	8102	DPW	1	0	no	6%	18. Jan 07
32	2	Smith Barracks	8161	DPW	1	0	no	5%	31. Jan 07
32	3	Smith Barracks	8163	DPW	1	1	no	9%	22. Jan 07
32	4	Smith Barracks	8177	DPW	1	0	no	5%	18. Jan 07
32	5	Smith Barracks	8248	DPW	1	0	no	6%	08. Jan 07
32	6	Smith Barracks	8256	DPW	1	0	no	7%	11. Jan 07
32	7	Smith Barracks	8262	DPW	1	0	no	12%	08. Jan 07
32	8	Smith Barracks	8271	DPW	1	0	no	6%	08. Jan 07
32	9	Smith Barracks	8280	DPW	1	0	no	9%	08. Jan 07
32	10	Smith Barracks	8312	DPW	1	0	no	8%	15. Jan 07
32	11	Smith Barracks	8349	DPW	1	0	no	7%	11. Jan 07
32	12	Smith Barracks	8354	DPW	1	0	no	6%	08. Jan 07
32	13	Smith Barracks	8410	DPW	1	0	no	8%	22. Jan 07
32	14	Smith Barracks	8413	DPW	1	0	no	7%	15. Jan 07
32	15	Smith Barracks	8421	DPW	1	0	no	8%	19. Jan 07
32	16	Smith Barracks	8428	DPW	1	1	no	7%	15. Jan 07
32	17	Smith Barracks	8447	DPW	1	0	no	9%	18. Jan 07
32	18	Smith Barracks	8451	DPW	1	0	no	8%	10. Jan 07
32	19	Smith Barracks	8460	DPW	1	0	no	6%	11. Jan 07
32	20	Smith Barracks	8461	DPW	1	0	no	9%	31. Jan 07
32	21	Smith Barracks	8475	DPW	1	0	no	10%	10. Jan 07
32	22	Smith Barracks	8479	DPW	1	0	no	7%	10. Jan 07
32	23	Smith Barracks	8486	DPW	1		no data available		
32	24	Smith Barracks	8494	DPW	1	0	no	6%	10. Jan 07
32	25	Smith Barracks	8520	DPW	1	0	no	7%	04. Jan 07
32	26	Smith Barracks	8572A	DPW	1	0	no	7%	04. Jan 07
32	27	Smith Barracks	8572B	DPW	1	0	no	7%	04. Jan 07
32	28	Smith Barracks	8587	DPW	1	4	no	7%	04. Jan 07
32	29	Quartermaster	8711	DPW	1	0	no	9%	09. Jan 07
32	30	Quartermaster	8712	DPW	1	0	no	9%	18. Jan 07
32	31	Quartermaster	8714	DPW	1	0	no	17%	17. Jan 07
32	32	Quartermaster	8715A	DPW	1	0	no	10%	09. Jan 07
32	33	Quartermaster	8715B	DPW	1	0	no	17%	09. Jan 07
32	34	Quartermaster	8721	DPW	1	0	no	8%	09. Jan 07
32	35	Quartermaster	8725	DPW	1	0	no	5%	09. Jan 07
32	36	Quartermaster	8729	DPW	1	0	no	8%	18. Jan 07
32	37	Quartermaster	8782	DPW	1	0	no	7%	04. Jan 07
32	38	Quartermaster	8785	DPW	1	0	no	7%	04. Jan 07
32	39	Quartermaster	8786	DPW	1	0	no	8%	04. Jan 07
32	40	Quartermaster	8787	DPW	1	0	no	7%	04. Jan 07
32	41	Wetzel	8895	DPW	2	0	no	10%	04. Jan 07
32	42	Wetzel	8897	DPW	1	0	no	8%	08. Jan 07
32	43	Pfeffelbach	8980	DPW	1	0	no	7%	28. Jun 06
32	44	Baumholder Airfield	8996	DPW	1	0	no	6%	05. Jan 06
32	45	Smith Barracks ASP 4	9184	DPW	2	0	no	9%	31. Jan 07
32	46	Hoppstaedten	9870	DPW	1		no data available		

grey cells indicate exceedance of criteria