

# **POLLUTION PREVENTION PROGRAM PLAN**

National Aeronautics and Space Administration  
Goddard Space Flight Center  
Wallops Flight Facility  
Wallops Island, Virginia



November 2010

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Goddard Space Flight Center  
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Wallops Island, Virginia

Reviewed by:

Carolyn Love

Associate Chief, Medical and Environmental Management

Division

11/5/10

Date



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## **P.1 PURPOSE**

The purpose of the Pollution Prevention Program Plan (P3) is to provide a formal procedure for conducting Pollution Prevention (P2), waste minimization, and green procurement activities at Goddard Space Flight Center's (GSFC's) Wallops Flight Facility (WFF), including roles and responsibilities, evaluation of P3 opportunities, implementation of P3 projects, and development of metrics to evaluate those projects. This plan will be reviewed annually.

## **P.2 APPLICABILITY**

This plan is applicable to all GSFC WFF personnel, facilities, and activities, including all permanent and temporary activities at Wallops Island, Virginia only. It also applies to all WFF tenants organizations, contractors, grantees, clubs, and other entities operating under the auspices of GSFC's WFF or on GSFC's WFF property as required by law and as directed by contractual, grant, and agreement documents.

## **P.3 AUTHORITY**

Authority for this P3 plan comes from:

- NASA Policy Directive (NPD) 8500.1B NASA Environmental Management
- NASA Procedural Requirements (NPR) 8530.1A Affirmative Procurement Program and Plan for Environmentally Preferable Products
- Goddard Policy Directive (GPD) 8500.1B, Environmental Policy and Program Management

## **P.4 REFERENCES**

References for this document include:

- Emergency Planning and Community-Right-to Know Act of 1986 (EPCRA) Public Law 99-499: Superfund Amendments and Reauthorization Act (SARA), Title III, Section 312 and 313
- Clean Air Act (CAA), Public Law 101-549, amended November 15, 1990
- Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq.)
- Resource Conservation and Recovery Act (RCRA) of 1977, as amended by the Hazardous and Solid Waste Amendments of 1984 (42 U.S.C. 6002)
- 40 CFR 372 –Toxic Chemical Release Reporting Community Right-to-Know
- 2002 Farm Security and Rural Investment Act, Section 9002
- EO 13514; federal leadership in Environmental, Energy, and Economic Performance
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management
- GPR 8500.3B Waste Management
- GPR 8500.4B Air Quality Management
- GSFC 23-54 Hazardous Waste Disposal Inventory

## P.5 CANCELLATION

Pollution Prevention Plan for Wallops Flight Facility, dated February 10, 2005, is cancelled by this document.

## P.6 SAFETY

Assessment Team members will be advised of relevant safety procedures by process owners in each work area prior to the start of the assessment.

## P.7 METRICS

Monitoring metrics are specific to the project but may include any or all of the following:

- changes in volume of waste generation
- changes in volume of raw materials purchased
- changes in toxicity of waste streams
- quantity of material recycled
- revenue from recycling
- dollars saved

## P.8 DEFINITIONS

- a. **Affirmative Procurement** – Environmental stewardship through the utilization of the Federal Government’s purchasing power to create markets, spur competition, create business and employment opportunities, enhance local and regional economies, reduce depletion of natural resources, and reduce the amount of material ending up in landfills through the preferential procurement of environmentally preferable goods and services. This program for acquiring Environmental Protection Agency (EPA)-designated products is required by the Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C. 6962) and Executive Order 13423 of January 24, 2007, "Strengthening Federal Environmental, Energy, and Transportation Management."
- b. **Biobased Product** – As defined by Farm Security and Rural Investment Act of 2002 (FSRIA), a product determined by the Secretary of Agriculture to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine mammals) or forestry materials. Biobased industrial products are produced from renewable plant and animal sources, and are generally presumed to be more environmentally benign than their petroleum counterparts.
- c. **Comprehensive Procurement Guidelines (CPG)** – The list of Environmental Protection Agency (EPA) designated items that must contain recycled content when purchased by federal, state, and local agencies, or by government contractors using appropriated federal funds. EPA is required to update the CPG every 2 years.
- d. **Environmentally Preferable** - Products or services that have a lesser or reduced adverse effect on human health and the environment when compared with competing

- products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.
- e. **Life Cycle Cost Analysis** - A comparison of the amortized annual costs of using a product with respect to a product that is not CPG-compliant. Costs under consideration include capital costs, installation costs, operating costs, maintenance costs, and disposal costs discounted over the lifetime of the product.
  - f. **Ozone Depleting Substances (ODS)** - Any substances containing chlorofluorocarbons (CFC) and/or having characteristics of depleting tri-atomic oxygen.
  - g. **Persistent, Bioaccumulative, and Toxic (PBT) Chemicals** - Highly toxic, long-lasting substances that can build up in the food chain to levels that are harmful to human and ecosystem health. They are associated with a range of adverse human health effects, including neurological, reproductive, and developmental problems; cancer; and genetic impacts.
  - h. **Pollution** - Any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment, including fugitive emissions.
  - i. **Pollution Prevention (P2)** – Source reduction as defined in the Pollution Prevention Act and 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 EO 13423 specifically excludes off site recycling from its definition of pollution prevention.
  - j. **Pollution Prevention Program (P3)** – At WFF, the Pollution Prevention Program includes pollution prevention (P2), waste minimization, and green procurement.
  - k. **Recovered Material** - Waste materials and byproducts which have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process. .
  - l. **Recycling** – The series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of new products, other than fuel for producing heat or power by combustion.
  - m. **Release** - Any planned or unplanned release of toxic chemicals to the environment including air emissions, off-site transfers of chemicals, waste water discharges, underground injections of waste, and wastes disposed of in on-site landfills. Examples include shipments of hazardous wastes to Treatment, Storage, and Disposal Facilities (TSDF).
  - n. **Request Originator** - The individual generating the procurement specification.
  - o. **Recovered Materials Advisory Notices (RMANs)** – Notices through which, EPA provides purchasing guidance and recommends recovered and post-consumer material content levels for designated items. RMAN recommendations are guidance only.
  - p. **Source Reduction** - Any practice that either reduces the amount of hazardous substance, pollutant, or contaminant entering any waste stream or released into the environment before recycling, treatment, or disposal or reduces the hazards to public health and the environment associated with the release of such substances, pollutants,

or contaminants.

- q. **Toxic Release Inventory (TRI) Chemical** - A chemical or chemical category listed in 40 CFR 372.65. Through EPCRA, Congress mandated that a TRI be made public. The TRI provides citizens with accurate information about potentially hazardous chemicals and their use so that communities have more power to hold companies accountable and make informed decisions about how toxic chemicals are to be managed.
- r. **Waste Minimization** – A program required by Resource Conservation and Recovery Act involving source reduction and/or environmentally sound recycling of hazardous waste.

## 1.0 COMMITMENT

In its Policy Directive GPD 8500.1B, *Environmental Program Management*, Goddard Space Flight Center states:

“The Goddard Space Flight Center (GSFC) missions expand knowledge of the Earth and its environment, the solar system, and the universe. To maintain our nation's leadership in this endeavor, GSFC commits to conducting missions in a manner that promotes environmental stewardship. As an integral part of all mission planning and implementation, GSFC’s environmental policy is to:

- a. Consider the neighboring natural environment while executing GSFC’s mission;
- b. Comply with applicable Federal, state, and local legislation and regulations; Executive Orders (EO); NASA policies and other requirements;
- c. **Prevent pollution** and conserve natural resources;
- d. Implement pragmatic and cost effective solutions to environmental problems;
- e. Communicate with GSFC’s family, our partners, and the public; and
- f. Continue to improve our environmental performance through our Environmental Management System (EMS) including:
  - (1) Promote awareness through education and training;
  - (2) Consider the environment as we do our jobs;
  - (3) Explore advances in environmental technology; and
  - (4) Provide a framework for setting objectives and targets.
 These commitments enable each of us to do our part for environmental stewardship in our backyard

To accomplish these objectives, WFF will implement projects for reducing or eliminating generation of waste through source reduction and other P3 methodologies. These projects will extend to air emissions, wastewater effluents, solid wastes, and hazardous wastes.

Priority is given to source and/or toxicity reduction. Where this is infeasible, recycling

will be explored. Where recycling is not an alternative, treatment to reduce waste volume and/or toxicity shall be implemented. Finally, waste will be managed in a manner to minimize present and future effects on human health and the environment. WFF is committed to reducing the quantity and toxicity of generated wastes.

Pollution prevention is the responsibility of *all* of WFF employees. WFF is committed to identifying and implementing P3 opportunities through solicitation, encouragement, and involvement of all employees.

## **2.0 PROGRAM IMPLEMENTATION**

The P3 at WFF will be managed in accordance with this plan. This plan and the policies and procedures established to implement the plan are developed by the Wallops Environmental Office and approved by the Associate Chief, Medical and Environmental Division. The P3 is implemented by the P3 manager with the assistance of other Wallops employees who may originate, develop, evaluate, and implement specific pollution prevention projects.

Employees will be trained on the elements of P3 through the Environmental Management System training and at RCRA Annual Generator Training. The plan will also be available on the website at [http://sites.wff.nasa.gov/code250/pollution\\_prevention.html](http://sites.wff.nasa.gov/code250/pollution_prevention.html).

## **3.0 ROLES AND RESPONSIBILITIES**

### **3.1 ASSOCIATE CHIEF, MEDICAL AND ENVIRONMENTAL MANAGEMENT DIVISION**

The Associate Chief is responsible for environmental issues at WFF. As such he/she will approve overall P3 policies and procedures. The Associate Chief signature will be evidence of plan approval.

### **3.2 POLLUTION PREVENTION PROGRAM MANAGER**

The program manager has overall responsibility for the development and implementation of the P3 plan. The program manager has the responsibility for organizing, implementing, managing, or monitoring the following conducting P2, waste minimization, and green procurement activities methods and programs.

- integrating pollution prevention into the installation's comprehensive planning;
- preparing and updating baselines for hazardous material use and waste generation;
- coordinating the performance of opportunity assessments to identify and evaluate P3 procedural changes, projects, and equipment;
- recommending P3 projects and equipment;
- recommending policies for identifying, procuring, and tracking hazardous materials; and
- developing the installation's P3 training programs.

### 3.3 ASSESSMENT TEAM

An assessment team will be formed as needed to perform P3 opportunity assessments. The primary responsibilities of the assessment team are to:

- perform opportunity assessments;
- aid in the implementation of projects identified by the opportunity assessment, if recommended by the program manager and approved by management of the process owner's organization, and
- monitor the performance of P3 projects.

The assessment team may be led by the P3 manager or by a team leader who has a vested interest in the particular waste streams or operations to be investigated. The results of all pollution prevention projects will be reported to the Environmental Office.

### 3.4 EMPLOYEES

Pollution prevention is the responsibility of all WFF employees.

### 4.0 WFF POLLUTION PREVENTION PROGRAM GOALS

The long-term goals of WFF are to minimize the use of hazardous materials, minimize the generation of wastes, and minimize emissions of pollutants to the environment. Table 4.1 lists WFF P3 goals.

Table 4.1 WFF Pollution Prevention Goals

Waste Type	Goal (%)	Baseline Year	Target Year December 31
Reduce SOx Emissions	99%	2008	2011
Reduce Quantity of Virgin Chemicals Disposed	50%	2008	2012
Reduce Class 1 Ozone-Depleting Substances (ODS) Use (Use alternatives as approved by EPA SNAP program)	100%	N/A	2010

Waste Type	Goal (%)	Baseline Year	Target Year December 31
Achieve nonhazardous Solid Waste Diversion Rate (recycling, donation, reuse, repair)	50%	N/A	2015
Achieve Construction and Demolition Materials Solid Waste Diversion Rate (recycling, donation, reuse, repair)	50%	N/A	2015
Increase Purchase of Green Products and Services	40%	2008	2012
Reduce the number of Waivers required	10%	2008	2012

## 5.0 BASELINE DATA

A baseline data is necessary to assess and thereby target specific waste streams, hazardous materials, and activities for P3. Data can be compiled from annual Tier II, Toxic Release Inventory (TRI), ODS, Biennial Hazardous Waste reports, NASA Environmental Tracking System (NETS) reporting calls, chemical inventories, and from the pertinent year's Hazardous Waste Disposal Inventory forms.

### 5.1 TOXIC AND HAZARDOUS CHEMICALS

The following waste streams shown in Table 5.1 below will be targeted for projects to reduce the quantity of toxic and hazardous chemical.

Table 5.1 WWF Waste Streams

Bldg	Type of area					Codes	Description
	HW	Oil/Oily rags	Universal	Project	Parts Washer		
A41				•		Non	Hydraulic oil from antenna changes
B31 Rm 102 GM		•			•	Non	Used oil from mowers Solvent PW
B129		•					Oily rags
D1 N. hanger AAI		•					Used oil
D1 N101 AAI	•	•	•			F001 F003 F005	Solvent rags w/ MEK, Acetone, Inhibisol used on aircraft parts, batteries
D2					•	non	Nonhaz PW
D8		•			•	Non	Oily rags, PW from cleaning boiler parts
D37	•					D001	JP8 fuel samples aircraft fuel storage tanks
D50 garage		•				Non	Used oil from maintenance at FOTW
E2 C145			•			UW, Non	UW batteries
E11		•				non	Oily rags, used oil
E107 2 <sup>nd</sup> Fl Kit			•			UW	Batteries
E109 170				•			
E109 153			•			UW	Batteries
E109 272	•		•			D001, D008, UW	Alcohol wipes, batteries, stycast, solder
E109 273	•		•			D001, D008, UW	Alcohol wipes, batteries, stycast, solder
E109 275	•		•			D001, D008, UW	Alcohol wipes, batteries, stycast, solder
E109 276	•					D001, D008,	Alcohol wipes, stycast, solder
F1	•					D001	Alcohol rags
F7 140	•					F001,F003	Methylene Chloride, Acetone and MIBK rags
F7 128			•			UW	Batteries
F7 141		•				Non	Oily rags
F7 142	•					F003, F005s	MEK, acetone rags
F10 machine shop	•	•			•	F003, D008, Non	Acetone rags, Nonhaz cutting fluid, oil, and blaster grit from machine shop for rocket assembly
F10A		•				Non	Used oil from machine shop
F10B	•					D001 F003F005	Petroleum Naptha from cleaning paint gun
F10 W301, N103,	•					D008	Solder past and wipes from circuit board for rockets
F10 N230 N221	•					D008	Solder past and wipes from circuit board for rockets

Bldg	Type of area					Codes	Description
	HW	Oil/Oily rags	Universal	Project	Parts Washer		
F10 W302			•			UW	Nicad batteries from rockets
F10N119 Boiler room		•				Non	Used oil, oily rags
F10 N130 ACS	•					D001	Alcohol and alcohol rags,
F16 105C Etron			•			UW	Universal waste batteries
F16E1 106		•	•			UW, non	Crushed fluorescent tubes from maintenance, oily rags,UW lead acid batteries,
F16AC 103		•	•			Non, UW	Refrigerant oil, oily rags,UW batteries, thermostats from changeouts
F16G 128	•	•			•	Non, D018 D039, Non	Used oil, fuel filters, nonhaz PW, solvent rags (tetrachloroethane, Bladeen)
F16PS 124	•					D001, D035,F003, F005	Paint related materials, thinner, paint, paint rags
F-160 C125			•			UW	UW Batteries
F160 E114	•					D001	Fuel samples
F160 E115	•	•				Non	Used oil, out dated chemicals from chemical laboratory
H-100			•				
M15 104	•	•				F002, F003, non	Alcohol, oily, enslove rags, acetone rags
M15 106				•		D003	Reactive trimmings from rocket motors
M16	•					F002, F003, non	Ensolve rags, acetone rags
N-159 Hangar	•	•				D001, Non;	JP8 (D001), Oil (non), oily rags (non)
N-159 E106			•			UW	Lead acid batteries, nicad batteries
N159 PB	•					D001,D035, F003, F005	Paint Waste, Paint Thinner
N159 E207		•				Non	Oily rags
N159 BGC Lab E101	•					F003, non	Acetone, Methanol, Oxazine 1perchlorate (non) from bio lab, glutaraldehyde
N162 Rm 114			•			UW	UW NiCAD batteries from antennae controls changeouts
N165		•		•	•	Non	Used oil from antenna changes, PW Nonhaz

Bldg	Type of area					Codes	Description
	HW	Oil/Oily rags	Universal	Project	Parts Washer		
U25		•				Non;	Used oil, oily rags
U30				•		Non	Used oil from antenna changes, oily rags
U70				•		Non	Oily rags, used oil from antenna changes,
V25 Rm 103		•				Non	Oily rags from maintenance
V-55		•				Non	Oily rags from spin balance
V67	•					D003	Trimblings from rocket motors
W15 Bay		•				D001, Non	Used oil from target/vandal repair
W40		•				Non	Used oil, oily rags
W65 Bay 6		•				Non	Oily rags and used oil from preventative maintenance, solvent rags
W65 Bay 1		•		•	•	UW, NOn	UW batteries, Oily rags
X15 UAV Rm110	•		•			UW, D008	UW batteries, Lead solder scraps
X30 Hood room	•					D001, F003, F005, D035, Non	Paint thinner from cleaning brushes and Nonhaz blaster grit from sandblasting, paint rags
X35 100		•				Non	Used oil and oily rags from launcher maintenance
X55 106			•			UW	UW batteries
Y15/Y20				•		D003	Trimblings from rocket motors
Y55 101				•		Non	Oily rags
Z25				•		Non	

## 5.2 SOLID WASTE DIVERSION AND RECYCLING

Opportunities for solid waste diversion may include recycling, donation, reuse and repair. Fiscal year 2008 recycling totals are included in Appendix A. Current recycling opportunities include:

- drum and pail reuse,
- plastic beverage containers,
- aluminum beverage containers,
- toner cartridges,
- scrap metal,
- packing peanuts,
- cardboard, and
- white paper.

Recycling activities at WFF will be conducted in accordance with GPR 8500.3 Waste Management.

### 5.3 GREEN PURCHASING

The Federal green purchasing program gives preference to:

- recycled content products
- Energy Star products
- water efficient products
- energy from renewable sources
- biobased products
- environmentally preferable products and services, including EPEAT –registered electronic products
- alternative fueled Vehicles and alternative fuels
- products with low or no toxic or hazardous constituents
- non-ozone depleting substances

Recycled content and biobased products will be discussed below

#### 5.3.1 RECYCLED CONTENT PRODUCTS

Federal agencies and their contractors are directed by Executive Orders 13514 and 13423 and the Resource Conservation and Recovery Act (RCRA) Section 6002 to develop “affirmative procurement” programs to ensure that designated items with recycled content are purchased by the government and its contractors whenever possible, and to obtain a waiver if purchase of a designated item is not possible because of any of a number of pre-specified reasons. In addition, 40 CFR 247.6 requires affirmative procurement programs to have the following four elements: a preference program for purchasing designated items; a promotion program; procedures for obtaining and verifying estimates and certification of recovered material content; and annual review and monitoring of the program.

The Affirmative Procurement Program will be conducted in accordance with the protocols established in NPR 8530.1A Affirmative Procurement Program and Plan for Environmentally Preferable Products. Those initiating a purchase will be responsible for determining if the item is designated on the Environmental Protection Agency’s Comprehensive Procurement Guidelines List. The Procurement Office will ensure that affirmative procurement is considered in every purchase and aid the initiator in market research.

The Environmental Office will maintain the waiver program and enter CPG purchase data into the NASA Environmental Tracking System (NETS) annually to quantify and review the progress of the program. The Affirmative Procurement program will be promoted by the Environmental Office through Special Announcements, Safety and Environmental newsletter, Inside Wallops, Wallops All, Earth Day, America Recycles Day, training classes or other appropriate avenues. The Environmental office will also annually spot check estimates and certification of recovered material content on non construction products. Certification of recovered material for construction related

products will be checked by Facilities Management personnel.

### **5.3.2 BIOBASED PRODUCTS**

The biobased program will be conducted in a similar manner to the affirmative procurement program. Those initiating a purchase will be responsible for determining if the item is on the Department of Agriculture product designation list. All other elements of the program will mirror the affirmative procurement program.

## **6.0 POLLUTION PREVENTION PROGRAM OPPORTUNITY ASSESSMENT**

The P3 manager will examine the previous year's inventory against the baseline inventory to target opportunities for assessment. Once a candidate chemical or waste stream is selected, the P3 manager will search the past pollution prevention program project data base in Appendix A for similar previous projects. Then the P3 manager may form an assessment team or utilize an existing team to perform the opportunity assessment. The assessment team will examine the alternatives available for P3. Each opportunity assessment will identify the waste stream and its generating operation(s), describe the process, and present several pollution prevention alternatives. Each alternative will be described along with its advantages and disadvantages. Alternatives will be evaluated for their:

- effectiveness in achieving WFF's P2 goals,
- feasibility,
- ease of implementation, and
- return on investment.

The assessment team can use the pollution prevention survey forms to perform the opportunity assessment. An example of a survey form is found in Appendix B. This form contains questions and notes areas to examine when interviewing or working with personnel during an opportunity assessment.

Process owners will advise assessment team members of relevant safety procedures in each work area prior to the start of the assessment. Process owners will provide process descriptions and metrics which directly contribute of the success of the project. Once P3 alternatives are proposed, process owners will assist in the evaluation of the alternatives.

Once the opportunity assessment has been completed, results will be submitted to the process owner's organization along with the assessment team's recommendation for the preferred alternative for reduction. The process owner's organization will review the assessment and either approve the recommended alternative, another alternative, or deny funding for the P3 project.

Implementation of the projects shall be conducted by the process owner, with assistance from the assessment team. Effectiveness of the P3 project will be monitored by the assessment team, which will report to the program manager.

## **7.0 ANNUAL POLLUTION PREVENTION PROGRAM REPORTING REQUIREMENTS**

The program manager will answer the annual Headquarters P2, Recycling, Solid Waste and Green Purchasing data calls.

**Appendix A**  
**Past Pollution Prevention Program Projects**

Table A.1 Pollution Prevention Program Projects

Date	Location	Topic	File
1996 Present	Facility- wide	Florescent Lighting and Exit Sign Upgrades - WFF saves \$45,000 annually in decreased energy costs.	70.02.03.12911 (2/1/2006)
1997	B-31, X- 30	Paint Thinner Distillation - Paint thinner was distilled and reused. Paint shop employees were not satisfied with the reclaimed product.	
2000	F-8	Printed Circuit Board Shop – In early 2000, WFF switched from processing circuit boards on site to purchasing them off site. In 1997, the circuit board shop generated 5,123 pounds of hazardous waste. This is no longer generated.	38.05.01.12880 (12/10/2001)
2000	N-222	Wood Recycling – Wood recycling was tried for a few months, but vendor was not reliable and a suitable replacement could not be found.	
11/2001 to Present	Facility - wide	Class 1 ODS – Except for nominal amounts, the Class 1 ODS have been replaced except for Halons.	38.04.03.12962 (11/20/2001)
11/2001 to Present	E-2	Digital Photography – WFF switched from film photography and in-house processing to digital photography for all except high speed, outsourcing the processing of high speed film. This conversion eliminated the average hazardous waste generation of 1138 pounds per year from the photography lab.	38.05.01.12892 (12/10/2001)
2001 to Present	B-29	Chemical Reuse – WFF makes available chemicals that are in date but not needed by their organization available to other organizations through the Code 250 website. Although no chemicals are currently available, during 2005, \$500 of disposal cost was avoided through reuse.	38.06.03.7570
3/2004 to Present	F-10	Parts Washer – WFF participated in a NASA agency project to test various parts washer solvents. WFF tested Inland Technology Breakthrough solvent which is an odorless solvent that has a low vapor pressure to control VOC emissions. It is used in a parts washer which filters the solvent contaminants to 0.1 micron. The machine shop that tested the parts washer elected to purchase the parts washer.	38.04.01.12729 (11/5/2004)
6/04 to Present	Facility- wide	Green cleaning chemicals – WFF developed a spreadsheet to screen housekeeping chemicals and continually tests new replacements.	38.04.01.12890 (06/30/2004)

Date	Location	Topic	File
6/04 to Present	Main Base	Plastic Recycling – Beginning with a pilot project, plastic recycling has increased from 3 building to 24 locations	
2005 to Present	Sites 2, 7, 10, 11, , 2, 20, 24, and F-8	Remediation – WFF restored 8.15 historically contaminated acres to residential levels. Restoration to residential levels is beyond what is required by the RCRA 7003 Administration Agreement on Consent.	
2005 to 2006	F-16	Glycol Recovery Unit - A recovery and distillation unit for a glycol/water mixture generated by the air conditioning shop was investigated. However, a cost effective unit could not be found.	
11/2005 to Present	Facility-wide	Non Paradichlorobenzene Urinal Screens – WFF replaced paradichlorobenzene screens with no para screens and eliminated 300 pounds of paradichlorobenzene in the environment per year.	38.04.01.12893 (06/30/2004)
1/2/06 to 4/1/06	Wallops Island	Christmas Tree project – Diverted from the landfill, donated Christmas trees were strategically placed at a cost savings of \$1100 to protect the \$500,000 runway which launched the first Unmanned Aerial Vehicle to fly into a hurricane.	70.03.01.12882 (06/08/2006)
2/2006 to 3/2009	B-31 and Facility-wide	Methylene Chloride – The sling test shop was looking for an effective fast-acting paint stripper to eliminate the hazardous effects of methylene chloride. Turco 6813E – Chemical Stripper was found to be a viable alternative. All users have either discontinued their use or are actively engaged in researching substitutes. Disposal of methylene choride waste has decrease from 440 to 60 pounds annually.	38.04.01.12895 (2/1/2006)
05/06 to Present	F-16	Garage Glycol – The upgrade of ethylene glycol recycling equipment in the automotive garage eliminates the need for extender agents and has a return on investment of 1.1 years.	38.02.01.12900 (05/01/2006)
2006 to Present	E-109	Green Building –The new engineering building incorporates many green building features including building orientation for optimal energy performance, natural lighting and ventilation, central courtyard, and use of low VOC materials.	38.03.03.12961 (3/17/2003)
10/2006 to 6/2008	E-11	VOC Remediation Project – A VOC filtration technology was tested at WFF which could have kept 6500 pounds of VOC's from the environment a year. The VOC's are produced during air sparging at an old aviation tank farm remediation	38.05.01.12903 (06/12/2006)

Date	Location	Topic	File
		site. However, the air sparging is currently not producing enough VOC to use the technology.	
2007 to 2008	Facility-wide	Electrical Metering – Electrical metering was installed on all buildings. This metering feeds the utility information system which engages buildings in energy savings competition and helps identify problem areas. Corrections made as a result of meters save 200,000 kW h annually.	
6/07 to 8/08	F-160	Mercury Replacement Pilot Project – WFF investigated the accuracy of several non-mercury thermometers which could replace mercury thermometers. Non- mercury thermometers were found to be less accurate than hoped and only one substitution was made at D-50.	
2008 to Present	Facility-wide	Building Tune-Ups – Adjusting HVAC operations at each building to include equipment schedules, outside air dampers, and night time schedules saves WFF \$25,000 annually.	
1/09 to 3/09	E-2	Grill Cleaner Substitution – A high pH grill cleaner used in the cafeteria was replaced with Scotch-Brite Quick Clean Griddle Liquid, a less toxic alternative	
3/09 to Present	D-8	Nozzle Cleaner - Gum Cutter Carb Cleaner, which contains toluene, xylene, and acetone, was replaced with a less hazardous cleaner.	
10/08 to Present	F-10	Metal Machining Coolant Recycling – Use of coolant recycler had prolonged the life of coolant life in the machine shop and with a 1 year pay back period, the reconditioning system has reduced off-site disposal by 45%.	
2009	N-159	Solar Powered Street Light Pilot Project – This project is projected to save 3000 kW per year.	
6/2009 to Present	E-2	Biodegradable Take-out containers – The cafeteria has begun to replace the styrofoam containers with corn and paper take-out containers	
7/09	E-107	Mixed Stream Recycling Collection – A pilot project is starting to assess compliance with mixed stream desk-side recycling.	Prelim 38.02.03.14954 (6/12/2002)
8/09 to present	F-10	Closed Loop Water Jet – The Machine Shop upgraded its garnet metal cutting machine to a closed loop system saving 41,000 gallons of water.	
11/09 to present	F-16	Recycling of Cell phones – Cell phones are collected for donation to Cell phone for life. In FY2010, 86 phones were collected.	
01/2011	WFF	Introduced Freecycle at Work to WFF community in Safety and Environmental newsletter	

Table A.2 Wallops Flight Facility (WFF) Recycled Material :  
Fiscal year 2010

Item	Quantity
Aluminum	2,111 lbs
Antifreeze	35 gals
Batteries	16,865 lbs
Cardboard	106,560 lbs
Cooking Grease	2,000 lbs
Electronics (scrap)	17,404 lbs
Fluorescent Lamps	350 lbs
Plastic	3,789 lbs
Scrap Metal	490,000 lbs
Solvents	1,847 lbs
Tires (1 for 1 swap)	1,050 lbs
Toner Cartridges	1,685 lbs
Used Oil	5,500 gals
White Paper	36,000 lbs
Total	723,976 lbs

**Appendix B**  
**Pollution Prevention Program Opportunity Assessment Survey Form**

**Pollution Prevention Program Opportunity Assessment Survey Form**

Date:

Assessment Team:

Unit Designation, Shop Name, Building:

Description of Operation:

Chemicals Used:

Wastes Generated:

Current Waste Minimization Practices:

Problems:

**Waste Minimization Opportunities:**

Alternative 1:

Prevention Type:

Estimated Reduction:

Technical Evaluation (feasibility and ease of implementation):

Economic Evaluation

Investment Cost:

Annual Savings:

Payback Period:

Alternative 2:

Prevention Type:

Estimated Reduction:

Technical Evaluation (feasibility and ease of implimentation):

Economic Evaluation

Investment Cost:

Annual Savings:

Payback Period:

*The following is a hypothetical example of a completed survey form:*

### **Pollution Prevention Program Opportunity Assessment Survey**

**Date :** June 1, 2009

**Unit Designation, Shop Name, Building:** Code 547, Machine Shop, Bldg 5

**Operation:** Parts Cleaning

#### **Description of Operation:**

Waste solvents are routinely generated at GSFC during parts cleaning. Parts cleaning typically takes place during fabrication and integration of flight hardware. Pollution generated during these activities includes liquid waste solvent and degreasing compounds containing unwanted film material, air emissions of volatile solvents, solvent-contaminated wastewater, and solid waste consisting of oil, grease, soil particles, and other film material. There are three common solvent cleaning methods: cold cleaning, vapor degreasing, and precision cleaning. Cold cleaning is employed in the machine shop. During cold cleaning, the solvent is applied either by brush or by dipping the items in a solvent dip tank.

**Chemicals Used:** Organic Solvents

**Wastes Generated:** Spent Organic Solvents, Sludge

**Current Waste Minimization Practices:** None

**Problems:** Spent organic solvents are a major component of the GSFC hazardous waste stream. No waste reduction effort is being implemented or contemplated by machine shop.

#### **Waste Minimization Opportunities**

##### Alternative 1: Onsite Recycling Using Distillation

Description: Distillation is a recycling method for spent solvents that involves boiling and recovering the solvent. A small amount of sludge remains. The sludge is the dirt and grease from the cleaning process. Distillation reduces the need for offsite transportation and manifesting. Distillation units come in various sizes and types. Small batch-style units would be appropriate for facilities with low solvent usage. Larger units are available that could be centrally located to service several users.

The advantage of onsite distillation is that the facility controls its own hazardous waste. Sending solvents off the site is expensive and requires manifesting of the waste. The disadvantages are that distillation requires labor, energy, cooling water, and maintenance. Solvents that are to be recovered by distillation must be segregated.

**Prevention Type: Recycling**

Estimated Reduction: To be determined by the installation

Technical Evaluation: To be determined by the installation

**Economic Evaluation**

Investment Cost: To be determined by the installation

Annual Savings: To be determined by the installation

Payback Period: To be determined by the installation

**Alternative 2: Off-Facility Recycling**

Description: Companies exist that provide the equipment and solvent for parts cleaning. The equipment is rented, and the company is contracted to pick up the spent solvent, supply fresh solvent, and recycle the spent material. The spent material will require a manifest. These units typically are dip tanks.

The advantage of this alternative is that the user does not have to dispose of waste solvents. The disadvantage is that the alternative is subject to the availability of local recyclers, is more expensive than having an in-house unit, is less convenient, and has the added liability of having an outside entity responsible for handling the installation's hazardous waste.

**Prevention Type: Offsite Recycling**

Estimated Reduction: To be determined by the installation

Technical Evaluation: To be determined by the installation

**Economic Evaluation**

Investment Cost: To be determined by the installation

Annual Savings: To be determined by the installation

Payback Period: To be determined by the installation

**Alternative 3: Water-Based Cleaners**

Description: Aqueous and semiaqueous cleaners are available that may be substituted for solvents. The cleaners can be alkaline or acidic or alcohol-based. The advantage of

water-based cleaners is that solvent use can be eliminated. Eliminating solvents will reduce environmental liability and reporting and documentation requirements. The disadvantages are that the effectiveness of water-based cleaners for a specific task will have to be measured. Water-based cleaning may not be acceptable for all materials or processes. Another disadvantage is that aqueous cleaning still can produce a significant volume of waste that has to be managed and may be classified as hazardous waste because of its contents or pH.

Prevention Type: Product Substitution

Estimated Reduction: To be determined by the installation

Technical Evaluation: To be determined by the installation

Economic Evaluation

Investment Cost: To be determined by the installation

Annual Savings: To be determined by the installation

Payback Period: To be determined by the installation