

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
White Sands Test Facility
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November 30, 2017

Reply to Attn of:

RE-17-144

Mr. John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Subject: NASA White Sands Test Facility (WSTF) 2017 Waste Minimization Plan

Enclosed is the 2017 Waste Minimization Plan as required by the WSTF Hazardous Waste Permit No. NM8800019434. Enclosure 1 provides a paper copy of the document. Enclosure 2 provides an electronic copy of the document on CD-ROM. This report has been prepared for fiscal year 2017. NASA tracks recycling and related waste activities on a federal fiscal year basis (October 1 to September 30). This approach maintains consistency with previous submittals and ensures a complete and accurate report.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or comments concerning this submittal, please contact Amanda Skarsgard at 575-524-5460.

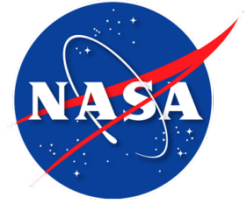
A handwritten signature in blue ink, appearing to read "AJ Davis".

for Timothy J. Davis
Chief, Environmental Office

2 Enclosures

cc: (with enclosures)
Mr. Gabriel Acevedo
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

National Aeronautics and Space Administration



Hazardous and Solid Waste Amendments (HSWA)
Waste Minimization Plan


October 1, 2016 to September 30, 2017

NM8800019434
NASA Johnson Space Center White Sands Test Facility

NASA Johnson Space Center White Sands Test Facility
Hazardous and Solid Waste Amendments (HSWA)
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for Timothy J. Davis
Chief, NASA Environmental Office

Date 11/30/2017

National Aeronautics and Space Administration

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Table of Contents

Table of Contents.....	iii
List of Acronyms and Abbreviations.....	iv
1.0 Introduction.....	1
2.0 Objectives and Scope.....	1
3.0 Waste Minimization Program Plan Components (Permit-specified).....	1
3.1 Policies and Programs.....	1
3.1.1 Environmental Management System.....	1
3.1.2 WSTF Sustainability Program.....	3
3.2 Training and Incentive Programs.....	4
3.3 Source Reduction and Recycling Measures.....	5
3.4 Operating Costs.....	6
3.5 Limiting Factors.....	6
3.6 Information Sources.....	6
3.7 Additional Waste Minimization Efforts.....	7
3.8 Hazardous Waste Matrix.....	8
3.9 Limitations to Waste Reduction.....	8
Appendix A Source Reduction and Recycling Tables.....	A-1
Table A-1 WSTF Hazardous Waste Source Reduction (Oct. 1, 2016 – Sept. 30, 2017).....	A-2
Table A-2 WSTF Hazardous Waste Recycling (Oct. 1, 2016 – Sept. 30, 2017).....	A-3
Table A-3 WSTF Hazardous Waste Source Reduction/Recycling Future Plans.....	A-4
Appendix B Hazardous Waste Matrix.....	B-1

List of Acronyms and Abbreviations

ADF-SW	Aerospace Data Facility - Southwest
BFP	Backflow preventers
DWB	New Mexico Environment Department Drinking Water Bureau
EMP	Environmental Management Program
EMS	ISO 14001 Environmental Management System
EO	Executive Order
EPA	United States Environmental Protection Agency
FY	Fiscal Year
HSWA	Hazardous and Solid Waste Amendments
HVAC	Heating, Ventilation, and Air Conditioning
ISO	International Organization for Standardization
LED	Light-emitting Diode
MDAL	Molecular Desorption Analysis Lab
NASA	National Aeronautics and Space Administration
NDMA	N-nitrosodimethylamine
NETS	NASA Environmental Tracking System
NMED	New Mexico Environment Department
NMRC	New Mexico Recycling Coalition
PCE	Tetrachloroethene
PHA	Process Hazard Analysis
RMP	Risk Management Plan
RSA	Recycling and sustainable acquisition
SSPP	Strategic Sustainability Performance Plan
TCE	Trichloroethene
WSC	Goddard White Sands Complex
WSI	WSTF Standard Instruction
WSIT	WSTF Sustainability Initiative Team
WSTF	NASA Johnson Space Center White Sands Test Facility

1.0 Introduction

The New Mexico Environment Department (NMED) Hazardous Waste Permit (Permit), issued to the National Aeronautics and Space Administration (NASA) Johnson Space Center White Sands Test Facility (WSTF) became effective December 9, 2009. The Permit requires that WSTF institute a waste minimization program to reduce the volume and toxicity of hazardous wastes generated by the facility's operation, to the degree determined by NASA to be economically practicable.

2.0 Objectives and Scope

The Permit requires that WSTF submit a copy of the annual certified statement regarding the waste minimization program to NMED by December 1st for the previous 12-month period ending September 30. The reporting period included in this document is October 1, 2016 through September 30, 2017, or the 2017 NASA fiscal year (FY).

The WSTF source reduction, recycling, and planning activities for this reporting period are addressed below. Each Permit requirement and WSTF response is listed below.

3.0 Waste Minimization Program Plan Components (Permit-specified)

3.1 Policies and Programs

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *Any written policy or statement that outlines goals, objectives, and methods for source reduction and recycling of hazardous waste at the Facility.* This section includes descriptions of existing policies and ongoing programs that support waste minimization at WSTF.

3.1.1 Environmental Management System

NASA incorporated the International Organization for Standardization (ISO) 14001:2015 Environmental Management System (EMS) into the WSTF Management Policy. This action emphasizes the NASA commitment to reducing the consumption of natural resources and exhibiting environmental stewardship in site activities and procedures.

WSTF uses EMS procedures to evaluate the environmental aspects of site activities, products, and services to determine their environmental impacts. Stakeholders rank the environmental impacts of each aspect and those with significant impacts are established as "significant aspects." An Environmental Management Program (EMP) is established for each significant aspect. Each EMP outlines objectives and targets developed to lessen the environmental impact and reduce the consumption of natural resources at WSTF. Actions taken to meet EMP objectives and targets are specified by tasks that may be directed toward regulatory compliance, pollution prevention, waste reduction and diversion, and resource conservation (materials, energy, water, and fuel).

The FY 2017 significant aspects and associated EMPs were:

- Water Quality – Cross Connection Control
- Air Emissions – Refrigerant Management
- Water Conservation
- Risk Management Plan and Process Safety Management Implementation and Collaboration

- Opportunity for Resource Conservation

Objectives and accomplishments for each EMP are discussed below.

3.1.1.1 Water Quality – Cross Connection Control

The objective of this EMP is to maintain the quality of WSTF drinking water by preventing drinking water contamination from non-potable water sources. To accomplish this, the following steps were completed in FY 2017:

- Backflow preventers (BFPs) installed in one area between potable and non-potable water systems. Five more installations are planned for FY 2018.
- A program is in place to perform annual test/maintenance/repair of BFPs. Two on-site technicians are certified to perform this work. Two additional technicians are in the process of being certified.
- Identified locations where the potable water system can be separated from industrial uses that only require non-potable water piping systems. Compliance/Safety project planned for FY 2018-FY 2020 to design separate pipelines for potable water where applicable.
- Ensure that Aerospace Data Facility - Southwest (ADF-SW) and White Sands Complex (WSC) comply with the WSTF potable water system requirements. An interagency agreement is in place with ADF-SW. A memorandum of agreement with WSC is in draft. WSTF performs sampling, analysis and reporting for both facilities.

3.1.1.2 Air Emissions – Refrigerant Management

The EMP was developed to strengthen the refrigeration management program by developing a site-wide management procedure. To accomplish this, the following steps were completed in FY 2017:

- Completed WSTF refrigerant inventory.
- Determined yearly consumption rate for each type of refrigerant.
- Tracking Heating, Ventilation, and Air Conditioning (HVAC) personnel training/Environmental Protection Agency (EPA) certifications and EPA equipment certifications.
- Developed a training class for using refrigerant software.
- Developed a leak detection program that matches each type of HVAC equipment with a specific type of leak detection. An equipment leak check schedule has been established based on the type of equipment and its past leak history.

3.1.1.3 Water Conservation

The objective of this EMP is to reduce water consumption to meet federal standards with the target of 2% reduction in water use per year from the FY 2007 baseline. FY 2017 accomplishments are below:

- Low-flow and waterless fixtures are installed as replacements are needed.
- The Energy Efficiency and Water Conservation Team was established and in partnership with the Site-Wide Sustainability Working Group will identify opportunities and advocate for water conservation.
- An awareness campaign is being planned to educate site personnel through site newsletters, safety meetings, and other site communications.

3.1.1.4 Risk Management Plan and Process Safety Management Implementation and Collaboration

The objective of this EMP is to ensure WSTF compliance with the EPA Risk Management Program (RMP) Rules promulgated in Chemical Accident Prevention Provisions (40 CFR 68, 2013) while collaborating with the Process Safety Management (PSM) lead. FY 2017 accomplishments are below:

- Developed functional RMP application within Environmental Information Management System (EIMS).
- Collected and centralized all pertinent RMP documents and archived into the EIMS.
- Continued to monitor maximum inventories of highly hazardous chemicals for 300, 400, and 500 Areas.
- Developed RMP internal audit worksheet and scheduled internal RMP audit to meet Compliance Audits requirements (40 CFR 68.79).

3.1.1.5 Opportunity for Resource Conservation

This EMP emphasizes continual improvement in pollution prevention, resource conservation and reuse for waste reduction and environmental stewardship. The Site-Wide Sustainability Working Group (S2WG) was established in FY 2016 as a forum for WSTF employees from all departments to identify resource conservation opportunities across the site. Management approved the continuation of the group in FY 2017 and a list of S2WG accomplishments is below:

- The Group supports WSTF Sustainability Goal Stakeholders to raise awareness for continual improvement toward NASA Strategic Sustainability Performance Plan Goals.
- Group representatives work to increase employee involvement to reduce resource use and increase material's reuse.
- Developed the Reuse Market Place software application to encourage resource reuse. Employees make unused materials available to the site to reduce waste.
- Supporting Fleet Manager in Idling Reduction Campaign
- Established hazardous materials management committee for continual improvement on this program on site.
- Partnered with the Energy Manager to form the Energy Efficiency and Water Conservation Team in support of resource conservation.

3.1.2 WSTF Sustainability Program

The WSTF Sustainability Program evolved out of the volunteer WSTF Sustainability Initiative Team (WSIT) established in 2005. The WSIT was made up of Environmental Department employees with the mission to raise employee awareness, advise management regarding opportunities for improvement in the areas of environmental stewardship and sustainability, and lay the foundation for a culture of sustainability at WSTF. WSIT represented the WSTF community's environmental conscience, gathered and disseminated information on the various aspects of sustainability, advocated for employees' ideas, documented site sustainable actions, and provided a mechanism for implementing change. As a result of extensive efforts of the WSIT throughout the last decade, sustainability awareness has been incorporated into the WSTF culture.

The WSTF Sustainability Program is administered by the site Environmental Department in accordance with federal laws, executive orders, and NASA procedural requirements. Recycling and waste minimization, pollution prevention, sustainable acquisition, and resource conservation initiatives fall under the umbrella of sustainability. The EMP *Opportunity for Resource Conservation* is managed through the WSTF Sustainability Program. WSIT has been folded into the S2WG, expanding its reach by involving employees from across the site to identify opportunities to continue to reduce WSTF's environmental impact.

The 2015 Executive Order (EO) 13693 *Planning for Federal Sustainability in the Next Decade* directs each federal agency to submit an annual Strategic Sustainability Performance Plan (SSPP). NASA submitted the 2017 SSPP in June 2017 to the Office of Management and Budget. SSPP goals include greenhouse gas reduction, sustainable buildings, clean and renewable energy, water use efficiency and management, fleet management, sustainable acquisition, pollution prevention and waste reduction (including recycling), energy performance contracts, electronics stewardship, and climate change resilience. S2WG provides support to WSTF stakeholders that are working to meet the Agency SSPP goals.

The WSTF Environmental Department maintains records of sustainable actions categorized according to the SSPP goals. As applicable, metrics from each FY are entered into the NASA Environmental Tracking System (NETS). NETS information is gathered for required NASA-wide reporting in the annual SSPP. NETS reporting information continues to be used on site for tracking waste and minimization projects.

3.2 Training and Incentive Programs

The Permit specifies that the following be included in the Waste Minimization Program Plan: *Any employee training or incentive programs designed to identify and implement source reduction and recycling opportunities.*

EMS awareness training is included in the environmental briefing section of the new hire orientation. The material emphasizes sustainability, pollution prevention, continuous improvement, and compliance with environmental laws. "Environmental Compliance Awareness" training serves as a refresher for waste minimization and other environmental programs.

A site-wide awareness campaign to strengthen the sustainability culture at the site continues under the WSTF Sustainability Program. Information is circulated to site employees through various forms of communication, such as WSTF Today emails, the LED message board at the WSTF entrance, sustainability presentations, and posting articles in the two WSTF newsletters; the bi-weekly "Porcelain Press" and the monthly "What's Going On at WSTF." Topics such as environmental awareness, process reminders, site accomplishments, program visibility, and employee awards for sustainable actions are shared using the site newsletters, emails, and sign postings. Earth Day (April 22nd) America Recycles Day (November 15th) are celebrated with various activities, awareness updates, and site-wide events.

All WSTF employees are required to attend an annual Environmental Awareness training, which includes specific content related to waste source reduction and recycling program elements. Sustainable Acquisition training specific to the WSTF procurement systems has been developed and is mandatory for all employees that order goods and services for the site. Employees are also required to attend annual sustainable acquisition refresher trainings.

3.3 Source Reduction and Recycling Measures

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *Any source reduction and/or recycling measures implemented in the last five years or planned for the near future.*

A Sustainability Program software application has been developed for ease of access to sustainable acquisition references and metrics, recycling metrics, sustainable actions, and resource conservation tools. All WSTF employees can access the application on their desktop. The application is used to collect, share, and compile data for annual reporting requirements.

The WSTF Sustainable Acquisition program requires that requestors identify any green requirements prior to submitting procurement requests for products or services. Federal requirements for environmentally responsible products (and services) are listed on the Green Products Compilation at <https://sftool.gov/GreenProcurement>. This site lists product categories (27 to date) and specifies biobased, less toxic, energy saving, water conserving, recycled/recovered content, environmentally preferable, and non-ozone depleting requirements for hundreds of products. The General Services Administration maintains and updates the database continually. Services with green requirements have been added and guidance for contract language is now available.

WSTF Environmental, procurement, and logistics departments have created a cross-contract partnership to replace conventional products with environmentally preferable products wherever feasible. For example, most cleaning products have been replaced with less toxic biobased alternatives. Pilot tests of biobased alternatives to lubricants are underway. Recycled content products conserve resources such as wood, petrochemicals, and metal. The majority of the copy paper used at WSTF now contains 100% recycled content. Every attempt is made to replace conventional aerosols with non-ozone depleting propellants and other ingredients that reduce WSTF's greenhouse gas footprint.

Where the green products do not meet project specifications or fall within budget, sustainable acquisition waivers are generated to document the justification for continuing use of the conventional product. A Just in Time contract for office supplies was initiated during FY 2015 to reduce the need for stocking office supplies in the warehouse. Prior to contract implementation, all potential vendors identified recycled or biobased products as required. Orders are now filled on an as needed basis, which saves resources and minimizes waste.

The Reuse Market Place (ReMaP) was developed in the Sustainability Program Application as a tool for employees to share resources across the site. If resources, including office supplies, furniture, and consumable materials cannot be used by the department that purchased them, the commodity can be posted in ReMaP for other departments to claim for use.

Single stream recycling is included in the refuse contract. Single stream materials include: office paper, shiny paper (catalogs and magazines), telephone books, newspaper, paper board, paper bags, books, junk mail, clean plastics #s 1-7, and tin and aluminum cans. One or more recycling stations are located inside each building and 8 cubic yard single stream recycling containers are now outside buildings in each area. Custodians empty recycling bins in the buildings regularly and transfer the materials to exterior recycling containers. These containers are emptied once a month by the solid waste contractor and hauled to the county's recycling facility.

The WSTF refuse contract also includes construction and demolition debris recycling for wood, gypsum board, plastic sheeting and certain plastic materials, and asphalt shingles. WSTF's maintenance and operations department transports green waste to the city's yard waste facility for composting. Concrete is hauled to the same facility where it is used for clean fill.

Every effort is made to divert materials from the landfill through reuse or recycling. In addition to traditional recyclables, the sustainability program personnel work to divert usable excess material to other federal agencies, schools, and non-profit agencies through a partnership with the South Central Solid Waste Authority which manages the local recycling program. Sustainability Program personnel work with the Logistics Department to determine the best method of disposition for site materials for landfill diversion. The average WSTF recycling/waste diversion rate has steadily increased from 12% in FY 2000 to 89% in FY 2016. WSTF tracks all recycling and solid waste diversion metrics for annual reporting purposes. Specific source reduction and recycling measures for the current reporting period and future plans are presented in [Appendix A](#).

3.4 Operating Costs

The Permit specifies that the following information be included in the Waste Minimization Program Plan: *An itemized list of the dollar amounts of capital expenditures (plant and equipment) and operating costs devoted to source reduction and recycling of hazardous waste.*

Capital expenditures and operating costs associated with source reduction and recycling are not specifically tracked, however, activities initiated or continuing during the reporting period reflect significant investments and cost avoidances. Approximately \$18,751 in service and labor was spent in FY 2017 recycling routine hazardous waste. As part of the WSTF property management process, approximately 22 tons (44,160 lb) of electronic equipment (E-waste) and 99.5 tons (199,000 lb.) of scrap metal were recycled in FY 2017. NASA also continued to fund the Sustainability Program as part of the overall Environmental Department compliance budget. Approximately \$118,000 of the total WSTF Environmental Department compliance budget was devoted to the Sustainability Program during the reporting period.

3.5 Limiting Factors

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *Factors that have prevented implementation of source reduction and/or recycling.*

NASA tests and evaluates spacecraft materials, components, and propulsion systems to enable the safe exploration and utilization of space. NASA test programs depend on federal funding, of which many projects are funded on a program-by-program basis. One-time, short-term, and inconsistent testing schedules generate dynamic and variable waste streams that are difficult to manage for source reduction and recycling. Customer/test requirements, military specifications, original equipment manufacturer specifications, and program timelines limit the use and feasibility of recycling test materials. Future NASA programs, National Defense System rocket engine testing, missile demilitarization, and decommissioning and decontamination of antiquated aerospace equipment will increase customer testing requirements and limit the feasibility of source reduction. Subsequently, the WSTF environmental department works closely with the testing and laboratory departments to identify any opportunities for source reduction and recycling.

3.6 Information Sources

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *Sources of information on source reduction and/or recycling received at the facility (e.g., local government, trade associations, suppliers, etc.).*

The NASA Principal Center for Regulatory Risk Analysis and Communication reviews the federal register and issues emails with specific information pertaining to changing regulations. The reviews

compel WSTF Environmental Department personnel to develop white papers or perform regulatory reviews to evaluate impacts to WSTF operations.

WSTF Sustainability Program personnel work with the South Central Solid Waste Authority, the local entity that handles waste and recycling for Las Cruces and Dona Ana County, to align the WSTF recycling program with that of the community.

Sustainability Program personnel also participated in the NASA Recycling and Sustainable Acquisition (RSA) Community of Practice video conferences, WebEx presentations, and workshops sponsored by the NASA RSA Principal Center. These venues facilitate the sharing of information about recycling, sustainability, and pollution prevention strategies between NASA centers. The 2017 NASA Environmental Conference provided the opportunity for environmental personnel from all NASA centers to share best management practices and collaborate for continual improvement of environmental programs agency wide.

Two Sustainability Program personnel are certified as Recycling Facility Operators by the New Mexico Recycling Coalition (NMRC) and the New Mexico Solid Waste Bureau. They are also national Sustainable Resource Management Certified Professionals through the NMRC in association with Penn State Altoona. WSTF personnel use online resources, including Webinars, which continually offer information related to source reduction and recycling. Source agencies include the NMED, the NMRC, Keep America Beautiful (America Recycles Day Initiative), the EPA, the Office of the Federal Environmental Executive, the United States Department of Agriculture, the General Services Administration, other NASA centers, and other federal agencies.

3.7 Additional Waste Minimization Efforts

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *An investigation of additional waste minimization efforts which could be implemented at the facility. This investigation shall analyze the potential for reducing the quantity and toxicity of each waste stream through production reformulation, recycling, and all other appropriate means. The analysis shall include an assessment of the technical feasibility, cost, and potential waste reduction for each option.*

The Permit requires frequent review and characterization of waste streams. These activities have promoted a closer look at waste generation and minimization at WSTF; modification of the hazardous waste generation process, improvement of waste determinations, and generator attention to waste stream constituents and concentrations.

The S2WG has formed a hazardous materials management working group to explore opportunities to reduce hazardous waste generated through source reduction. Measures to reduce hazardous waste, minimize the use of toxic substances, reduce resource use, and improve environmental performance at WSTF are ongoing, and WSTF continues to evolve toward environmental sustainability.

The WSTF operational organizations continuously research equipment replacement, product replacement, and product conservation efforts. For example, Facilities Engineering continues to replace fluorescent light fixtures where feasible with LED fixtures. This includes indoor, outdoor, and emergency lighting. Replacing the light fixtures will reduce the site's energy consumption, reduce waste, and reduce labor hours (for bulb replacement) since the LED bulbs have a longer life cycle compared to traditional lighting.

3.8 Hazardous Waste Matrix

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *The Permittee shall submit a flow chart or matrix detailing all hazardous wastes it produces by quantity, type, and building/area.*

The Hazardous Waste Matrix ([Appendix B](#)) identifies the FY 2017 WSTF hazardous waste streams by waste name, accumulation site ID, WIWPS, generating group, and the annual quantity.

3.9 Limitations to Waste Reduction

The Permit specifies inclusion of the following in the Waste Minimization Program Plan: *The Permittee shall demonstrate the need to use those processes which produce a particular hazardous waste due to a lack of alternative processes or available technology that would produce less hazardous waste.*

WSTF test programs support the federal and aerospace industry. The wastes generated in association with this testing are derived from the following processes: engine firings; developmental research; equipment cleaning/repair; missile demilitarization; aerospace equipment decommissioning and decontamination; facility construction/maintenance; and computer and electrical support. These wastes are often dependent upon contractor test requirements, military specifications, program timelines, and additional conditions mandated by contracts.

Appendix A
Source Reduction and Recycling Tables

NASA White Sands Test Facility

Table A-1 WSTF Hazardous Waste Source Reduction (Oct. 1, 2016 – Sept. 30, 2017)

YEAR	SOURCE REDUCTION EFFORT	NET REDUCTION
Since 2010	Contamination control continued emptying cleaning tanks with corrosive solutions (Oakite ^{®1}) on a yearly schedule, rather than weekly (as previously done), with tank recharge as needed.	Approximately 360 gallons annually
Since 2010	Molecular Desorption Analysis Lab (MDAL) replaced organic solvents with HFE 7100 for the cleaning of collector plate used in Volatile Condensable Materials process.	3 to 5 gallons of hazardous waste organics (spent toluene, chloroform, and ethanol) annually. Also 80 to 90% of the HFE 7100 goes to Component Services for cleanup and reuse.
Since 2011	Working to meet federal requirements for sustainable acquisition. Requirements include replacing ozone depleting substances with approved substitutes listed in the significant new alternatives policy: http://www.epa.gov/ozone/snap/lists/index.html	NA
FY 2017	Electronics recycling (including toner cartridges) through UNICOR. Program initiated in 2009.	44,160 lb

¹ Oakite is a registered trademark of Chemetall US, Inc.

NASA White Sands Test Facility

Table A-2 WSTF Hazardous Waste Recycling (Oct. 1, 2016 – Sept. 30, 2017)

FISCAL YEAR	HAZARDOUS WASTE RECYCLED	NET REDUCTION
2017	Nickel-hydrogen batteries were collected and shipped off site for recycling as universal waste rather than hazardous waste.	271 kg
2017	Nickel-cadmium batteries were collected and shipped off site for recycling as universal waste rather than hazardous waste.	441 kg
2017	Lithium batteries were collected and shipped off site for recycling as universal waste rather than hazardous waste.	16 kg
2017	Lead acid batteries were collected and shipped off site for recycle as universal waste rather than hazardous waste.	1,832 kg
2017	Spent dry cell batteries (alkaline) batteries are collected and shipped off site for recycling as solid waste rather than hazardous or universal waste	178 kg
2017	Spent fluorescent lamps (including odd shaped) were collected and shipped off site for recycle as universal waste rather than hazardous waste.	410 kg
2017	Non-PCB Ballasts were collected and shipped off site for recycle as universal waste rather than hazardous waste.	262 kg
2017	Spent UV mercury containing lamps which are recycled as universal waste.	25 kg
2017	Used Antifreeze, Recycled	632 kg
2017	Mercury Containing Equipment	7 kg

NASA White Sands Test Facility

Table A-3 WSTF Hazardous Waste Source Reduction/Recycling Future Plans

TIME FRAME	PLANNED SOURCE REDUCTION/RECYCLING	NET REDUCTION
In progress	NASA personnel have chosen the technology and are cold flow testing a distillation system that has the capability of maintaining propellants within the parameters required by NASA customer-driven specifications. The system will avoid the high cost of new propellant and monies required for labor, dilution, and disposal of potential hazardous waste.	Installation completed in FY 2015, system will not be used until upgrades are complete at Fuel Storage Area.
Ongoing	NASA continues to be an integral support system for the space effort. WSTF support is critical in NASA's ability to test engines at simulated altitudes. The Propulsion Test Office will continue to test systems that use methanol, LOX, and other propellants instead of hydrazine(s) and nitrogen tetroxide in an effort to reduce the generation of highly toxic hazardous wastes.	TBD
Ongoing	The NASA Plume Front Treatment System continues to treat groundwater contaminated with trichloroethene (TCE), Tetrachloroethene (PCE), Freon-113, Freon-11, and N-nitrosodimethylamine (NDMA).	> 99.9 %
Ongoing	The NASA Mid-plume Groundwater Remediation System continues to treat groundwater contaminated with Freon-113, TCE, PCE, Freon-11, and NDMA.	> 99.9 %
In progress	NASA WSTF has initiated the installation of a 1.64 megawatt photovoltaic system by an off-site contractor.	TBD
In progress	Connected to the City of Las Cruces Publicly Owned Treatment Works in FY 2015. This may allow NASA to significantly reduce waste, such as P078 ADGAS, if accepted by the City. Closure of the existing sewage lagoons continued during the reporting period.	TBD

Appendix B
Hazardous Waste Matrix

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Isopropyl Alcohol (IPA), Spent	2025	2020172-99, 20-01-05	D001	MS2	71
Spent VOC Indicator	5002	5020165-99, 50-05-02	D001	ENV	1
Unused Chemicals	1003	80201714-99	D001	ENV	1
N-Nitrosodimethylamine And Dimethylnitramine In Acetone And Water	2007	20201651-99	D001	MT2	2
Unused Commercial Chemical Products	2013	20201717-99	D001	MT2	1
Off- Spec Analytical Standards	2007	20201662-99, 20-04-13	D001, D022, D039, D040	MT2	3
Organic Acid Waste	2013	20201656-99, 20-04-103	D001, D002	MT2	87
Unused Commercial Chemical Products	2007	20201672-99, 20201485-99	D001, D002	MT2	3
Unused Chemicals	8004	8020172-99, 8020174-99, 8020168-99, 8020178-99	D001, D002, D018, F003, F005	HFTA	11
Unused Commercial Chemical Products	1003	80201712-99, 20201737-99	D001, D003, D005, D018	ENV	20
Aerosol Cans, Empty	1033	10-20-43, 10201752-99	D001, D003, D005, D018	ENV	75
Aerosol Cans, Empty	1033	10-20-43, 1020173-99	D001, D003, D005, D018, D035	ENV	20
Spent Solvents	1025	10-03-01, 10201699-99	D001, D005, D005, D018	FA2	37
Unused Paints And Paint Related Materials	1034	10-03-06	D001, D005, D006, D007, D008, D018, D035	ENV	178
Spent Solvents	1025	10-03-01	D001, D005, D006, D007, D008, D018, D035, F003	FA2	23
Unused Commercial Chemical Products	8005	80201717-99	D001, D005, D007, D018, D035	Standard Test	29
Unused Paints And Paint Related Materials	1034	10-03-06, 1020174-99	D001, D005, D018	ENV	137
Unused Paints And Paint Related Materials	1034	10-03-06, 10201747-99	D001, D005, D018	ENV	49
Spent Solvents	1025	10-03-01	D001, D005, D018,	FA2	26
Unused Paints And Paint Related Materials	1034	10-03-06, 102016100-99	D001, D005, D018, D035	ENV	91

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Unused Paints And Paint Related Materials	1003	4020172-99, 20201710-99	D001, D018	ENV	64
Off-Spec Chemical (Lexsol)	3001	3020171-99	D001, D018	300 PTD	181
Fuel, Waste	1015	10-10-20, 102016123-99	D001, D018	FA3	27
Waste Water, Fuel	1021	10-01-07, 10201744-99	D001, D018	FA2	97
Organic Liquids, Waste	2013	20201715-99, 20201725-99, 20-04-04, 20-04-33, 20-04-55, 20-04-100	D001, D018, D019, D022, F003, U154	MT2	16
Organic Liquids, Waste	2013	20201730-99, 20-04-04, 20-04-33, 20-04-55, 10201743-99	D001, D018, F003	MT2	8
Organic Liquids, Waste	2013	20201655-99, 20-02-05, 20-04-04, 20-04-33, 20-04-55, 20-04-100, 80-04-03	D001, D018, F003, U002	MT2	22
Diesel Fuel Waste	4014	40201612-99	D001, D018.	400 PTD	86
Off- Spec Analytical Standards	2007	20201763-99	D001, D022, D039, D040	MT2	3
Contaminated Debris, Fuel	1003	10201775-99, 20-04-18	D001, P068, U098, U133	ENV	50
Contaminated Debris, Fuel	1003	10201797-99	D001, P068, U098, U133	ENV	40
Unused Chemicals	8004	8020176-99	D002	HFTA	7
Unused Chemicals	8004	8020175-99	D002	HFTA	2
Oakite 33 Rust Stripper Solution, Spent	2033	2020177-99, 20-01-13	D002	MS2	39
Waste Water, Instrument Process Waste	2007	20201674-99, 20201674-99	D002	MT2	24
Waste Water, Instrument Process Waste	2007	20201720-99, 20-04-66	D002	MT2	25
Oakite 126 Solution, Spent	2029	20201735-99, 20-01-11	D002	MS2	80
Waste Water, Instrument Process Waste	2007	20-04-66, 20201742-99	D002	MT2	23
Unused Chemicals	8009	80201711-99	D002	Standard Test	8

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Unused Commercial Chemical Products	2007	20201723-99	D002, D004, D005, D006, D007, D008, D009, D010, D011	MT2	5
Metal Solutions, Waste	2007	20201647-99	D002, D004, D005, D006, D007, D008, D009, D011	MT2	7
Acid Waste, Matrix	2029	2020175-99, 20-01-41	D002, D004, D006, D007, D008, D011	MS2	17
Oxygen Candle Materials Waste	2013	20201713-99, 20201731-99	D002, D005	MT2	6
Spent Oakite 31 Cleaning Solution	2030	20201675-99, 20-01-50	D002, D006	MS2	371
Oakite 31, Spent	2029	20201749-99	D002, D006	MS2	20
Spent Organic Etchants	2006	20201660-99, 20-02-32	D002, D007	MS3	2
Inorganic Etchants, Spent	2006	20201665-99, 20-02-01	D002, D007	MS3	5
Urine Treatment Solution	2020	20201667-99	D002, D007	MT2	18
Oakite Deoxidizer SS, Spent	2033	2020174-99, 20-01-44	D002, D007	MS2	88
Oakite 126 Solution, Spent	2029	2020173-99, 20-01-11	D002, D007	MS2	109
Spent Inorganic Etchants	2006	20201668-99	D002, D007	MS3	21
Oakite 126 Solution, Spent	2029	20201750-99	D002, D007	MS2	124
Discarded Sample	2007	10201697-99	D002, D007, D008	MT2	1
Contaminated Debris	2032	20201659-99, 27-01-23	D004, D005, D006, D007, D008, D018	All Sections	52
Contaminated Debris	2032	2020171-99, 27-01-23	D004, D005, D006, D007, D008, D018	All Sections	31
Contaminated Debris	2032	20201721-99, 27-01-23	D004, D005, D006, D007, D008, D018	All Sections	60
Contaminated Debris	2032	20201744-99	D004, D005, D006, D007, D008, D018	All Sections	33
Contaminated Debris	2032	27-01-23, 20201755-99	D004, D005, D006, D007, D008, D018	All Sections	37
Contaminated Debris	1018	10-01-18, 10201690-99	D004, D005, D006, D007, D008, D018, D039, F002, F005	FA2	59

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Contaminated Debris	1018	10-01-18	D004, D005, D006, D007, D008, D018, D039, F002, F005	FA2	54
Contaminated Debris	1018	10-01-18, 10201718-99, 10201729-99, 20-28-06	D004, D005, D006, D007, D008, D018, D039, F002, F005 F005, F005	FA2	58
Contaminated Debris	2030	20201734-99, 10201772-99, 20-01-60, 20-07-06, 10201768-99, 10-12-06, 10-12-06, 10201770-99, 3020173-99	D004, D006, D007, D008, D018	MS2	20
Contaminated Spill Dry	1017	10-01-13, 10201691-99	D004, D006, D007, D008, D018	FA2	73
Contaminated Debris	6044	60201664-99	D004, D006, D007, D008, D018	ENV	113
Petroleum Contaminated Media	1033	10201746-99, 10-01-13, 10201745-99, 10201751-99	D004, D006, D007, D008, D018	ENV	68
Petroleum Contaminated Media	1003	10201746-99	D004, D006, D007, D008, D018	ENV	170
Contaminated Debris	2021	20201765-99	D004, D006, D007, D008, D018, D035	CTF	26
Discarded Diesel Fuel And Oil Samples	2007	20201652-99	D004, D006, D007, D008, D018, D035, D039	MT2	8
Contaminated Debris	1006	10201698-99, 10-02-09	D005, D007, D008, D018	MS4	59
Contaminated Debris	1006	10-02-09, 102016122-99	D005, D007, D008, D018	MS4	54
Contaminated Debris	1006	10-02-09, 10201711-99	D005, D007, D008, D018	MS4	48
Contaminated Debris	1006	10-02-09, 10201741-99	D005, D007, D008, D018	MS4	55
Contaminated Debris	1006	10-02-09	D005, D007, D008, D018	MS4	106
Contaminated Debris And Waste Paint Related Materials	1034	10-03-08, 102016112-99	D005, D018	ENV	39
Contaminated Debris And Waste Paint Related Materials	1034	10-03-08, 10201729-99, 10-03-04	D005, D018	ENV	47
Contaminated Debris And Waste Paint Related Materials	1034	10-03-08, 10-03-04, 10201769-99	D005, D018	ENV	20
Contaminated Debris And Waste Paint Related Materials	1003	10-03-08	D005, D018	ENV	46
Contaminated Debris	2006	20201722-99, 20-02-22, 20-02-42, 20-04-40	D006, D007, D008, D011, D018, D022	MS3	10

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Contaminated Debris	2006	20201748-99	D006, D007, D008, D011, D018, D022	MS3	3
Antifreeze, Used	1020	10-01-04	D006, D008	FA2	98
Unused Commercial Chemical Products	2006	20201718-99	D007	MS3	6
Unused Commercial Chemical Products	8005	80201718-99	D007	Standard Test	1
Contaminated Debris	2027	2020178-99, 20-02-22, 20-02-42, 20-04-40, 20-06-09	D007, D018, P098	MT2	24
Contaminated Debris	8004	80-02-74, 80201710-99	D007, D018	HFTA	22
Carbon Steel Piping Joints	1003	102015111-99	D008	ENV	180
Contaminated Soil	1047	1020176-99	D008	ENV	52717
Contaminated Soil	6050	6020172-99	D008	ENV	79823
Lead Paint Contaminated Debris	1049	10201755-99	D008	ENV	50
Lead Paint Contaminated Debris	2055	20201739-99	D008	ENV	104
Contaminated Debris	1029	10201689-99, 10-12-06	D008, D018	PSOB	2
Mercury Contaminated Debris	2014	20201741-99	D009	MS3	3
Hazardous Debris	1003	100-007, 10201721-99	D009	ENV	1
Fixer Solution, Spent	2043	20201663-99, 20-02-14	D011	Chem Lab	28
Fixer Solution, Spent	2043	20-02-14, 2020179-99	D011	Chem Lab	23
Fixer Solution, Spent	2043	20201759-99	D011	Chem Lab	28
Contaminated Debris And Waste Paint Related Materials	1034	10-03-08	D018	ENV	98
Contaminated Debris (Waste Paint Related Materials)	1050	10-03-08	D018	ENV	56
Asbestos Containing Material	1003	10201692-99	D018	ENV	59

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Contaminated Debris	4014	40201617-99	D018, D004, D006, D007, D008	400 PTD	1013
Contaminated Debris	8005	80-04-09	D018, D008, D011	Standard Test	12
Contaminated Debris	8005	80201612-99, 80-04-09	D018, F005	Standard Test	15
Contaminated Debris	8005	80-04-09, 8020171-99	D018, F005	Standard Test	15
IDW Saturated Soil	6049	60201673-99	F001 F002	ENV	472
Remediation System Water Filters And Debris, IDW	6004	60-04-07, 60201715-99	F001, F002	ENV	78
Remediation System Water Filters And Debris, IDW	6004	60-04-07	F001, F002	ENV	54
Contaminated Debris, IDW	1003	60201665-99, 60-01-02	F001, F002	ENV	17
Contaminated Debris, IDW	1003	6020176-99, 60-01-02	F001, F002	ENV	14
Contaminated Debris, IDW	1003	60201711-99, 60-01-02	F001, F002	ENV	15
Contaminated Debris, IDW	1003	60201716-99, 60-01-02	F001, F002	ENV	13
Contaminated Debris, IDW	1003	60201720-99	F001, F002	ENV	27
Contaminated Slurry, IDW	6045	60201722-99, 60-07-03	F001, F002	ENV	20
Contaminated Debris, IDW	1003	60201668-99	F001, F002	ENV	17
Remediation System Water Filters And Debris, IDW	6004	60-04-07	F001, F002	ENV	55
Contaminated Debris, Fuel	1003	102016102-99, 20-04-18	P068, U098, U133	ENV	46
Contaminated Debris, Fuel	1003	102016114-99	P068, U098, U133	ENV	15
Contaminated Debris, Fuel	1003	102016115-99	P068, U098, U133	ENV	18
GAC With Hydrazines	5002	5020164-99, 50-20-04	P068, U098, U133	ENV	99
Contaminated Debris, Fuel	1003	10201712-99, 20-01-25, 20-19-06, 50-20-01	P068, U098, U133	ENV	4

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Contaminated Debris, Fuel	1003	10201713-99, 20-04-18	P068, U098, U133	ENV	31
Contaminated Debris, Fuel	1003	10201733-99, 20-01-25, 50-02-05, 50-20-01	P068, U098, U133	ENV	6
Contaminated Debris, Fuel	1003	10201734-99, 20-04-18	P068, U098, U133	ENV	15
Dilute Fuel Contaminated Sample Vials	2007	20201726-99, 20-04-108	P068, U098, U133	MT2	3
Contaminated Debris, OX	1003	10201776-99, 20-01-24, 20-19-07, 30-01-30, 40-01-28	P078	ENV	4
Contaminated Debris, OX	1003	10201798-99	P078	ENV	6
Contaminated Debris, OX	1003	102016103-99, 20-01-24	P078	ENV	3
Contaminated Debris, OX	1003	102016104-99, 20-04-16	P078	ENV	34
Contaminated Debris, OX	1003	102016116-99	P078	ENV	2
Contaminated Debris, OX	1003	102016117-99	P078	ENV	15
Contaminated Debris, OX	1003	10201714-99, 20-01-24, 20-19-07, 80-02-08	P078	ENV	3
Contaminated Debris, OX	1003	10201715-99, 20-04-16	P078	ENV	34
Contaminated Debris, OX	1003	10201735-99, 20-01-24	P078	ENV	2
Contaminated Debris, OX	1003	10201777-99	P078	ENV	25
Contaminated Debris, OX	1003	10201799-99	P078	ENV	20
P078 ADGAS Treatment Residual (Water)	1034	20201661-99, 20-04-74, 30-01-02, 40-01-02, 40-01-04	P078	ENV	191
P078 ADGAS Treatment Residual (Water)	1034	20201661-99, 40-01-02, 40-01-04, 30-01-02, 20-04-74	P078	ENV	218
Hydrolyzed Oxidizer	2038	20201673-99, 20-04-74	P078	Chem Lab	5
P078 ADGAS Treatment Residual (Water)	2038	20201711-99, 20-04-74, 20-04-123, 40-01-02, 80-02-03	P078	Chem Lab	125
P078 ADGAS Treatment Residual (Debris)	1003	3020172-99, 30-01-02, 40-01-02	P078	ENV	10

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
P078 ADGAS Treatment Residual (Water)	5007	102017104-99	P078	ENV	1034
Cyanide Bearing, Waste	2013	20201666-99	P098	MT2	3
Petroleum Contaminated Soil	1003	40201626-99	TBD	ENV	251
Contaminated Debris, Fuel	1003	10201774-99, 20-01-25, 20-19-06, 50-20-01	U133, P068, U098, U133	ENV	9
Contaminated Debris, Fuel	1003	10201796-99	U133, P068, U098, U133	ENV	9
Contaminated Debris	1003	10-15-01, 10201740-99, 20201623-99, 8020156-99, 10201234-99		ENV	8
Petroleum Contaminated Soil	6044	60201649-99		ENV	255
Petroleum Contaminated Media	4016	40201627-99		ENV	79
Petroleum Contaminated Media	1018	10201746-99		FA2	170
Unused Chemicals	8001	80201714-99		All Sections	1
Water Contaminated With Paint	1050	10-27-08		ENV	230
Water Contaminated With Paint	1050	10-27-08		ENV	158
Oil Contaminated Debris	1003	40201712-99		ENV	83
Waste Water, Instrument Process Waste	1046	20-04-66		ENV	16
Unused Commercial Chemical Products	2007	20201671-99		MT2	3
Oakite 126 Solution, Spent	2030	20201676-99, 20-01-11		MS2	474
Oakite 126 Solution, Spent	2001	20-01-11		CTF	80
Oakite 126 Solution, Spent	2029	20-01-11		MS2	176
Waste Water, Instrument Process Waste	2001	20-04-66		CTF	23

Waste Stream	Site ID	WIWPS	EPA Code(s)	New	Weight (kg)
Unused Chemicals	8001	80201711-99		All Sections	8
P078 ADGAS Treatment Residual (Water)	1003	10201779-99		ENV	12
P078 ADGAS Treatment Residual (Debris)	1003	10201791-99		ENV	36

Legend

300 PTD - 300 Area Propulsion Test Dept.

400 PTD - 400 Area Propulsion Test Dept.

CTF - Component Test Facility

ENV - Environmental Dept.

FA2 - Maintenance and Operations

FA3 - Warehouse

HFTA - Hazardous Fluids Test Area

MS2 - Component Services

MS3 - Calibration Lab

MS4 - Machine/Weld Shop

MT2 - Hazardous Test Engineering

PSOB - Security Building