National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
White Sands Test Facility
P.O. Box 20
Las Cruces, NM 88004-0020

November 26, 2019

Reply to Attn of: RE-19-175

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) 2019 Waste Minimization Program Certification and Plan

Through this submittal, NASA is certifying that a program is in place to reduce the volume and toxicity of hazardous waste generated at WSTF to the degree determined to be economically practicable and that the treatment, storage, and disposal methods of waste generated at WSTF minimize present and future threats to human health and the environment. This certification is provided in accordance with 40 CFR 264.73(b)(9) and Section II.D of the WSTF Hazardous Waste Permit (No. NM8800019434). Enclosure 1 provides a paper copy of the 2019 WSTF Waste Minimization Plan. Enclosure 2 provides an electronic copy of the document on CD-ROM. The enclosed report was prepared for federal fiscal year 2019 (October 1, 2018 – September 30, 2019) in accordance with Permit requirements.

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.

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, 2018 to September 30, 2019

NM8800019434

NASA Johnson Space Center White Sands Test Facility

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Timothy J. Davis
Chief, NASA Environmental Office

Date 11/26/19

National Aeronautics and Space Administration

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Table of Contents

List of Acronyms and Abbreviations

BFP	Backflow preventers
EMP	Environmental Management Program
EMS	ISO 14001 Environmental Management System
EO	Executive Order
EPA	United States Environmental Protection Agency
FY	Fiscal Year
HMM	Hazardous Materials Management
HSWA	Hazardous and Solid Waste Amendments
ISO	International Organization for Standardization
JIT	Just in Time
kg	Kilogram(s)
lbs	Pound(s)
LED	Light-emitting Diode
LOX	Liquid oxygen
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
Permit	WSTF Hazardous Waste Permit
PV	Photovoltaic
ReMaP	Reuse Market Place
RSA	Recycling and sustainable acquisition
S2WG	Site-Wide Sustainability Working Group
STGT	Second TDRSS Ground Terminal
TCE	Trichloroethene
TDRSS	Tracking and Data Relay Satellite System
WIWPS	WSTF Individual Waste Profile Sheet
WSTF	NASA Johnson Space Center White Sands Test Facility

1.0 Introduction

The New Mexico Environment Department (NMED) Hazardous Waste Permit (Permit) was issued to the National Aeronautics and Space Administration (NASA) Johnson Space Center for White Sands Test Facility (WSTF) on November 10, 2016. 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 NASA submit a copy of the annual certified statement regarding the WSTF 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, 2018 through September 30, 2019, or the 2019 NASA fiscal year (FY). Source reduction, recycling, and planning activities for this reporting period are addressed below. Each Permit requirement and NASA 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

The International Organization for Standardization (ISO) 14001:2015 Environmental Management System (EMS) is incorporated into the WSTF Integrated Management System. NASA uses EMS procedures to evaluate environmental aspects of WSTF activities, products, and services to determine their environmental impacts. Stakeholders annually rank environmental impacts of each aspect and identify those with significant impacts as "significant aspects." Once the significant aspects are identified, NASA establishes an Environmental Management Program (EMP) 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). If warranted, EMPs may be carried over two or more years.

The FY 2019 significant aspects and associated EMPs were:

- Drinking Water System Improvements
- Resource Conservation Measures
- Environmental Improvement and Outreach Initiatives

Objectives and accomplishments for each EMP are discussed below.

3.1.1.1 Drinking Water System Improvements

The objective of this EMP is to maintain the quality of WSTF drinking water by upgrading and improving the overall system. The following steps were completed in FY 2019.

- One backflow preventer (BFP) was installed at Building 113 between potable and non-potable water systems. Three more installations are planned for FY 2020.
- Supply Well M was completed and placed into service.
- Supply Well J was plugged and abandoned. A replacement well is planned.
- Supply Well K will be rehabilitated following the completion of replacement Well J.
- Project to complete and install Public Water System Loop Improvement Project and install Tank 4 and Booster 5 is planned for FY 2020.

3.1.1.2 Resource Conservation Measures

The objective of this EMP is to reduce WSTF energy and water consumption. FY 2019 accomplishments are listed below.

- A 1.64-Megawatt Photovoltaic (PV) System is complete and online.
- Photovoltaic (PV) energy storage systems (in conjunction with Well Road and Second Tracking and Data Relay Satellite System [TDRSS] Ground Terminal [STGT] PV system operations is in design phase.
- Assisted with evaluation, design, construction, and startup of Solar 2 500 KW PV system, including energy storage solutions. Construction is estimated to start in FY 2020 with a planned completion and startup in FY 2022.
- Installed area-specific water meters (Building 113, STGT, 800 Area liquid oxygen [LOX] pad) to evaluate usage and identify resource conservation opportunities.
- Ongoing eddie current testing of chillers to evaluate health and longevity for future replacement projects.
- Energy Efficiency and Water Conservation Team met periodically to discuss opportunities and plan energy/water conservation projects.

3.1.1.3 Environmental Improvement and Outreach Initiatives

This EMP emphasizes improved employee awareness for continual improvement in pollution prevention, resource conservation and reuse for waste reduction and environmental stewardship. The Site-Wide Sustainability Working Group (S2WG) is a forum for WSTF employees from all departments to identify resource conservation and waste minimization opportunities across the site. Management approved the continuation of the group in FY 2019. A list of S2WG accomplishments and initiatives is below:

- The S2WG supports WSTF Sustainability Goal Stakeholders to raise awareness for continual improvement toward NASA Sustainability Goals.
- S2WG representatives work to increase employee involvement to reduce resource use and increase material’s reuse. An example is the pilot Green2Go program that is testing reusable cafeteria carryout containers.

- The Reuse Market Place (ReMaP) software application, developed to encourage resource reuse, has saved significant resources for the site (over $145,000 through cost avoidance). Employees make unused materials available to other departments on-site to reduce waste.
- S2WG members support the Hazardous Materials Management (HMM) working group for continual improvement to this program on-site. This group focused on inventory management improvements and identifying hazardous material reuse opportunities during the reporting period. One of the main objectives of these efforts is to reduce the amount of hazardous waste generated from the disposal of unused commercial chemical products at WSTF.
- S2WG members support the Energy Efficiency and Water Conservation Team to identify opportunities for energy and water conservation.

3.1.2 WSTF Sustainability Program

The site Environmental Department administers the WSTF Sustainability Program 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. Sustainability Program Personnel manage the EMP, *Environmental Improvement and Outreach Initiatives,* and facilitate S2WG meetings. S2WG allows NASA to expand its reach by encouraging employees across WSTF to identify opportunities to continue to reduce WSTF's environmental impact.

Goals for federal agencies are outlined in the 2018 Executive Order (EO) 13834 *Efficient Federal Operations*. EO goals are based on statutory requirements in the following areas: building efficiency and energy cost reduction; renewable energy and electricity; reduction of potable and non-potable water consumption; employing performance contracts to achieve energy; water, building modernization and infrastructure goals; sustainable design and efficient use of building space; toxic, hazardous, and solid waste prevention and recycling; and, sustainable acquisition and life cycle management of materials. Federal agencies are required to track and report progress and performance measures toward the goals in the EO.

The WSTF Environmental Department maintains records of sustainable actions categorized according to NASA sustainability 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 to the Office of Management and Budget and the Council on Environmental Quality.

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 training content 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.

All WSTF employees are required to attend annual Environmental Compliance Awareness Training, which includes specific content related to waste source reduction and recycling program elements. Annual sustainable acquisition training specific to the WSTF procurement systems is mandatory for all employees that order goods and services for the site.

WSTF Sustainability Program Personnel and the S2WG determine content and maintain the site-wide awareness campaign to strengthen the sustainability culture at the site. Information is circulated to site employees through various forms of communication, such as WSTF Today emails, the LED sign at the WSTF entrance, sustainability presentations, and articles posted in the two WSTF newsletters; the bi-weekly "Porcelain Press" and the monthly "What's Going On at WSTF." Topics such as new sustainability initiatives, environmental awareness, process reminders, site accomplishments, and employee awards for sustainable actions are shared using the site newsletters, emails, and sign postings. Earth Day (April 22) America Recycles Day (November 15) are celebrated with various activities, awareness updates, and site-wide events.

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.*

NASA reduced the amount of acute hazardous waste generated at WSTF over the last FY by continuing to use a molecular sieve to reclaim off-specification oxidizer. Approximately 3,000 gallons of oxidizer were reclaimed. This effort reduced the need to purchase new product and eliminated the need to dispose of the off-specification oxidizer as acute hazardous waste.

A Sustainability Program software application continued to be used by WSTF employees to access sustainable acquisition references and metrics, recycling metrics, sustainable actions, and resource conservation tools. This application also provides resources for identifying less toxic and sustainable products during the procurement process. Identifying and procuring non-hazardous replacement products reduces the amount of toxic chemical products on-site. The application is also used to collect, share, and compile data for annual sustainability reporting requirements.

NASA centers are directed to purchase environmentally preferable products and services to reduce negative environmental impacts of resource consumption. Federal requirements for environmentally responsible products (and services) are listed on the Green Products Compilation at https://sftool.gov/GreenProcurement. This site lists 27 product categories 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 and guidance for contract language is available. The WSTF Sustainable Acquisition Program requires that requestors identify any green requirements prior to submitting procurement requests for products or services.

WSTF Environmental, Procurement, and Logistics Departments make an effort 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 for lubricants are underway. Recycled content products conserve resources such as wood, petrochemicals, and metal. The majority of copy paper used at WSTF contains 100 percent post-consumer recycled content.

Sustainable acquisition waivers are used to document the justification for continued use of conventional products when specific green products do not meet project specifications or exceed budget constraints. A Just-in-Time (JIT) contract for office supplies was initiated in FY 2015 to reduce the need for stocking office supplies in the warehouse. Prior to contract award, all potential vendors identified recycled or biobased products as required. JIT orders are filled on an as needed basis to conserve resources and minimize waste.

ReMaP is an award-winning application that was developed as a tool for employees to share excess resources across WSTF. If resources, including office supplies, furniture, and consumables cannot be used by the department that purchased them, the commodity can be posted in ReMaP for other departments to claim for use on-site. Unused chemical products are included on the list of acceptable materials to post on ReMaP. WSTF was recently presented with the 2018 Environmental Protection Agency (EPA) Region 6 award for Innovation to Promote Environmental Improvements for the implementation of ReMaP.

Single-stream recycling is included in the solid waste contract for WSTF. Single-stream materials include: office paper, shiny paper (catalogs and magazines), newspaper, paper board, paper bags, books, junk mail, clean plastic containers numbered 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 located outside buildings in each area. Custodians empty recycling bins in the buildings regularly and transfer the materials to exterior recycling containers. The solid waste contractor empties these containers monthly and hauls the materials to the county's recycling facility. A large roll-off container for accumulating cardboard at the warehouse is also serviced as needed.

The WSTF solid waste and recycling contract also includes construction and demolition debris recycling for wood, gypsum board, 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, repurposing, or recycling. In addition to traditional recyclables, the Sustainability Program personnel work to divert usable excessed material to other federal agencies, schools, and non-profit agencies through a partnership with the South Central Solid Waste Authority (SCSWA) which manages the Doña Ana County Recycling Program.

Sustainability Program personnel work with the WSTF Logistics Department to determine the best method of disposition for site materials to achieve landfill diversion. The average WSTF recycling/waste diversion rate since FY 2000 is 83 percent. WSTF tracks all recycling and solid waste diversion metrics for annual reporting purposes. Specific hazardous waste source reduction and recycling measures for the current reporting period are presented in Appendix A. Over 8,000 kilograms (kg) of potential hazardous waste was recycled as universal waste.

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 $26,390 in service and labor was spent in FY 2019 recycling routine hazardous waste. As part of the WSTF property management process, approximately 5.27 tons (10,540 pounds [lbs]) of E-waste (electronic equipment) and 44 tons (88,000 lbs) of scrap metal were recycled in FY 2019. NASA also continued to fund the Sustainability Program as part of the overall Environmental Department compliance budget. Approximately $193,500 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 safe space exploration and utilization. Federal and industry funding supports NASA test programs often 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, commercial industry contracts, missile demilitarization, and decommissioning and decontamination of antiquated aerospace equipment will increase customer-testing requirements and limit the feasibility of source reduction. However, the WSTF Environmental Department works closely with the Testing and Laboratory Departments to identify and implement 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 weekly 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.

Sustainability Program personnel participate 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 forums facilitate the sharing of information about recycling, sustainability, and pollution prevention strategies between NASA centers.

WSTF Sustainability Program personnel work with the SCSWA to align the WSTF recycling program with similar efforts in the community. The WSTF Environmental Department is a member of the New Mexico Recycling Coalition (NMRC) which sponsors a website, training opportunities, and conferences on waste reduction and recycling opportunities in New Mexico. Two Sustainability Program personnel are certified both as Recycling Facility Operators by the NMRC and the New Mexico Solid Waste Bureau and as national Sustainable Resource Management Certified Professionals through the NMRC in association with Pennsylvania State Altoona.

WSTF personnel also use online resources, including webinars, that 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 Federal Sustainability Council for Environmental Quality, 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 formed an HMM working group to explore opportunities to reduce hazardous waste generated through source reduction. The HMM proposed a pilot project to develop and test a HMM database to track site chemicals from receipt through use and disposal. The project has been funded and will be initiated in FY 2020. The objective of the project is to reduce the hazardous waste burden from the disposal of commercial chemical products, facilitate the responsible use of chemicals on site, provide a real-time/auditable chemical inventory, and provide a centralized database for on-site chemical tracking. The database will provide opportunities for identifying redundant chemicals and those that may potentially be replaced with less toxic alternatives. Excess chemicals identified during the inventory process will be posted for reuse on ReMaP.

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 2019 WSTF hazardous waste streams by waste name, WSTF area designation, accumulation site identification number, waste code, WSTF Individual Waste Profile Sheet (WIWPS) number, and quantity. The table is sorted by WSTF area first, accumulation site identification number second, and waste code third.

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 commercial 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; laboratory work and analyses; and computer and electrical support. The products used and resultant 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

Table A-1 WSTF Hazardous Waste Source Reduction (Oct. 1, 2018 – Sept. 30, 2019)

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.
FY 2019	Electronics recycling (including toner cartridges) through UNICOR. Program initiated in 2009.	4,790 kg
FY 2019	NASA continued to use a portable molecular sieve during the reporting period to reclaim off-specification oxidizer. Reclaiming off-specification reduces the need to purchase new product and reduces the amount of acute hazardous waste that would have been generated from discarding the off-specification oxidizer. Program initiated in 2018.	3,000 gallons
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

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

Table A-2 WSTF Waste Recycling for Oct. 1, 2018 – Sept. 30, 2019

HAZARDOUS AND NON-HAZARDOUS WASTE RECYCLED	NET REDUCTION
Used Antifreeze, recycled	130 kg
Used Oil, recycled	4,251 kg
Used Oil Filters, recycled	303 kg
The following materials were collected and shipped off site for recycling as universal waste rather than disposed of as hazardous waste.	
Silver zinc batteries	38 kg
Nickel-cadmium batteries	4,196 kg
Lithium and lithium ion batteries	21 kg
Lead acid batteries	2,659 kg
Spent dry cell batteries (alkaline) batteries	165 kg
Spent fluorescent lamps (including odd shaped)	369 kg
Non-PCB Ballasts	547 kg
Spent UV mercury containing lamps	55 kg
Mercury Containing Equipment	3 kg

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

TIME FRAME	PLANNED SOURCE REDUCTION/RECYCLING	NET REDUCTION
Ongoing	The NASA Plume Front Treatment System continues to treat groundwater contaminated with trichloroethene (TCE), tetrachloroethene (PCE), Freon-113, Freon-11, and NDMA (N-nitrosodimethylamine).	> 99.9 %
Ongoing	The NASA Mid-plume Interception and Treatment System continues to treat groundwater contaminated with Freon-113, TCE, PCE, Freon-11, and NDMA.	> 99.9 %
Ongoing	NASA will continue to utilize a portable molecular sieve during the reporting period to reclaim off-specification oxidizer. Reclaiming off-specification reduces the need to purchase new product and reduces the amount of hazardous waste that would have been generated from discarding the off-specification oxidizer.	2,000 to 3,000 gallons
Ongoing	WSTF continues to provide integral support for government and private space efforts. WSTF operations are a critical component of NASA's core ability to test rocket engines at simulated altitudes. The WSTF 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	Unused commercial chemical products are added to ReMaP to increase reuse opportunities for these items at WSTF. This activity will reduce the amount of new hazardous materials brought onto WSTF and reduce the amount of hazardous waste that would have been generated through disposal of these products if they were not reused. New process. Data is under evaluation.	TBD
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. Using fuel from this distillation system will reduce the need to purchase new propellant, and will reduce the need to dispose of off-specification fuel as hazardous waste. Additional testing of this technology is planned for FY 2020.	Installation completed in FY 2015, system will not be used until upgrades are complete at Fuel Storage Area.
Ongoing	1.64-Megawatt Photovoltaic System is complete and online This system is reducing the amount of natural resources and emissions required to provide electricity to WSTF. NASA is currently evaluating the effect of implementing this system on net electrical use at WSTF.	TBD

Appendix B
Hazardous Waste Matrix

Waste Stream	WSTF Area	Accumulation Site ID	WIWPS	EPA Codes	Weight (kg)
Unused Commercial Chemical Products	100	1003	10201946-99, 10201947-99, 10201950-99	D001	29
Unused Commercial Chemical Products	100	1003	10201949-99	D001, D003	1
Spent Aerosol Cans	100	1003	10-20-43, 10201939-99	D001, D003, D018, D035, D039	63
Spent Aerosol Cans	100	1003	10-20-43	D001, D003, D018, D039	21
Paint Related Waste	100	1003	10-03-06	D001, D018	323
Spent Solvents	100	1003	10-03-01, 10201933-99	D001, D018	31
Unused Commercial Chemical Products	100	1003	102018141-99	D002	1
Igniter Waste, Rinsate	100	1003	8020196-99	D002	22
Petroleum Contaminated Media	100	1003	60201843-99	D004, D006, D007, D008, D018	719
Contaminated Debris	100	1003	4020193-99, 40-02-26	D004, D006, D007, D008, D018	135
Contaminated Soil (Antifreeze)	100	1003	10201891-99	D006, D008	49
Unused Commercial Chemical Products	100	1003	10201948-99	D007, D008	5
Discarded Commercial Chemical Products	100	1003	20201864-99	D018	20
Contaminated Debris, IDW	100	1003	60201845-99, 60201855-99, 60201914-99, 60201920-99, 60-01-02, 60-02-02, 60201922-99	F001, F002	94
Unused Commercial Chemical Products	100	1003	10201951-99	P015	1
Contaminated Debris, Fuel	100	1003	102018104-99, 102018105-99, 102018131-99, 102018132-99, 1020197-99, 1020198-99, 10201927-99, 20-01-25, 20-19-05, 30-01-08, 50-20-01	P068, U098, U133	166
Fuel Contaminated Debris/Water Mixture	100	1003	10201928-99, 20-04-18, 10201941-99, 10201969-99	P068, U098, U133	97
Fuel Contaminated Softgoods	100	1003	10201968-99	P068, U098, U133	19
GAC With Hydrazines	100	1003	5020193-99, 50-20-04	P068, U098, U133	184
P078 ADGAS Treatment Residual (Debris/Water Mixture)	100	1003	10201930-99, 20-04-16	P078	25
Contaminated Debris, OX	100	1003	10201942-99, 20-01-24, 30-01-30, 10201943-99, 20-04-16, 10201970-99, 10201971-99, 102018106-99, 102018133-99, 1020199-99, 10201929-99	P078	65

Waste Stream	WSTF Area	Accumulation Site ID	WIWPS	EPA Codes	Weight (kg)
Contaminated Debris	100	1006	10-02-09, 10201916-99, 10201932-99	D005, D007, D008, D018	371
Spent Machine Shop Coolant	100	1006	10-02-02, 10201924-99	D007, D008	1134
Spent Machine Shop Coolant	100	1006	10-02-02, 10201923-99	D008	1052
Metal Cutting Fluids, Spent	100	1007	10-02-02, 10201934-99	D008	220
Petroleum Contaminated Debris	100	1012	1020195-99	D004, D006, D007, D008, D018	38
Contaminated Debris	100	1018	10-01-18, 10201937-99	D004, D005, D006, D007, D008, D018, D039, F002, F005	105
Waste Water, Fuel	100	1021	10-01-07	D001, D018	105
Filters, Fuel Spent	100	1021	102018139-99, 10-01-22	D018	55
Contaminated Debris and Waste Paint Related Materials	100	1034	10-03-08	D004, D006, D007, D008, D018	18
Contaminated Debris,Waste Paint & Paint Related Materials	100	1034	10-03-08	D018	56
Inorganic Etchants, Spent	200	2006	20-02-01	D002, D006, D007, D008	10
Spent Organic Etchants	200	2006	20201919-99, 20-02-32	D002, D007	3
Organic Liquids, Waste	200	2007	20201862-99	D001	30
Off- Spec Analytical Standards	200	2007	20201876-99, 20-04-12, 20-04-13	D001, D039, D040	2
Metrohm-850 Professional IC Instument Process Waste	200	2007	20201874-99	D002	20
Metal Solutions, Waste	200	2007	20-04-99, 20201868-99	D002, D004, D005, D006, D007, D008, D009, D010, D011	12
Dilute Fuel Contaminated Sample Vials	200	2007	20201875-99	P068, U098, U133	5
Organic Acid Waste	200	2013	20201884-99	D001, D002	51
Organic Liquids, Waste	200	2013	20201912-99	D001, D018, D022, D040, F003, U080, U239	8
MMH Fuel Oxidizer Reaction Products	200	2013	20201861-99	D001, F002, F003	3
Cyanide Bearing, Waste	200	2013	20201911-99	P098	2.95

Waste Stream	WSTF Area	Accumulation Site ID	WIWPS	EPA Codes	Weight (kg)
Waste Water, Organic	200	2014	20201920-99, 20-10-08	D001	7
Organic Acid Waste	200	2020	20201935-99	D002	57
Spent Oakite 31 Cleaning Solution	200	2029	20-01-50, 2020195-99	D002	71
Spent Oakite 31 Cleaning Solution	200	2030	20201880-99	D002, D006	356
Contaminated Debris	200	2030	20-01-60, 20-07-06	D004, D006, D007, D008, D011, D018	25
Unused Commercial Chemical Products	200	2032	20201882-99	D001, D018	10
Contaminated Debris	200	2032	20201914-99, 20-02-22, 27-01-23, 20201859-99, 20201865-99, 20201877-99, 20201910-99, 20201918-99, 20201926-99, 20201933-99	D004, D005, D006, D007, D008, D018	363
Fixer Solution, Spent	200	2043	20201860-99, 20201917-99, 20-02-14	D011	46
Oakite 126 Solution, Spent	200	2029, 2030	20-01-11, 2020196-99, 20201881-99	D002	431
Contaminated Debris	200	2030, 2021	20201858-99, 20201929-99, 20201932-99	D007, D018	80
Unused Commercial Chemical Products	200	2032, 2013	20201883-99, 20201938-99	D001	3.5
Decon Water With Ox	300	3003	50201920-99	D002, P078	189
Decon Water With Fuel	300	3010	40-04-12	P068, U133	1,702
Unused Commercial Chemical Products	400	4008	4020191-99	D001	5
Unused Commercial Chemical Products	400	4008	4020192-99	D002, D018	2
Contaminated Debris And Waste Paint Related Materials	400	4020	10-03-08	D004, D006, D007, D008, D018	25
Contaminated Debris (Waste Paint & Paint Related Materials)	400	4022	40201814-99	D005, D006, D007, D008	29
Spent VOC Indicator	500	5002	5020194-99, 50-05-02	D001	1
Decon Water With Fuel	500	5002	5020195-99	P068, U098, U133	1,153
Contaminated Water (Hydrazines)	500	5002	50201921-99, 50201927-99	P068, U133	3,764
P078 ADGAS Treatment Residual (Water)	500	5002, 5007	102018111-99, 102018138-99, 10201893-99, 50201920-99, 50201923-99, 50201928-99, 5020198-99	P078	9,409

Waste Stream	WSTF Area	Accumulation Site ID	WIWPS	EPA Codes	Weight (kg)
Contaminated Water (Hydrazines)	500	5002, 5008	5020196-99, 5020199-99, 5020191-99, 50201916-99, 50201921-99	P068, U098, U133	4,616
Petroleum Contaminated Debris	600	6001	60-11-05, 60201921-99	D004, D006, D007, D008, D018	65
Contaminated Solids, IDW	600	6001	60201939-99	F001, F002	857
Decon, Water	600	6001	30201816-99	F001, F002, P068, P078	44
Contaminated Debris	600	6001	30201815-99	P068, P078	2
Contaminated Media, IDW	600	6003	60201847-99	F001, F002	129
Remediation System Water Filters And Debris, IDW	600	6004	60-04-07	F001, F002	51
Remediation System Water Filters And Debris, IDW	600	6004	60201912-99	F001, F002	51
Remediation System Water Filters And Debris, IDW	600	6004	6020195-99	F001, F002	35
Contaminated Debris	600	6055	10201931-99	D004, D006, D007, D008, D018, F001, F002	71
Petroleum Contaminated Soil	600	6058	60-11-05, 6020196-99	D004, D006, D007, D008, D018	221
Contaminated Debris, IDW	600	6001, 6056	60201931-99, 60201937-99	F001, F002	83
Petroleum Contaminated Debris	800	8004	80201810-99	D018	2
Igniter Waste, Rinsate	800	8005	8020189-99	D002	20
Contaminated Debris	800	8005	80-04-09	D006, D007, D008, D018, D035, F005	29