Storm Water Pollution Prevention Plan

National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA

December 2024

Environmental Support Services Contract
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Storm Water Pollution Prevention Plan

Prepared for:
Environmental Management Division
NASA Ames Research Center
M/S 204-15
Building N204, Room 102B
Moffett Field, CA 94035-0001

December 2024

BB&E
CONSULTING ENGINEERS
& PROFESSIONALS

Executive Summary

The NASA ARC SWPPP (CDRL 06-064) was developed for implementation to meet compliance objectives in accordance with Title 40, Code of Federal Regulations, Parts 122, 123, and 124 and the California State Water Resource Control Board Industrial General Permit (IGP).

This SWPPP has two major objectives:

1. Identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of a facility's storm water discharges and authorized non-storm water discharges.
2. Identify, describe, and implement required site-specific BMPs to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges. BMPs are required and shall be selected to achieve Best Available Technology/Best Control Technology (BAT/BCT) and compliance with water quality standards.

CERTIFICATION

"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 ensure 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."

Jeanne Sabin

Digitally signed by Jeanne Sabin
Date: 2024.12.31 14:48:03 -08'00'

Authorized Signature

Jeanne Sabin
Print Name

12/31/2024
Date

Water Compliance Program Manager
Title

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LIST OF ACRONYMS

ACSCE	Annual Comprehensive Site Compliance Evaluation
AFFF	Aqueous Film Forming Foam
APR	Ames Procedural Requirement
ARC	Ames Research Center
BAT/BCT	Best Available Technology/Best Control Technology
BMP	Best Management Practice
CAANG	California Air National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGP	Construction General Permit
COC	Chain of Custody
CWA	Clean Water Act
DFSP	Defense Fuel Support Point
DoN	Department of the Navy
EATS	Eastside Aquifer Treatment System
EDM	Eastern Diked Marsh
EIS	Environmental Impact Statement
EMD	Environmental Management Division
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
gpm	gallons per minute
GWTS	Groundwater Treatment System
IGP	Industrial General Permit
IRP	Installation Restoration Program
LRP	Legally Responsible Person
MEP	maximum extent practicable
MEW	Middlefield-Ellis-Whisman
MIMP	Mitigation Implementation and Monitoring Plan
MS4	Municipal Separate Storm Sewer System
NADP	NASA Ames Development Plan
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act of 1969
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRP	NASA Research Park
NSWD	Non-Storm Water Discharges
PCBs	Polychlorinated biphenyls

PV	Planetary Ventures
QISP	Qualified Industrial Stormwater Practitioner
QSD	Qualified Storm Water Pollution Prevention Plan Developer
QSE	Qualifying Storm Event
RGRP	Regional Groundwater Remediation Program
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SMARTS	Storm Water Multiple Application and Report Tracking System
SPCC	Spill Prevention, Control, and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWRP	Storm Water Retention Pond
SWSB	Storm Water Settling Basin
TOC	Total Organic Carbon
TOG	Total Oil & Grease
USFWS	United States Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WATS	Westside Aquifer Treatment System
WDRs	Waste Discharge Requirements

Storm Water Pollution Prevention Plan (SWPPP)

Executive Summary

The discharge of storm water from National Aeronautics and Space Administration (NASA) Ames Research Center (ARC) is regulated by four permits issued by the State Water Resources Control Board (SWRCB) under the National Pollutant Discharge Elimination System (NPDES):

- NPDES No. CAS000001: General Permit for Storm Water Discharges Associated with Industrial Activities, Industrial General Permit Order 2014-0057-DWQ as amended in 2015 and 2018. On November 6, 2018, the State Water Board amended the Industrial General Permit Order 2014-0057-DWQ, Order 2015-0122-DWQ, and Order 2018-0028-DWQ. In accordance with this permit, a SWPPP has been established and is reviewed annually, or more frequently as needed. In addition to regular updates to the SWPPP, an annual report is submitted to the San Francisco Bay Regional Water Quality Control Board (RWQCB) as required by the IGP.
- NPDES No. CAS000004: General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), Order 2013-0001-DWQ as amended by Order WQ 2015-0133-EXEC, Order WQ 2016-0069-EXEC, WQ Order 2017-0031-DWQ, Order WQ 2018-0001-EXEC, and Order WQ 2018-0007-EXEC, effective January 24, 2018. The ARC SWPPP is an equivalent document as described in Section F.4 of Order WQ 2018-0007-EXEC and therefore is not implementing a separate MS4 program.
- NPDES General Permit No. CAS000002: State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, adopted by the State Water Resources Control Board adopted the 2022 Construction Stormwater General Permit, Order 2022-0057-DWQ, on September 8, 2022, and it went into effect on September 1, 2023.
- NPDES No. CAG912002: California Regional Water Quality Control Board San Francisco Bay Region General Waste Discharge Requirements for Discharge or Reclamation of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds (VOC), Fuel Leaks, Fuel Additives, and Other Related Wastes (VOC and Fuel General Permit), became effective on January 1, 2019. NPDES No. CAG912002 (amendment Order No. R2-2018-0050) applies to the ARC Remedial Groundwater Remediation Program (RGRP) at the Westside Aquifer Treatment System (WATS).

Each NPDES permit requires the development and implementation of BMPs designed to reduce the discharge of pollutants to the maximum extent practicable (MEP). As part of the aforementioned General Permits, NASA ARC must abide by any standards and requirements established by Santa Clara County and the San Francisco Bay RWQCB. Santa Clara County is a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program, and incorporates their recommendations into the County's Parameter Benchmark Values. The San Francisco Bay RWQCB establishes and defines its requirements through the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan).

In April 2015, Planetary Ventures (PV) entered into a 60-year land lease agreement with NASA. Included in the lease was a portion of the land to be used for parking and maintaining a fleet of commuter buses for PV employees. Roughly 320 large commuter buses are parked in a paved lot located between Hangar 3 and the Golf Club at Moffett Field on the east side of ARC. Industrial operations in this area are dissimilar to other industrial operations at ARC, and PV filed a Notice of Intent (NOI) for their Planetary Ventures Bus Parking Facility (depicted on Figure 3) which covers activities performed within the bus operations area. Therefore, the Planetary Ventures Bus Parking Facility is not directly covered under ARC's SWPPP. However, discharge from the Planetary Ventures Bus Parking Facility enters ARC's stormwater system and is at that point covered under ARC's SWPPP.

Introduction

The NASA ARC SWPPP has been developed and implemented to comply with the requirements of Title 40, Code of Federal Regulations, Parts 122, 123, and 124 and the requirements of the IGP.

This SWPPP has two major objectives:

1. Identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of a facility's storm water discharges and authorized non-storm water discharges;
2. Identify, describe, and implement required site-specific BMPs to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges. BMPs are required, and shall be selected to achieve Best Available Technology/Best Control Technology (BAT/BCT) and compliance with water quality standards.

NASA endeavors to eliminate pollutants from storm water discharges at ARC. This SWPPP was developed and implemented in accordance with the Federal Water Pollution Control Act, also known as the Federal Clean Water Act (CWA) to achieve this goal.

Under the CWA's authorization, the California SWRCB has elected to issue a statewide Industrial General Permit (IGP) that applies to all storm water discharges associated with industrial activities that require a permit, with the exception of discharges related to construction activities. Separate general permit(s) are issued for discharges associated with construction activities that encompass more than one (1) acre of land disturbance. The IGP authorizes the discharge of industrial storm water, and prohibits non-storm water discharges unless authorized by a NPDES permit, with the exception of certain authorized non-storm water discharges.

The IGP requires the development and implementation of a SWPPP that places an emphasis on BMPs that reduce or prevent pollutants in both storm water discharges and authorized non-storm water discharges. Each pollutant and its source may require one or more BMPs. BMPs may include a variety of pollution prevention measures and pollution control devices. ARC has incorporated the seven (7) Minimum BMPs required by the IGP, five (5) Advanced BMPs, and 25 Site-Specific BMPs (Appendix C). ARC generates potential storm water pollutants through multiple ongoing industrial activities. The industrial activities at ARC are primarily associated with research and development in aeronautics and space science technologies, aircraft operations, and site-wide

property maintenance. Each area of industrial activity is evaluated annually and assigned the appropriate BMPs for the industrial activities being performed in each location.

On February 5, 2013, the SWRCB adopted a statewide general permit for Small MS4s, requiring NPDES permits for storm water discharged from non-traditional MS4s: storm water systems serving public campuses (including universities, community colleges, primary schools and other publicly owned learning institutions with campuses), military bases and prison and hospital complexes within or adjacent to other regulated MS4s; and from construction sites disturbing between one and five acres of land. According to Sections F.3 and F.4 of Order WQ 2018-EXEC, adopted January 24, 2018: "Permittees may incorporate the required storm water provisions into already existing programs and leverage existing staff to implement BMPs during its day to day business and operations" (Section F.3); and "A Permittee may utilize an equivalent or existing document such as a standard Operations and Procedures manual, Operation and Maintenance Plan, or Spill Response Plan if that document includes the necessary information required to comply with the provisions of this section" (Section F.4). Although ARC is a Non-Traditional Small MS4 Permittee, this SWPP is implemented across the entire ARC property (other than equivalently permitted tenant operations) and is implemented as an equivalent document as described in Section F.4. Section 5.0 of this SWPPP provides a detailed discussion of the NPDES MS4 General Permit, and of ARC's responsibilities under it.

1.0 Facility Description and Contact Information

1.1 Facility Information

Name of Facility: NASA Ames Research Center
Street: Environmental Management Division
MS 204-15, Building 204, Room 102
City: Moffett Field **State:** California
ZIP Code: 94035-0001 **County:** Santa Clara
Facility WDID Number: 2 43I011003
SIC Code: 3728-Aircraft Parts and Auxiliary Equipment, NEC
Estimated area of industrial activity at site exposed to storm water: 942 acres
Latitude: 37.413154 **Longitude:** -122.061282

1.2 Contact Information/Responsible Parties

Facility Owner/Operator
Name: NASA Ames Research Center
Address: Moffett Field, California
Mailing Address: MS 204-15, Building 204, Room 102
City: Moffett Field **State:** CA **ZIP Code:** 94035-0001

Primary Legally Responsible Person (LRP)
Name: Jeanne Sabin
Water Compliance Program Manager
Telephone Number: (650) 604-1800
Email Address: Jeanne.m.sabin@nasa.gov
Fax Number: (650) 604-7572

Secondary Legally Responsible Person (LRP)
Name: Garrett Michael Turner
Restoration Program Manager
Telephone Number: (650) 604-1406
Email Address: garrett.michael.turner@nasa.gov
Fax Number: (650) 604-7572

CWA regulations require the facility director to sign CWA permits and, if desired, to designate in writing a Legally Responsible Person (LRP) to sign CWA-related documents. The ARC Director, Dr. Eugene Tu, has authorized both Jeanne Sabin, Water Compliance Program Manager; and Garrett Michael Turner, Restoration Program Manager as his Duly Authorized Representatives for purposes of signing reports submitted to State permit programs under the CWA (Appendix A).

1.3 General Location Map

1.4 Site Maps

The following Site Maps are presented in Appendix B:

- Figure 2-Storm Distribution: shows the location of the storm water collection and conveyance system; including any structural control measures that affect storm water discharges. The map also identifies municipal storm drain inlets where the facility's storm water discharges and authorized non-storm water discharges may be received.
- Figure 3-Storm Water Drainage and Discharge Areas: shows the facility boundaries; the outline of all storm water drainage areas within the facility boundaries; sample collection and observation locations, associated points of discharge; portions of the drainage area impacted by run-on from surrounding areas; direction of flow of each drainage area, on-site and nearby surface water bodies, the locations of the Caltrans Culverts; and the location of the Settling Basin.
- Figure 4-Impervious Areas: shows the outline of all impervious areas, including paved areas, buildings, covered storage areas, or other roofed structures.
- Figure 5-Areas of Industrial Activities: shows the locations where materials are directly exposed to precipitation.
- Figure 6-Significant Spills or Leaks: shows the locations where significant spills or leaks identified in Section 2.3 have occurred.
- Figure 7-Utility Vault Dewatering Delimited Zone: depicts the boundary of the A1 aquifer where the concentrations of contaminates in the groundwater are above water quality criteria for the protection of aquatic life. Water removed from utility vaults within the delimited zone must be containerized and characterized to determine the appropriate wastewater disposal method. Refer to the Utility Vault Dewatering BMP for additional information.

1.5 Storm Water Pollution Prevention Team

Personnel specifically responsible for the SWPPP at ARC are associated with the Environmental Management Division (EMD), Code JQ. These personnel are listed below.

Staff	Title	Phone	Responsibilities
Donald Chuck	EMD Division Chief	(650) 604-0237	Oversees the SWPPP Program Ensures that affected personnel receive necessary training.
Jeanne Sabin	EMD Water Programs Manager Code JQ	(650) 604-1800	Acts as the Legally Responsible Person. Ensures that affected personnel receive necessary training. Oversees the development and implementation of the SWPPP.
Garrett Turner	EMD Restoration Program Manager QSD/QSP, QISP, Code JQ	(650) 604-1406	Acts as the backup Legally Responsible Person.
Marcia Christlieb	Spill Prevention Control and Countermeasures (SPCC), and SWPPP Subject Matter Expert, QISP, Code JQ, ERT	(650) 604-5360	Manages the development, implementation, and revisions to the SWPPP. Conducts storm water monthly and annual inspections and prepares Storm Water Annual Report. Oversees Monitoring Plan. Coordinates storm water sampling.

Every NASA employee is responsible for complying with environmental regulations and NASA policies related to official duties. Each NASA organizational element has responsibility for incorporating environmental policies into planning and budgeting; allocating and maintaining appropriate levels of authority and funding; assuring appropriate training; overseeing environmental process and material selection; minimizing hazardous waste; and stewardship for energy and water usage. The responsibility for environmental compliance falls on the director of each field installation, and those individuals with management and functional responsibilities. It is the responsibility of each individual in a management position to know and understand the environmental regulatory requirements applicable to their operation(s) and to ensure that sufficient resources are applied to achieve and maintain compliance with applicable federal, state, and local regulations.

The EMD, Code JQ, at ARC is responsible for amending the SWPPP whenever there is a change in design, construction, operations, or maintenance that has a significant effect on the potential for the discharge of pollutants to surface waters, ground waters, or the local agency's storm water system.

2.0 Facility Assessment

2.1 Facility Description

NASA ARC occupies approximately 421 acres of the 2,000 acre site that constitutes Moffett Federal Airfield and the NASA Research Park. Stewardship of the airfield and adjoining property was transferred to ARC in July of 1994, with the closure of the Naval Air Station (NAS) in response to the recommendation of the Defense Base Closure and Realignment Commission. Planetary Ventures assumed operations of Moffett Field, which includes both the airfield and the golf course, in April, 2015. Planetary Ventures provides airfield fueling operations at Moffett Field.

ARC is located approximately one mile from the southwestern shoreline of San Francisco Bay, approximately 25 miles east of the Pacific Coast. The City of Mountain View is adjacent to the western and southern boundaries of the facility. The eastern and southern boundaries adjoin the City of Sunnyvale. Downtown San Jose is located approximately seven miles southeast and the City of San Francisco is located approximately 32 miles northwest of the site. U.S. Highway 101 passes south of the facility. ARC is bounded by Lockheed Martin to the east, Highway 101 to the south, Stevens Creek to the west, and the United States Fish and Wildlife Service (USFWS) salt ponds to the north.

The ARC Campus consists of approximately 40 technical facilities and 48 other major supporting and administrative buildings and structures. The resident staff at ARC is roughly 2,300 employees which include approximately 1,200 civil service employees (temporary and permanent assignments) and 1,100 contract and subcontract employees. The mission of ARC is to conduct research and development in the fields of nanotechnology, biotechnology, aeronautics, space science, life science, information science, and earth system science.

Pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR parts 1500—1508), NASA policy and procedures (14 CFR part 1216

subpart 1216.3), NASA has prepared a programmatic Environmental Impact Statement (EIS) and signed a Record of Decision (ROD) to implement the NASA Ames Development Plan (NADP). In the NADP, NASA proposed the development of a world-class, shared-use education, research and development campus at ARC. The shared use campus, which includes the NASA Research Park (NRP), is focused on astrobiology, life sciences, space sciences, nanotechnology, biotechnology, information technology and aeronautics. As part of the NADP, NASA officials are creating partnerships with Federal, State and local government agencies, universities, private industry and non-profit organizations in support of NASA's mission to conduct research and develop new technologies. Responsible parties will submit a NOI to obtain a separate NPDES permit for construction activities associated with the redevelopment.

2.1.1 Storm Water Drainage System

The storm water at ARC flows through a storm drainage system consisting of approximately 230 manholes, 505 catch basins, one Storm Water Settling Basin (SWSB), two storm drainage treatment systems, two water pumps, and various pipes and ditches. The westernmost storm drainage treatment system is located along Zook Road, adjacent to the VTOL Pad and the easternmost storm drainage treatment system is located on the northeast corner of the intersection of Macon Road and Marriage Road. The water pumps are located in the storm drain pumping station at Building M191, northeast of the airfield, and are designed to continuously discharge water from the North Patrol Road Ditch into the Northern Channel. The piping is made of concrete and ranges in size from 6 inches to 42 inches in diameter.

PV Bay View Campus, located west of N254 and south of the Western Diked Marsh, is designed as a zero-discharge campus and able to contain a 100-year storm. Storm water on the PV Bay View Campus collects in the black water pond, which is treated and reused throughout the campus as non-potable water. An overflow pond northwest of the blackwater pond serves as secondary containment during large storm events. The overflow pond also has an above-ground overflow north into ARC's western diked marsh if 100-year storm precipitation is exceeded.

A detailed depiction of the storm water distribution system is presented in Figure 2 (Appendix B).

Eastern Drainage System

The storm water from the southern portion of the runways and the areas around N244 and N245 flows through Manhole D170 to Building M191. For the areas east of the runways, Hangar 2, and Hangar 3, storm water flows into Macon Road Ditch, and Marriage Road Ditch, which in turn flows to North Patrol Road Ditch and into Building M191. Water from the northern portion of the runways flows to Building M191 via storm drain line No 9. The flow from Building M191 is pumped over to the Northern Channel, where it flows to the Lockheed Pumping Station before it is pumped one more time from the Lockheed Channel to the Moffett Channel, the flow then meets up with the Guadalupe Slough and eventually, the San Francisco Bay. In wet years, storm water may be pumped from North Patrol Road Ditch into the Northern Channel utilizing emergency pumps at Gate 14A and Gate 14B as flood control measures.

Approximately 11 acres of the Eastern Drainage System has been set aside for the PV Bus Parking Facility. Roughly 320 large commuter buses are parked and maintained within a paved lot located between Hangar 3 and the Golf Club at Moffett Field. PV obtained and maintains IGP

coverage for activities associated with the bus parking facility. Although the parking facility is not covered under ARC's SWPPP, the area does discharge into the ARC storm distribution system.

Western Drainage System

The storm drain main enters the ARC Campus at Bushnell Street and McCord Avenue. It then proceeds north on McCord Avenue to Hunsaker Road, collecting runoff from the central core of the developed portion of the ARC Campus. It then proceeds west along Hunsaker to a junction structure with a 38-inch by 60-inch low head PVC pipe, which passes under the High Pressure Compressed Air Storage Facility. A smaller portion of the runoff from the northwesterly area of the ARC Campus south of Hunsaker Road is collected by an 18-inch diameter main running north along DeFrance Avenue and east along Hunsaker Road to the junction structure. The western drainage system proceeds north from the High Pressure Compressed Air Storage Facility into a pair of 40-inch pipes, which discharge into the SWSB. Overflow from the SWSB spills onto the diked wetland area north of the basin, currently known as the Eastern Diked Marsh (EDM). The EDM was included in the Navy's cleanup project, which is known as Site 25. The storm water then flows overland to the Perimeter Road outfall structure. Three 48-inch storm drainpipes run beneath Perimeter Road to allow drainage of the EDM into the Storm Water Retention Pond (SWRP), where it evaporates during the dry season.

Storm water from the southwestern portion of ARC, known as the NRP, includes the WATS, Hangar 1, intern housing area, and the Wescoat Housing area. In addition, drainage from approximately 50 acres of the Highway 101 right-of-way discharges onto ARC by means of several bubble-up drainage structures and culverts. Storm water from the westernmost portion of the ARC Campus includes the Full Scale Aerodynamics Complex, the Unitary Plan Wind Tunnel Complex, various research facilities, as well as run-on from the PG&E electrical substation that is adjacent to the western border of the ARC Campus. Storm water from these areas and the area around Hangar 1 flows into the SWSB, the SWSB discharges into the Eastern Diked Marsh, before discharging to the SWRP.

NASA Ames is currently in the planning process to develop a mixed use housing project with approximately 3,000 housing units within the footprint of the NRP. This SWPPP will be updated to include changes to the existing MS4 footprint when they occur.

RT Jones Road, which runs north-south along the western perimeter of ARC, was recently redeveloped to accommodate an increase of traffic to the newly constructed Planetary Ventures Bay View Campus. Storm water from RT Jones Road discharges onto NASA property. The RT Jones storm water system includes a series of bio-swales and two below-ground storm drainage treatment systems along RT Jones Road, terminating at the southwest corner of the western diked marsh. Samples are collected from the access point at the terminating end of the storm distribution system as detailed in Figure 3 (Appendix B). A detailed depiction of the storm water distribution system is presented in Figure 2 (Appendix B).

2.2 Industrial Activities, Materials Inventory, and Associated Pollutants

Industrial activities at ARC are primarily associated with research and development in aeronautics and space science and technologies, aircraft operations, and site-wide property maintenance. ARC is open for regular business, Monday through Friday, between the hours of 0700 and 1630.

ARC is operated and managed in a manner that minimizes potential contact of pollutants with storm water discharge. Materials of both hazardous and non-hazardous nature are managed, stored, and disposed of in a manner that does not pose a threat to storm water quality.

2.2.1 Industrial Activities

ARC generates potential storm water pollutants through multiple ongoing industrial activities. Storm water runoff from urban and industrial areas typically contains significant quantities of the same general types of pollutants found in industrial and wastewater point source discharges, and cause similar water quality problems.

Automobiles can contribute particles and fluids high in metals content: tires, brake-pad linings, and automotive fluids such as fuels, oils, antifreeze, and brake and transmission fluids. Road-surfacing materials such as asphalt and paint can also contain high concentrations of metals and petroleum.

Dusts and particulates are potentially generated through several operations at ARC. These include routine building and grounds maintenance, golf course maintenance, construction, demolition, building remodeling and excavation. All of these activities are covered by BMPs, which address sediment as a potential pollutant. The goal of these BMPs is to minimize the potential for dusts and particulates to settle on impervious surfaces that would allow them to be mobilized by storm water flow and discharged.

The ARC Research Center BMPs are presented in Appendix C, and general descriptions of the BMPs are presented in Section 3 of this SWPPP. To date, 18 areas of industrial activities with a potential for contaminating storm water have been identified at ARC. Located within the BMPs is Table A: Summary of Moffett Field Industrial Activities and BMPs, which provides a description of each industrial activity, along with a listing of the potential pollutants, and the applicable BMPs to be implemented is included in the BMPs.

2.2.2 Materials Inventory

For information on significant materials that have been properly treated, stored or disposed of, this SWPPP will refer to the hazardous materials inventories and hazardous waste manifests files on record in the EMD, Code JQ, Building N204, as authorized by Section X.G.1.D.ii.b of the IGP. The Hazardous Materials Inventory is updated annually by NASA ARC for hazardous materials threshold limits and reporting purposes.

Areas where hazardous materials and/or hazardous waste are stored in outside locations at ARC have been identified as areas with a potential to impact storm water quality. As such, these locations are inspected annually as part of an Annual Comprehensive Site Compliance Evaluation (ACSCE). A table listing all the locations to be inspected, including hazardous material or hazardous waste handling and storage areas, is included as Appendix D. Detailed descriptions of

each of these locations, including the types of materials or waste stored, any spill or leak prevention measures and any associated containment structures, are included as part of the individual inspection reports and retained on site in accordance with the IGP section XXI.J.

2.2.3 Associated Pollutants

Pollutants most frequently associated with storm water include sediment, nutrients, bacteria and viruses, polychlorinated biphenyls (PCBs), oxygen demanding substances, oil and grease, heavy metals, and other toxic materials. These pollutants and their impacts on water quality and aquatic habitat are described below.

Bacteria and Viruses

Bacteria and viruses are generally present on ARC due to animal excrement and sanitary sewer overflows. There is minimal potential for bacteria and viruses to be present in the storm water discharge from ARC.

Heavy Metals

Cadmium, copper, chromium, lead, mercury, nickel, and zinc are the heavy metals most commonly used at ARC. Heavy metals are toxic to aquatic organisms, can bioaccumulate, and have the potential to contaminate drinking water supplies. Storm water runoff has contributed significantly to the accumulation of metals in the sediment of South San Francisco Bay. This accumulation has resulted in restricted water uses and impaired aquatic habitat. Lead, zinc, and copper have been detected in very low quantities in storm water discharge from ARC. Mercury was not previously included in the storm water sampling plan, but was added to the plan in June of 2016 due to its presence at ARC.

Nutrients

Nutrients, including nitrogen and phosphorous, can cause excessive or accelerated growth of vegetation or algae resulting in a reduction of beneficial uses of various bodies of water. In addition, un-ionized ammonia, a form of nitrogen, can be toxic to fish. Vegetation and fertilizer are the primary nutrient sources at ARC. In response to increased nutrients detected in storm water runoff during the 2023-2024 season, Site-Specific BMPs were modified to increase monitoring of nutrient application activities and to establish a more aggressive maintenance schedule for the storm water distribution system (Section 3.0).

Oil and Grease

Oil and grease, including all petroleum products, contain a wide array of hydrocarbon compounds, some of which are toxic to aquatic life at low concentrations. Oil and grease are commonly found in runoff from streets, parking lots, and runways. The potential exists for variable quantities of oil and grease to be present in the storm water discharge from ARC. Low levels of petroleum products have been detected in storm water runoff at ARC. This can be attributed to street runoff and various industrial activities. Minimum, Advanced, and Site-Specific BMPs have been established to address oil and grease at ARC (Section 3.0).

Oxygen Demanding Substances

Oxygen Demanding Substances include plant debris (such as leaves and lawn clippings), animal excrement, street litter, and organic matter and are commonly found in storm water. Such

substances depress the dissolved oxygen levels in creeks, estuaries, and the San Francisco Bay. The potential exists for small quantities of plant debris and street litter to be present in the storm water discharge from ARC.

PCBs

PCBs are biphenyl molecules that have been chlorinated to varying degrees and that belong to a family of organic compounds known as chlorinated hydrocarbons. PCBs have a heavy oil-like consistency, a high boiling point, a high degree of chemical stability, low flammability, and low electrical conductivity. PCBs and PCB byproducts are highly toxic and persistent. They have been found to be teratogenic and carcinogenic. PCBs are known to cause chronic reproductive effects, gastric disorders, and skin lesions, such as chloracne.

The only toxic chemical listed in 40 CFR 372 that has been discharged to the storm drain system is an uncommon PCB; Aroclor 1268, which was first detected in sediment samples from the Storm Water Retention Basin in 1997, and again in storm water samples in 1999, when the investigation was conducted to identify the source of this contamination. This investigation was outlined in the subsequent Annual Reports. In July of 2002, samples taken from the roof of Hangar 1 confirmed the suspicion that the deterioration of siding, paint, and roofing material containing Aroclor 1268 and Aroclor 1260 was the source of Aroclor 1268 in both storm water and sediment at ARC. The release was reported to the RWQCB, National Response Center, and California Office of Emergency Services as continuous and ongoing. The Hangar 1 Summary Report summarizes the investigation and subsequent findings, and is included as Appendix E.

Priority Pollutants

Other toxic materials including those on the Priority Pollutants list may be found in storm water in low concentrations. Chlorinated solvents have been detected in storm water at ARC, resulting from infiltration of the contaminated groundwater plume into the storm drain system.

Sediment

Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, and reproduction. In addition, sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids, a common water quality parameter. There is minimal potential for sediments to be present in the storm water discharge from ARC.

Specific Conductance

Specific conductance is no longer analyzed at ARC. The current IGP removed the requirement to analyze for specific conductance since the U.S. Environmental Protection Agency (EPA) does not require it for any industry type. Additionally, stakeholder comments indicated that non-industrial sources may cause high specific conductance that would interfere with the test. ARC will consider including specific conductance in the future if it would prove useful in detecting a particular pollutant of concern.

2.3 Significant Spills and Leaks

Every effort must be taken to prevent accidental releases. When significant spills or unauthorized discharges occur, the release is required to be reported to the EMD. ARC is prepared to deploy a

response team to control and clean up spills in a way that minimizes and/or eliminates contact with storm water. Any spills, leaks, or unauthorized discharges impacting the storm sewer system will be reported to the RWQCB within eight hours of discovery. Verbal reports will be followed up with written reports outlining the following:

- Investigation into the cause of the spill or leak,
- Measures taken to clean up the spill or leak, and
- Any corrective actions taken or proposed to prevent the reoccurrence.

Spills of any size must be documented in a Spill Log and must include the following details of the spill or unauthorized discharge:

- Date and time of the spill
- A description of materials released,
- The quantity spilled,
- Any spill or leak cleanup measures administrated, and
- Measures taken or proposed to prevent a reoccurrence.

The spill log must be maintained by the responsible party and retained on site for a period of at least five (5) years in accordance with the IGP section XXI.J. Any significant spill or leak occurring subsequent to this revision of the SWPPP will be recorded and included in Table B: Table of Significant Spills or Leaks (Appendix F) of the next SWPPP update.

2.3.1 Non-storm Water Discharges

As outlined in Section IV.A of the IGP, all non-storm water discharges and their sources must be identified in the SWPPP. This shall include the source, quantity, frequency, and characteristics of the non-storm water discharges and associated drainage areas.

2.3.2 Authorized Non-storm Water Discharges

Non-storm water discharges are issued individual NPDES permits. Four such operations are covered by individual NPDES Permits at ARC:

1. Middlefield-Ellis-Whisman (MEW) North of 101 Treatment System - In 1997, Locus Technologies received a NPDES permit (File No. 2189.8009) from the RWQCB for authorization to discharge treated groundwater from the MEW RGRP groundwater treatment system located on ARC (current NPDES Permit No. CAG912002, Order No. R2-2017-0048 and R2-2018-0050). This treatment system is part of the groundwater cleanup of the regional plume containing volatile organic compounds (VOCs) from the MEW site. The treatment system on ARC property addresses contamination that has migrated onto ARC from the MEW site and is part of a regional cleanup effort. After the treatment to discharge requirements have been met, the groundwater is directed to ARC's Unitary Cooling Tower or Arc Jet boiler for reuse. When these facilities are not in operation or are unable to accept the water, it is redirected and discharged through a dedicated line to Stevens Creek, and ultimately to San Francisco Bay. This discharge line, which is shared with the NASA groundwater treatment system and the MEW RGRP system, discharges at a maximum rate of 150 gallons per minute (gpm).
2. West-side Aquifers Treatment System (WATS) - On October 20, 1998, the Department of the Navy received a NPDES permit (File Nos. 2189.8009 and 1210.48 (FA)) from the RWQCB

for authorization to discharge treated groundwater from the WATS as part of remedial actions aimed to treat VOCs in the Site 28 area of ARC. Discharge of the treated water was in accordance with RWQCB Resolution 88-160 for disposal of extracted groundwater from cleanup projects but has been discharging under the VOC and Fuel General Permit, NPDES Permit No. CAG912002 since March 27th, 2014. Treated groundwater is discharged at an average rate of approximately 50 gpm into the storm distribution system immediately east of the WATS. Discharge water flows through the storm distribution system into the SWSB. After passing through the SWSB, the water flows overland to the SWRP north of ARC where it is expected to evaporate. No discharge to San Francisco Bay is anticipated. WATS sampling is currently conducted in accordance with the NPDES Self-Monitoring Program, NPDES Permit No. CAG912002, Order No R2-2017-0048 and R2-2018-0050. Operational responsibility of the WATS was transferred from Navy to NASA on November 1st, 2016.

3. NASA Groundwater Treatment System (GWTS) - On December 7, 1999, NASA ARC received a NPDES permit (File no. 2189.8009, and 1210.48 (FA)) from the RWQCB for authorization to discharge treated groundwater from the ARC groundwater treatment system. The treated groundwater is the result of the cleanup of groundwater polluted by VOCs on the northwestern side of ARC. After treatment to discharge requirements, the groundwater is discharged through a dedicated line, shared by the MEW treatment system, to Stevens Creek when ARC's Unitary Cooling Tower or Arc Jet boiler are not accepting the water for reuse. The ARC system came on-line on September 10, 2001 and discharges a maximum of 20 gpm. The NASA GWTS currently discharges treated groundwater under the same permit and order as WATS and MEW: NPDES Permit No. CAG912002, Order No. R2-2017-0048 and R2-2018-0050.

In addition to the authorized non-storm water discharges discussed above, the IGP authorizes the following types of non-storm water discharges at ARC:

- Discharges from firefighting activities. **Note:** releases of Aqueous Film Forming Foam (AFFF) are **not** authorized under the IGP.
- Fire hydrant flushing.
- Potable water sources including waterline flushing.
- Lawn watering.
- Uncontaminated groundwater discharges.
- Routine exterior building wash-down which does not use detergents, abrasives, or other compounds.
- Air conditioning condensate.

When chlorine levels in the drinking water system reach unsafe levels, the drinking water system will be flushed at M191. Water must be aerated prior to entry into the North Patrol Road Ditch.

Monthly observations of the storm water system to identify pollutants in industrial storm water and their sources are documented and records will be maintained on-site in accordance with IGP Section XXI.J.

2.3.3 Illicit Connections

Since 1987, over 100 illicit connections to the storm drain system have been identified and eliminated through ongoing studies at ARC. Any illicit connections discovered during subsequent

investigations and surveys will be discussed in the Annual Comprehensive Site Compliance Evaluation (ACSCE). Records of these inspections will be maintained on-site in accordance with IGP Section XXI.J.

2.3.4 Soil Erosion

The geography and geology at ARC is such that there is no known naturally occurring soil erosion. This does not include potential erosion caused by construction activity or emergency flood control measures. The potential for erosion due to construction activity is addressed in the existing Minimum BMP (Erosion and Sediment Controls). The potential for erosion due to emergency flood control measures will be addressed in a site-specific BMP for Emergency Flood Control, which will be developed as needed in order to manage conditions unique to each flood event. Flooding in the eastern drainage area can be controlled by utilizing the water pumps at Gates 14A and 14B to discharge storm water from the North Patrol Road Ditch into the Northern Channel. Water pumps at Gates 14A and 14B would be used in addition to the two pumps at Building M191 that are already in operation for normal storm water discharge. The discharge of storm water into Stevens Creek is not currently permitted. ARC is currently evaluating emergency flood control procedures for the western drainage area. Any flood control procedures put into place will be included in the next SWPPP update.

3.0 BMP IDENTIFICATION

BMPs are described in the IGP as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment measures, operating procedures, and practices to control facility site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may include any type of pollution prevention and pollution control measure necessary to achieve compliance with the IGP. **In accordance with APR 8500.1.14; all personnel, tenants, and partners are required to implement all ARC Storm Water BMPs relevant to their activities.**

The purpose of the BMPs described in this section is to meet the intent of Paragraph X of Section C.1.b in the IGP. The BMPs employed at ARC are categorized as Minimum, Advanced, and Site-Specific. ARC developed these Site-Specific BMPs to address potential pollutants associated with particular activities on site. Implementation of these BMPs is expected to reduce or prevent pollutants in storm water and authorized non-storm water discharges. A table listing each industrial activity, along with the pollutant source, potential pollutants, and the applicable BMPs to be implemented is included in the BMPs as Table A within Appendix C.

3.1 Minimum BMPs

ARC shall, to the extent feasible, implement and maintain all of the following minimum BMPs to reduce or prevent pollutants in industrial storm water discharges. These minimum BMPs consist of processes, prohibitions, procedures, and schedules of activities that prevent pollutants associated with industrial activity from contaminating storm water and authorized non-storm water discharges. Minimum BMPs are considered low technology cost-effective measures. Facility operators are expected to implement all of the minimum BMPs at each pollutant source.

The Minimum BMPs as required by the IGP are:
- Employee Training Program.
- Erosion and Sediment Controls.
- Good Housekeeping.
- Material Handling and Waste Management.
- Preventive Maintenance.
- Quality Assurance and Recordkeeping.
- Spill and Leak Prevention and Response.

3.2 Advanced BMPs

Where the Minimum BMPs as identified above are not effective, Advanced BMPs shall be considered. Advanced BMPs generally consist of structural devices that reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

The following Advanced BMPs have been implemented, where applicable, at ARC:
- Control Devices.
- Overhead Coverage.
- Retention Ponds.
- Secondary Containment Structures.
- Water Treatment.

3.3 Site-Specific BMPs

To date, the following industrial activities with a potential for contaminating storm water have been identified at ARC. Site-Specific BMPs are intended to address industrial activities that have a potential to impact storm water quality.

The Site-Specific BMPs for ARC are:
- Aircraft Exhaust and Fueling.
- Aircraft Maintenance.
- Aircraft Washing and Rinsing.
- Building and Grounds Maintenance.
- Building Repair, Remodeling, and Construction.
- Construction, Demolition, and Excavation Operations That Disturb Ground Surfaces Less Than One Acre.
- Dewatering: Groundwater
- Dewatering: Utility Vault
- Elimination of Non-Storm Water Discharges.
- Fire Department Equipment Testing and Training.
- Fire Fighting Activities
- Fleet Parking.
- Fuel Tank Vehicles.
- Golf Course Maintenance.
- Outdoor Process Equipment Operations and Maintenance.
- Project Closeout Requirements
- Small Motor Oil Spill Response Procedures
- Source Reduction.

- Transportation Control Measures.
- Vehicle and Equipment Fueling.
- Vehicle and Equipment Maintenance and Repair.
- Vehicle and Equipment Washing.
- Washing and Rinsing of Outdoor Equipment, Materials, and Displays.
- Washing of Exterior Building Surfaces and Fixed Outdoor Equipment.

3.4 BMP Implementation

The implementation of BMPs is facilitated through annual inspections of each location of industrial activity. The BMPs are always available through the EMD website: https://nasa.sharepoint.com/sites/arc-jq/SitePages/storm-water.aspx. Additionally, projects with the potential to impact storm water quality are reviewed by ARC's Construction Permit Review Board, which identifies and provides any required applicable BMPs to be implemented.

3.4.1 Employee Training Program

Beginning July 1, 2023, federal and contract personnel will be required to take the training as an annual refresher. Information on classes offered by the ARC Health, Safety and Environmental Training Department is available on the Safety, Health and Medical Services web page: (http://q.arc.nasa.gov/content/training/), and in a training catalog that is published and distributed annually. Individuals involved in projects or operations with the potential to impact storm water quality are identified through a training questionnaire. Through the training course, employees and contractors are provided with information on how to prevent storm water pollution at work and at home. The storm water training course is available online, 24-hours a through the SATERN web-based training module (COURSE ARC-001-01). In-person instructor-led classes are offered to facility personnel upon request. Through the ASAP training program, COURSE ARC-001-01 is automatically assigned to federal and contract personnel who have a potential to impact storm water quality. Attendance at these classes is tracked in the ASAP training database. Personnel and tenants without access to the ASAP training program will be offered an equivalent training program as upon availability. The class emphasizes the awareness that all personnel are required to follow each of the applicable BMPs for their operations. A comparable class may be substituted provided it contains a corresponding level of storm water pollution prevention awareness.

3.4.2 Quality Assurance and Recordkeeping

In accordance with IGP Section XXI.J, all records of laboratory analysis, inspections, and observations along with all reports and data pertinent to storm water management are kept for a minimum of five years. These records are available, upon request, from the EMD, Code JQ. In addition to the information included in this SWPPP, the following information is discussed in the Storm Water Annual Report (SWARM), which covers the period from July 1 through June 30:

- Sampling and analysis results.
- Records of monthly dry weather and qualified storm event visual observations.
- Records of the Annual Comprehensive Site Compliance Evaluation.
- Records of significant spills or leaks.
- Listing of potential pollutants and associated industrial activities.
- Current BMPs.
- Current site maps.

The Storm Water Annual Report and analytical results of sampling and analysis efforts are submitted online through the SWRCB's Storm Water Multiple Application and Report Tracking System (SMARTS) website. All records are maintained on-site in accordance with IGP Section XXI.J.

4.0 EVALUATION AND MONITORING PROGRAM

4.1 Sampling Plan

The Storm Water Monitoring Program at ARC includes both observations of storm water discharge locations as well as storm water sampling for laboratory analysis. Dry weather visual observations are conducted monthly. Visual observations are also conducted during each Qualifying Storm Event (QSE) sampling activities. A QSE is defined as a precipitation event that produces a discharge for at least one drainage area and is preceded by 48 hours with no discharge from any drainage area. These observations are intended to document the presence or absence of any floating and suspended material, oil and grease, discolorations, turbidity, odor, and source of any pollutants. Records of these inspections will be maintained on-site in accordance with IGP Section XXI.J.

On July 1, 2015, the sampling program was updated to integrate the requirements included in the new IGP. Storm water sampling is now conducted four times each year during QSEs. Two QSEs are sampled within the first half of each reporting year (July 1 to December 31) and two QSEs are sampled within the second half of each reporting year (January 1 to June 30). Sample collection is only required of storm water discharges that occur during scheduled facility operating hours and are within four hours of the start of the discharge or the start of scheduled facility operating hours if the QSE occurred within the previous twelve hours. Sampling and analysis results are submitted online as Ad Hoc reports through the SWRCB's SMARTS website.

The trench around Hangar 1 is inspected periodically to identify sediment build up. If the amount of sediment is determined to be of a sufficient amount, the sediment is removed and sampled. The inspection is scheduled for the month of August, with any sampling and removal taking place in September, before the beginning of the wet season. The SWSB is cleaned out annually and the sediment is sampled and analyzed to gauge the effectiveness of the treatment system and to characterize the waste. All catch basins at ARC are cleaned out annually, and the sediments are sampled and analyzed to characterize the waste. Finally, the EDM immediately downstream from the overflow area of the SWSB is sampled each year during the dry season.

4.1.1 Locations

There are five storm water discharge locations at ARC: the discharge location of Building M191, the effluent outlet of the SWSB, and the effluent outlet of the RT Jones Road outfall (see Figure 2 in Appendix B for locations of monitoring and sampling points). In addition, there are two emergency pumps along North Patrol Road Ditch that are available to use for emergency storm water discharge into the Northern Channel during flood events. Emergency storm water discharge during flood events is representative of the discharge at outfall M191 and will not be sampled individually.

4.1.2 Laboratory Analysis

All storm water samples will be collected in accordance with Section XI.B. A Chain of Custody form (COC) will be completed for each set of samples collected. The COC form shall include the Discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, and the analysis that is required for each sample container. An example of the COC is presented as Appendix G.

All storm water samples shall be analyzed for the following constituents by the following sufficiently sensitive methods:

Constituents	Method (EPA[1] and SM[2])	Instantaneous NAL (ml/L)	Annual NAL (ml/L)
Ammonia	SM 4500-NH3 C	N/A	2.14
Halogenated Volatile Organics	EPA 624	N/A	N/A
Semi-VOCs	EPA 625	N/A	N/A
Total Petroleum Hydrocarbons (Including JP-4, JP-5, JP-8, Diesel, Gasoline and, Motor Oil)	EPA 8015M	N/A	N/A
N-Hexane Extractable Material/Total Oil & Grease (TOG)	EPA 1664A	15	25
Metals	EPA 200.8		
Chromium	EPA 200.8	N/A	N/A
Copper	EPA 200.8	N/A	0.0332
Lead	EPA 200.8	N/A	0.262
Zinc	EPA 200.8	N/A	0.26
Mercury	EPA 245.1	N/A	0.0014
PCBs (Including Aroclor 1013, 1221, 1232, 1242, 1248, 1254, 1260 and 1268)	EPA 8082A	N/A	N/A
Nitrate + Nitrite as Nitrogen	EPA 300.0	N/A	0.68
Total Phosphorus	SM 4500-P E	N/A	2
Biological Oxygen Demand	SM 5210B	N/A	30
Chemical Oxygen Demand	EPA 410.4	N/A	120
Total Suspended Solids	SM 2540-D	100	400

[2] EPA – EPA Test Methods
[3] SM – Standard Methods for the Examination of Water and Wastewater, 18th edition

pH	Field	<6.0, >9.0	N/A

The sediment from the annual clean out of the SWSB, catch basins and the soil from the dry season sampling of the EDM shall be analyzed for the following constituents:

Constituents
Oil & Grease, VOCs, and Semi-VOCs (EPA 1664B, EPA 8260M, EPA 8015M),
CAM 17 Metals (EPA 6020),
STLC for Metals (Cr, Cu, Hg, Pb, Zn) (California Waste Extraction Test, EPA 6010B, EPA 7470A, and EPA 6010B),
TCLP for Cr, Pb (EPA 6010B),
Total Petroleum Hydrocarbons
(Including JP-4, JP-5, JP-8, Diesel, Gasoline, and Motor Oil), (EPA 8260M, EPA 8015M),
PCBs
(Including Aroclor 1016, 1221 1232, 1242, 1248, 1254, 1260 and 1268), (EPA 8082A),
Percent moisture content.

4.1.3 Field Instrument Calibration

pH will be analyzed in the field using a hand-held instrument. The hand-held instrument will be calibrated prior to collecting field samples. All field measurements will be conducted in accordance with the accompanying manufacturer's instructions and section XI.C.2 of the IGP.

4.2 Annual Comprehensive Site Compliance Evaluation (ACSCE)

Section XV of the IGP requires the facility operator to conduct one ACSCE in each reporting period. The ACSCE must include the following:

- A review of all sampling, visual observation, and inspection records conducted during the previous reporting year.
- An inspection of all areas of industrial activity and associated potential pollutant sources for evidence of, or the potential for, pollutants entering the storm water conveyance system.
- An inspection of all drainage areas previously identified as having no exposure to industrial activities and materials in accordance with the definitions in Section XVII.
- An inspection of equipment needed to implement the BMPs.
- An inspection of any BMPs.
- A review and effectiveness assessment of all BMPs for each area of industrial activity and associated potential pollutant sources to determine if the BMPs are properly designed, implemented, and are effective at reducing and preventing pollutants in industrial storm water discharges and authorized Non-Storm Water Discharges (NSWDs).
- An assessment of any other factors needed to comply with the requirements in Section XVI.B.

Annual industrial activity inspections are conducted at ARC each year and the records of these inspections will be maintained on-site in accordance with IGP Section XXI.J. These industrial activities include the following:

- Outdoor wash and rinse areas.
- Loading and unloading areas.

- Hazardous material storage areas.
- Hazardous waste storage areas.
- Dust or particulate generating areas.
- Building repair and remodeling operations.
- Construction and operations.
- Vehicle and equipment storage areas.
- Vehicle fueling and maintenance areas.

4.2.1 Evaluation of BMPs

As part of ACSCE, all BMPs are evaluated annually to determine whether they are adequate, properly implemented and maintained, or whether additional BMPs are needed. Additionally, any time a new process or procedure is introduced it is evaluated for potential impacts to storm water quality. If a potential impact is identified, existing BMPs are reviewed for their applicability and, if necessary, revised to specifically address the new process. New BMPs are developed as necessary to address process-specific concerns. Certification that all BMPs have been evaluated and are adequate is included as part of the Annual Report.

4.2.2 Review and Revise SWPPP

As part of the ACSCE, this SWPPP will be reviewed at least annually, as required by the IGP. This SWPPP will be revised, when necessary, and any updates are implemented prior to significant changes in industrial activities which may:

- Significantly increase the quantities of pollutants in storm water discharge,
- Cause a new area of industrial activity at the facility to be exposed to storm water, or
- Begin an industrial activity which would introduce a new pollutant source at the facility.

5.0 SMALL MS4 PERMIT REQUIREMENTS

Permits for discharges covered under the Municipal Storm Water Permitting Program were issued in two phases. Under Phase I, which started in 1990, the RWQCBs adopted NPDES storm water permits for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities. Most of these permits are issued to a group of co-permittees encompassing an entire metropolitan area. These permits are reissued as the permits expire. As part of Phase II, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ) to provide permit coverage for smaller municipalities, including non-traditional Small MS4s, which are governmental facilities such as military bases, public campuses, and prison and hospital complexes. This permit expired on May 1, 2008, but remained in effect until the new MS4 General Permit was issued. On February 5, 2013, the State Water Resources Control Board adopted the General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems, NPDES No. CAS000004, (WQ Order 2013-0001-DWQ as amended by Orders WQ 2015-0133-EXEC, WQ 2016-0069-EXEC, WQ 2018-0001-EXEC, and WQ 2018-0007-EXEC. The current amendments to WQ Order 2013-0001-DWQ (Order 2018-0007-EXEC), effective on January 4, 2018.

The MS4 permits require the discharger to develop and implement a Storm Water Management Plan/Program with the goal of reducing the discharge of pollutants to the MEP. MEP is the performance standard specified in Section 402(p) of the CWA. The management programs specify

what BMPs will be used to address certain program areas. The program areas include public education and outreach; illicit discharge detection and elimination; construction and post-construction; and good housekeeping for municipal operations. In general, medium and large municipalities are required to conduct chemical monitoring, though small municipalities are not; as stated in Order WQ 2018-EXEC, Section F.3: "Permittees may incorporate the required storm water provisions into already existing programs and leverage existing staff to implement BMPs during its day to day business and operations". Section F.4 states: "A Permittee may utilize an equivalent or existing document such as a standard Operations and Procedures manual, Operation and Maintenance Plan, or Spill Response Plan if that document includes the necessary information required to comply with the provisions of this section". Although ARC is a Non-Traditional Small MS4 Permittee. The BMPs included in Appendix C of this SWPPP address the program elements required by the MS4 Permit. Additionally, this SWPP is implemented across the entire ARC property (other than equivalently permitted tenant operations) and is implemented as an equivalent document as described in Section F.4.

5.1 Employee Education and Outreach on Storm Water Impacts

As outlined in Section 3.4.1 of this SWPPP, employees identified as having the potential to impact storm water quality are required to attend the Storm Water Pollution Prevention class. Additionally, this SWPPP is made available to all employees via the EMD website.

5.2 Illicit Discharge Detection and Elimination

As stated in Section 2.3.3 of this SWPPP, extensive surveys have been conducted to identify and correct illicit connections at ARC. When new illicit connections are discovered, procedures exist for developing corrective action plans. All known illicit connections will be discussed in the Annual Report along with a description of the actions to be taken to close or mitigate the connections. Non-storm water discharges are effectively prohibited through extensive use of BMPs and employee training.

The storm water Evaluation and Monitoring Program, outlined in Section 4.0 of this SWPPP, utilizes both observations and sampling activities for laboratory analysis to detect unauthorized non-storm water discharges. If such discharges are detected, they are to be reported and any actions taken to prevent any reoccurrence will be documented.

The employee training program is outlined in Section 3.4.1 of this SWPPP. In addition to training classes on Storm Water Pollution Prevention, the ARC Health, Safety, and Environmental Training Department offers classes on Environmental Essentials, Hazardous Material and Hazardous Waste Handling, Hazard Communication, Incidental Waste Water Discharges, Spill Prevention Control and Countermeasures, and other pertinent topics.

Authorized non-storm water discharges at ARC are listed in Section 2.3.2 of this SWPPP and detailed descriptions of identified potential pollutant sources are included in Section 2.2 of this SWPPP.

Storm sewer maps are described in Section 1.4 of this SWPPP and are included as Appendix B.

5.3 Construction Site Storm Water Runoff Control

Construction site plans are reviewed during NASA ARC's NEPA process and by the Construction Permit Review Board, both of which will provide an opportunity to include existing BMPs as a condition of a construction permit, identify areas where new procedures may be needed, and identify mitigation measures to prevent or minimize water quality impacts. As part of the process for developing the EIS for the NRP, ARC thoroughly reviewed proposed plans and included several mitigation measures that will reduce potential negative impacts on storm water quality.

Multiple BMPs exist to address construction site waste and erosion and sediment control at ARC. These include Building Repair, Remodeling and Construction; Construction, Demolition, and Excavation Operations That Disturb Ground Surfaces Less Than One Acre; Good Housekeeping; Erosion and Sediment Controls; and Project Closeout Requirements. These BMPs are discussed in Section 3 of this SWPPP, and are included as Appendix C.

5.4 Post Construction Storm Water Management in New Development and Redevelopment

As described in Section 2.1 of this SWPPP, and as part of the NADP, a General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit) will be obtained prior to the start of all redevelopment activities that disturb ground surfaces of one acre or more.

The 2022 General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order 2022-0057-DWQ, was adopted by the State Water Resources Control Board on September 8, 2022, which went into effect on September 1, 2023. The CGP requires the development and implementation of a site-specific SWPPP by a Qualified SWPPP Developer (QSD) and implemented by a Qualified Industrial Stormwater Practitioner (QISP). The SWPPP shall contain a site map(s), which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection, and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must be appropriate for the type and complexity of the project and must address project-specific conditions and all possible generated pollutants. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs; BMPs must be included that address source control, pollution control, and treatment control. The SWPPP must address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled.
2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated.
3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard.
4. Calculations and design details as well as BMP controls for site run-on are complete and correct.
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

The SWPPP must also contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section XIV of the Construction General Permit describes the elements that must be contained in a SWPPP. These elements will be added to this SWPPP prior to the start of redevelopment activities.

Upgrades to the storm drain system and mitigation measures were discussed in the EIS for the NADP. Proposed changes to the storm water system included the creation of three new drainage areas within the Western Drainage System and a diversion of a portion of the Eastern Drainage System, ultimately resulting in a total of six drainage areas. Descriptions of these proposed drainage areas can be found in section 5.D.2 of Chapter 4 of the EIS. Two new settling basins were proposed in the EIS, one of which was to be located adjacent to the existing basin; these two basins would have drained into the SWRP. The other proposed settling basin would have been located west of the discharge location for the Eastern Drainage Area at Building M191. In 2009, ARC installed two Bay Saver storm drainage treatment units. The first unit is located adjacent to Zook Road at the north end of Runway 32L. The second unit is located at the northeast corner of Marriage Road and Macon Road. The Bay Saver treatment system is a prepackaged product designed to remove both suspended solids and oils from storm water.

Additional mitigation measures included in the Mitigation Implementation and Monitoring Plan (MIMP) for the NADP EIS are as follows:

- CIR-7: Improvements to facilities within Caltrans right-of-way associated with the development proposed under the NADP shall adhere to the conditions and requirements of Caltrans statewide NPDES Permit CAS #000003, Order #99-06-DWQ and NPDES General Permit CAS #000002, Order #99-08-DWQ, and shall incorporate Treatment Best Management Practices described in Section 4.4 of the Caltrans Statewide Storm Water Management Plan (CTSW-RT-02-008), which implements the Caltrans statewide NPDES permit, as such requirements specifically apply to the proposed improvements. In general, this would include the preparation and implementation of a SWPPP and Best Management Practices for construction and post-construction conditions for each such project.
- AQ-6a: Measures to control dust generation would reduce the impact associated with PM_{10} to a level of less-than-significant.
- BIO-18: Potentially contaminated runoff would be managed using storm water BMPs. Swales would be constructed adjacent to wetlands in upland areas to intercept and filter any runoff before it reaches the wetland. Construction of swales would be permitted within the 61-meter (200-foot) buffer zone around wetlands, but not within the wetlands themselves.
- X-6: Connect landscaping irrigation in Shenandoah Plaza to the Navy's treated groundwater system.
- X-7: Create green space west of Hangar 1.
- X-18: Convert Eastside/Airfield golf course irrigation system to reclaimed water. This transition was completed in February 2009 via a partnership between ARC and the City of Sunnyvale.

- X-24: Construct storm water infiltration measures, e.g., swales, permeable pavement, rooftop gardens, and other measures to ensure that rate and quantity of storm water runoff after construction does not exceed the rate and quantity before construction.

Existing BMPs, including those addressing structural and non-structural means of controlling storm water pollution, are listed in Section 3 of this SWPPP, and are included as Appendix C. As conditions or activities change due to redevelopment, existing BMPs are reviewed and updated as necessary or new BMPs are written to address potential impacts to storm water quality. BMPs will be incorporated into the buildout process and design guidelines to reduce pollutant loading in storm water runoff from construction activities. These are described in detail in Section J of Chapter 2 of the EIS and include the following:

- BMPs for Construction, Demolition and Excavation Operations.
- BMPs for Erosion Control, Site Stabilization and Storm Water Management.
- BMPs to Achieve No Net Increase in Peak Discharge to the SWRP.
- BMPs to Reduce Pollutant Loading in Storm Water Runoff.

As part of the Construction General Permit, the flow rate, quantity, and content of storm water must be addressed. Additionally, the proposed athletic fields in the western drainage area would also serve as a detention pond in times of peak flow. Finally, in-line flow restrictors, storm mains with in-line detention and decentralized detention elements (green roofs, grass lined swales and permeable pavement) are all proposed as part of the effort to achieve no net increase in the peak discharge. Increased monitoring requirements in the Construction General Permit, including increased observations and sampling at construction sites, will address potential impacts to storm water quality, if any.

5.5 Pollution Prevention/Good Housekeeping for Municipal Operations

Multiple BMPs exist to address storm water pollution prevention and good housekeeping at ARC. These include Elimination of Non-Storm Water Discharges; Building and Grounds Maintenance; Building Repair, Remodeling and Construction; Construction, Demolition and Excavation for Operations That Disturb Ground Surfaces Less Than One Acre; Vehicle and Equipment Washing; and Good Housekeeping. These BMPs are listed in Section 3 and included as Appendix C.

APPENDIX A
DESIGNATION OF DULY AUTHORIZED REPRESENTATIVES

National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, CA 94035-1000

September 18, 2023

Reply to Attn of: JQ: 204-15

Ms. Eileen Sobeck
Executive Director
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Dear Ms. Sobeck:

Pursuant to U.S. Environmental Protection Agency regulation in 40 CFR 122.22(a)(3) and (b), I authorize the below-named person to be my "duly authorized representative" for the purpose of signing reports submitted to State permit programs under the Clean Water Act.

Jeanne M. Sabin
Water Compliance Program Manager
Environmental Management Division
NASA Ames Research Center
MS 204-15
Moffett Field, CA 94035
Telephone: (650) 604-1800
E-mail: jeanne.m.sabin@nasa.gov

Sincerely,

Eugene L. Tu
Center Director

cc:
DL/202A-4/C. Pham
DL/202A-4/D. Hymer
J/200-9/A. Goodsell
JQ/204-15/D. Chuck
JQ/204-15/G. Turner
JQ/204-15/J. Sabin

National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, CA 94035-1000

January 19, 2016

Reply to Attn of: D: 200-1

Mr. Tom Howard
Executive Director
State Water Resources Board
P.O. Box 100
Sacramento, CA 95812-0100

Dear Mr. Howard:

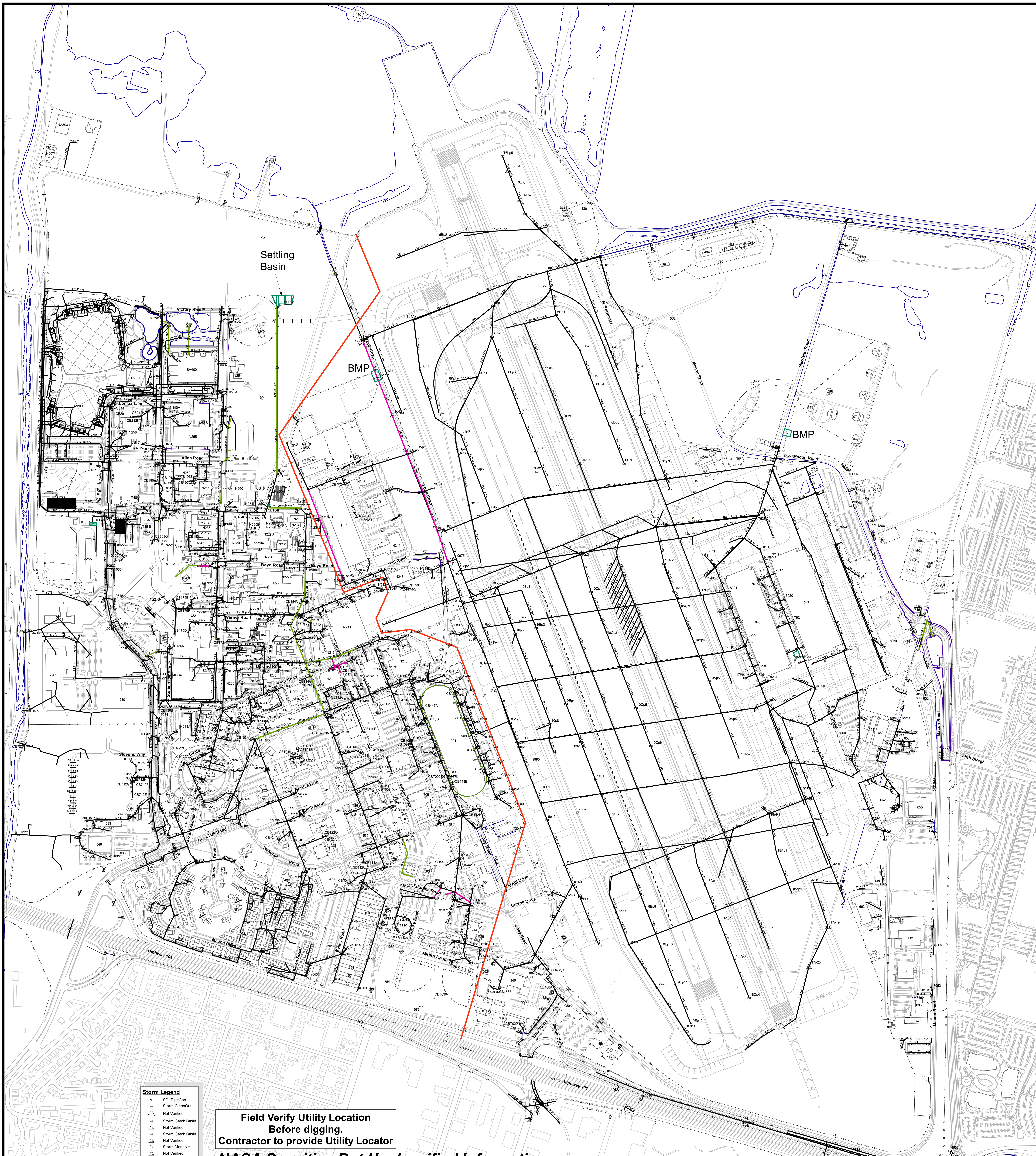
Pursuant to U.S. Environmental Protection Agency regulations in 40 CFR 122.22(a)(3) and (b), I authorize the following person to be my "duly authorized representative" for the purpose of signing reports submitted to State permit programs under the Clean Water Act:

Garrett Michael Turner
Water Compliance Program Manager
Environmental Management Division
NASA Ames Research Center
MS 204-15
Moffett Field, CA 94035-
Telephone: (650) 604-1406
E-mail: garrett.michael.turner@nasa.gov

Sincerely,

Eugene L. Tu
Center Director

cc:
DL/200-12/T. Berndt
DL/2021-4/G. Sloup
J/200-9/J. Alwyn
JQ/204-15/D. Chuck
JQ/204-15/G. Turner



Storm Legend

- SD_PipeCap
- Storm CleanOut
- Not Verified
- Storm Catch Basin
- Not Verified
- Storm Catch Basin
- Not Verified
- Storm Manhole
- Not Verified
- Settling Basin
- Runoff Divide
- Ditch (Lined)
- Ditch (Unlined)
- Waterway
- French Drain
- Storm Pipe
- Storm Pipe (Bad)
- Storm Pipe (Good)
- Trench Drain

Field Verify Utility Location
Before digging.
Contractor to provide Utility Locator

NASA Sensitive But Unclassified Information

Geographic Information Systems – Ames Research Center – N.A.S.A.

N / S / E / W

Feet: 0 – 300 – 600 – 1,200

Utilities\Distribution_ARC\StormDistribution_ARC.mxd
Printed June 2021

Storm Distribution

Legend

- Areas With Run-On
- Caltrans Culvert
- Direction of Flow
- Discharge Area Boundary
- Discharge Locations
- Drainage Areas
- Emergency Discharge Areas
- Facility Boundary
- Google Bus Parking
- Northern Channel
- NPDES Discharge Points
- Storm Drain Inlet
- Settling Basin

0 1,500 Feet

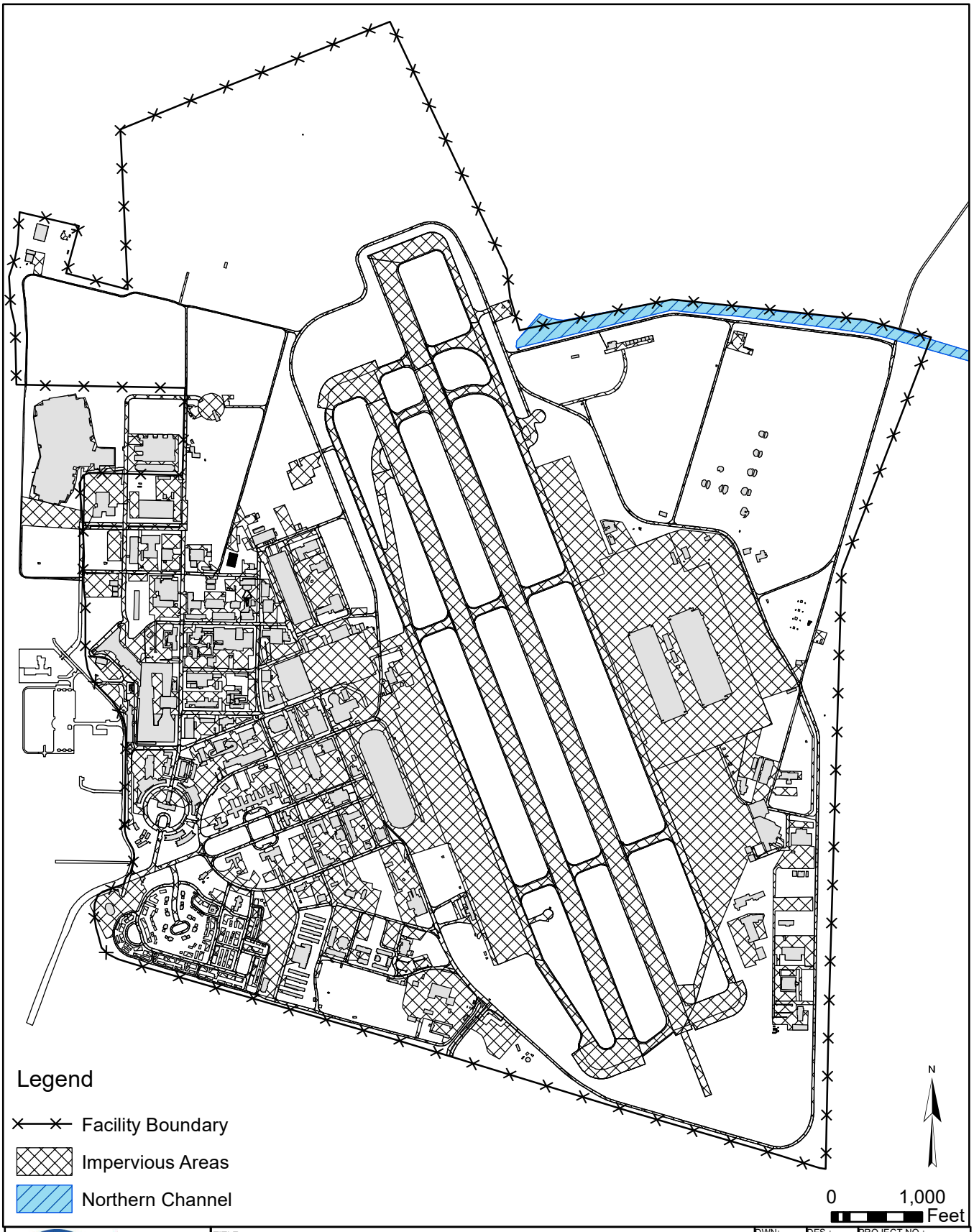
N

Ames Research Center
Moffett Field, CA 94035

TITLE:

Storm Water Pollution Prevention Plan
Storm Water Drainage and Discharge Areas

DWN:	DES.:	PROJECT NO.:
MJC	MJC	SWPP Plan
CHKD:	REV.:	FIGURE NO.:
GMT	4	3
DATE:	APPD:	
07/24	GMT	

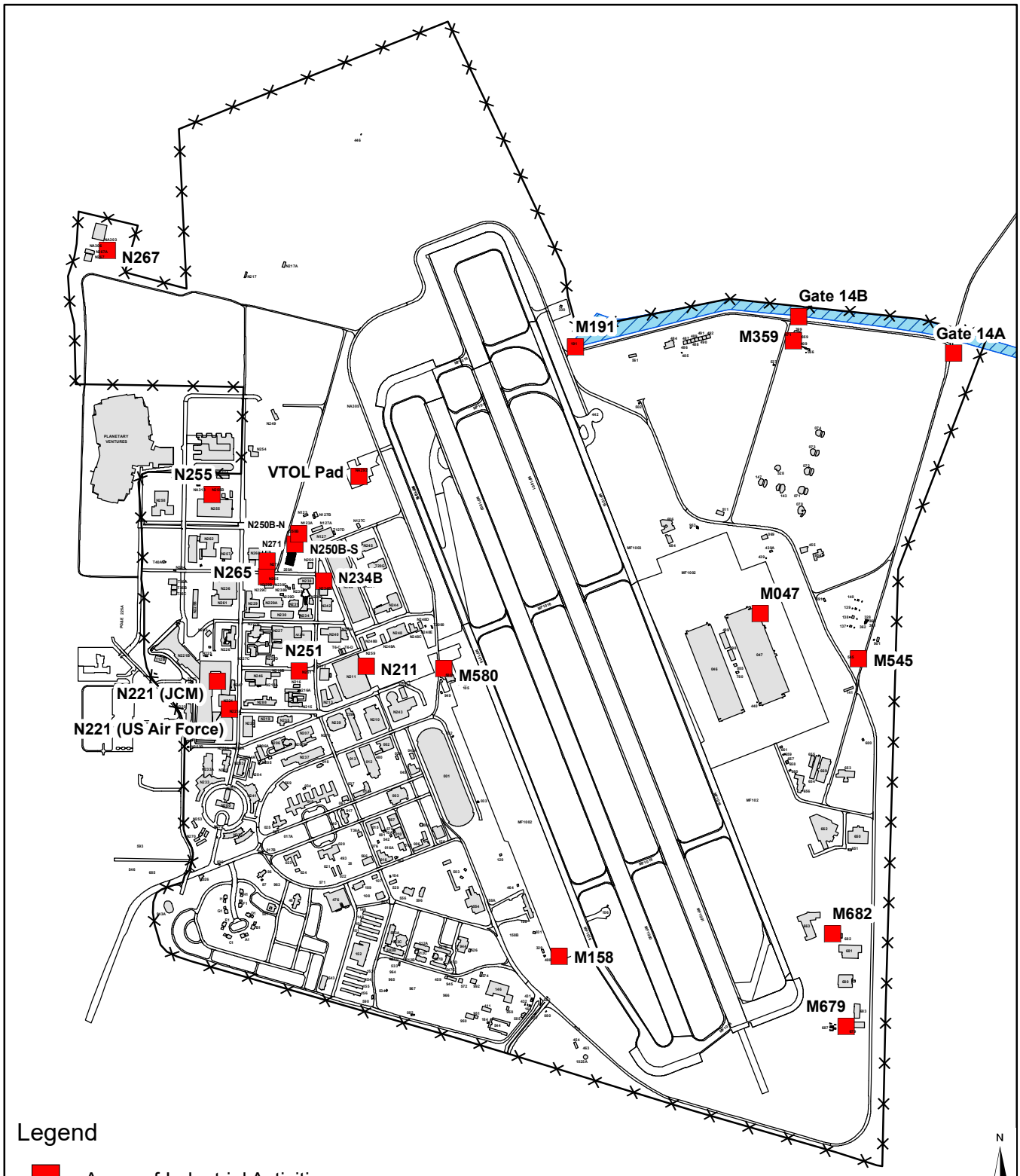


Ames Research Center
Moffett Field, CA 94035

TITLE:

Storm Water Pollution Prevention Plan
Impervious Areas

DWN: MJC	DES.: MJC	PROJECT NO.: SWPP Plan	
CHKD: GMT	APPD: GMT	FIGURE NO.: 4	
DATE: 07/23	REV.: 4		

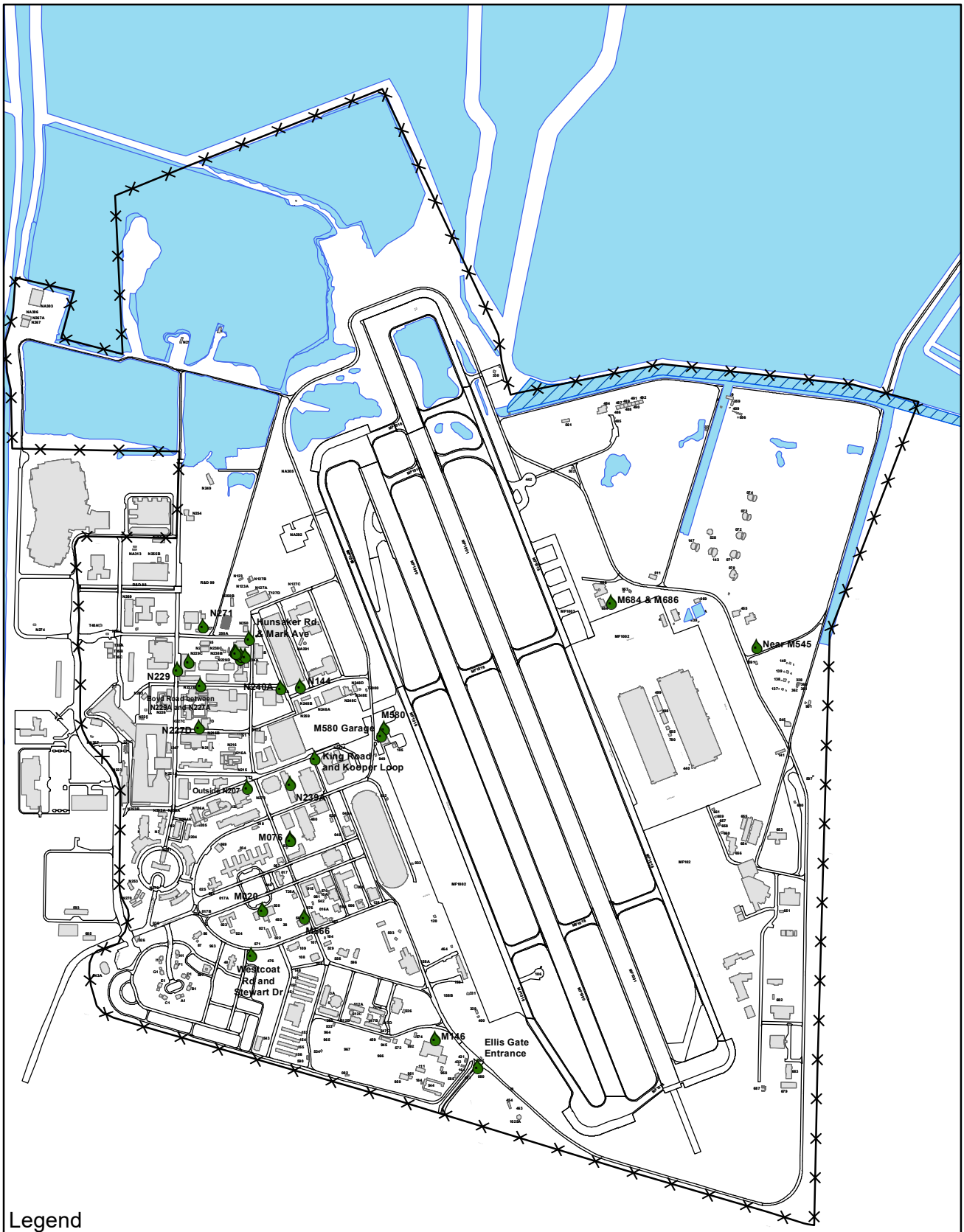


NASA Ames Research Center
Moffett Field, CA 94035

TITLE:

Storm Water Pollution Prevention Plan
Locations With Industrial Activities

DWN: MJC	DES.: MJC	PROJECT NO.: SWPP Plan	
CHKD: GMT	APPD: GMT		
DATE: 06/23	REV.: 6	FIGURE NO.: 5	

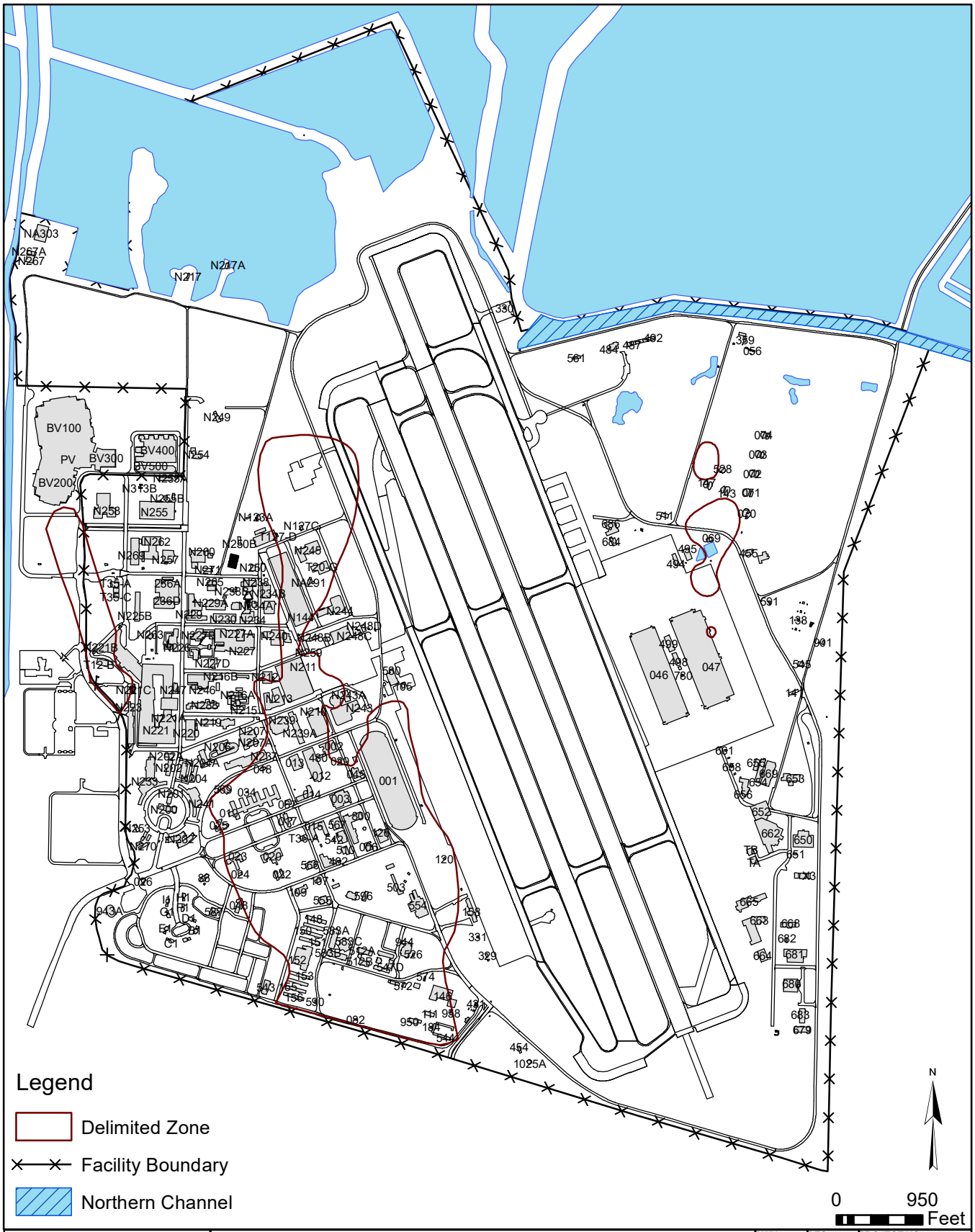


Ames Research Center
Moffett Field, CA 94035

TITLE:

Storm Water Pollution Prevention Plan
Significant Spills or Leaks

DWN: MJC	DES.: MJC	PROJECT NO.: SWPP Plan	
CHKD: GMT	APPD: GMT		
DATE: 06/24	REV.: 7	FIGURE NO.: 6	



Ames Research Center
Moffett Field, CA 94035

TITLE:

Storm Water Pollution Prevention Plan
Utility Vault Dewatering Delimited Zone

DWN: MJC	DES.: MJC	PROJECT NO.: SWPP Plan	
CHKD: GMT	APPD: GMT		
DATE: 6/24	REV.: 4	FIGURE NO.: 7	

NASA Ames Research Center Required Best Management Practices

National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA

December 2024

www.nasa.gov

Environmental Support Services Contract
80ARC020F0036
NASA Ames Research Center Required Best Management Practices

Prepared for:
Environmental Management Division
NASA Ames Research Center
M/S 204-15
Building N204, Room 102B
Moffett Field, CA 94035-0001

December 2024

BB&E
CONSULTING ENGINEERS
& PROFESSIONALS

NASA AMES RESEARCH CENTER
REQUIRED BEST MANAGEMENT PRACTICES

Executive Summary

The NASA ARC SWPPP (CDRL 06-064) was developed for implementation to meet compliance objectives in accordance with Title 40, Code of Federal Regulations, Parts 122, 123, and 124 and the California State Water Resource Control Board Industrial General Permit (IGP).

This SWPPP has two major objectives:

1. Identify and evaluate sources of pollutants associated with industrial activities that may affect the quality of a facility's storm water discharges and authorized non-storm water discharges, and
2. Identify, describe, and implement required site-specific BMPs to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges. BMPs are required and shall be selected to achieve Best Available Technology/Best Control Technology (BAT/BCT) and compliance with water quality standards.

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INTRODUCTION

The purpose of these Storm Water Best Management Practices (BMPs) is to establish site-specific BMPs for the objectives outlined in the 2021 NASA Ames Research Center (ARC) Storm Water Pollution Prevention Plan (SWPPP). The SWPPP provides three primary objectives: (1) identify potential pollution sources that may reasonably be expected to affect the quality of storm water discharges associated with industrial activity at ARC, (2) implement BMPs to minimize storm water pollution, and (3) assure compliance with all terms and conditions of the 2014 General Permit No. CAS000001. Paragraph X, Section A in the General Permit requires that a SWPPP include a narrative description of the Minimum BMPs as well as any Advanced BMPs required for each potential pollutant and its source. This report provides the necessary Minimum and Advanced BMPs for mitigating storm water contamination at ARC.

Industrial activities at ARC are associated with research and development in aeronautics, space science and technology, aircraft operations, and site-wide property maintenance. NASA ARC Environmental Management Division (EMD) has evaluated these industrial activities and concluded that they present a risk to storm water runoff due to the potential exposure to contaminants. Rainfall mobilizes pollutants by falling on and traveling across streets, parking lots, construction, and industrial sites. Through natural or artificial conveyances, the run-off is transported by gravity flow through the drainage system. Storm water run-off scours accumulated pollutants off rooftops, and out of gutters, catch basins, storm sewers, and drainage channels. Storm water at ARC discharges to surface bodies such as ditches, channels, marshes, and San Francisco Bay waters.

Run-off from urban and industrial areas can carry heavy metals, (e.g., chromium, cadmium, copper, lead, mercury, nickel, and zinc), pesticides, herbicides, and organic compounds such as fuels, waste oils, solvents, polychlorinated biphenyls (PCBs), lubricants, and grease. These pollutants may cause problems for both human health and aquatic organisms. To address these issues, this SWPPP was developed and implemented in accordance with the Federal Water Pollution Control Act, also known as the Clean Water Act (CWA).

In 1972, the CWA was amended to provide that the discharge of pollutants to waters of the United States from any point source is expressly prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES program. On November 16, 1990, EPA published final regulations that establish application requirements for storm water permits. The regulations require owners or operators of specific categories of industrial facilities that discharge storm water associated with industrial activity (industrial storm water) to obtain an NPDES permit. Discharge of industrial storm water either directly to surface waters or indirectly through municipal separate storm sewers, must be covered by a permit. This includes the discharge of “sheet flow” through a drainage system or other conveyance.

In accordance with the CWA, the California State Water Resources Control Board (SWRCB) has elected to issue a statewide Industrial General Permit (IGP) that applies to all industrial storm water dischargers in Santa Clara County: Water Quality Order No. 2014-0057-DWQ, NPDES No. CAS000001: General Permit for Storm Water Discharges Associated with Industrial Activities. Construction activity discharges are not covered by the IGP, a separate Construction General Permit is required for construction activities that disturb ground surfaces that are equal to or greater than one acre. Storm water discharges at ARC are governed by the IGP, which prohibits non-storm water discharges unless authorized by a NPDES permit, except for certain specific permissible discharges. The General Permit requires development and implementation of a SWPPP that emphasizes the elimination of discharges of pollutants through the implementation of Minimum, Advanced, and Site-Specific BMPs. Each pollutant source must implement each of the Minimum BMPs, furthermore, each pollutant source will be evaluated and assigned Advanced BMPs and/or Site-Specific BMPs as appropriate. Pollutant sources undergo an Annual Comprehensive Facility Compliance Evaluation (Annual Evaluation) to ensure the appropriate BMPs are being implemented.

TYPES OF REQUIRED BEST MANAGEMENT PRACTICES

Required BMPs are schedules of activities, prohibitions of practices, maintenance procedures and management practices to reduce or prevent the contact of authorized Non-Storm Water Discharges (NSWDs) with materials or equipment that are potential sources of pollutants. BMP are also designed to reduce, to the extent practicable, the flow or volume of authorized NSWDs, ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards, and reduce or prevent discharges of pollutants in authorized NSWDs. BMPs reflect best industry practices, and consider technological availability, economic practicability, and achievability. BMPs may include any type of pollution prevention and pollution control measure necessary to achieve compliance with the IGP.

NASA ARC Procedural Requirement (APR) 8500.1.14 states that all personnel, tenants, and partners are required to implement all ARC Storm Water BMPs relevant to their activities. Additionally, NASA Procedural Requirement (NPR) 8831.2F.11.3.6 states that "Centers shall comply with all requirements of their National Pollutant Discharge Elimination System (NPDES) permits, as imposed by the EPA (or as imposed by the State or local government)".

BMPs include treatment measures, operating procedures, and practices to control facility site run-off, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may include any type of pollution prevention and pollution control measure necessary to achieve compliance with the IGP. These practices can be effective in preventing pollution by reducing potential pollutants at the source and are required for all industrial activities at ARC.

In accordance with Section X.H of the IGP, the BMPs are categorized as:

- Minimum BMPs (BMPs that, to the extent feasible, are required to be implemented and maintained throughout ARC to reduce or prevent pollutants in industrial storm water discharges),
- Advanced BMPs (BMPs that are required to reduce or prevent discharges of pollutants in its storm water discharge in a manner that reflects best industry practice considering technological availability and economic practicability and achievability).
- Site-Specific BMPs (BMPs designed to address specific ARC industrial activities and are required to be implemented in addition to the Minimum and Advanced BMPs described above.

Collective implementation of these required BMPs must demonstrate prevention or reduction of pollutants in storm water discharges and authorized non-storm water discharges.

Detailed descriptions of each BMP are located on the NASA ARC Environmental Management Division's (EMD) public facing website at https://environment.arc.nasa.gov/index.html, or the EMD internal website at: https://nasa.sharepoint.com/sites/arc-jq/SitePages/storm-water.aspx.

TABLE A: SUMMARY OF MOFFETT FIELD INDUSTRIAL ACTIVITIES AND BMPS

Industrial Activity	Pollutant	
Aircraft Exhaust and Fueling	Oil & Grease, Fuel, Heavy Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Aircraft Exhaust and Fueling, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, and Source Reduction.
Aircraft Maintenance	Sediment, Oil & Grease, Jet Fuel, Toxic Materials, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Aircraft Exhaust and Fueling, Aircraft Maintenance, Aircraft Washing and Rinsing, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations and Maintenance, and Source Reduction.
Aircraft Washing & Rinsing	Sediment, Oil & Grease, Fuel, Toxic Materials, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Aircraft Washing & Rinsing, Elimination of Non-Storm Water Discharges, and Source Reduction.
Building & Grounds Maintenance	Sediment, Nutrients, Herbicides, Oil & Grease, Fuel Products, Toxic Materials,	**Minimum BMPs -** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs -** Building & Grounds Maintenance, Construction, Demolition and Excavation Operations That Disturb Ground Surfaces Less Than One Acre, Dewatering: Groundwater, Dewatering: Utility Vault, Washing and Rinsing of Outdoor Equipment, Materials, and Displays, Elimination of Non-Storm Water Discharges, Fuel Tank Vehicles, Outdoor Process Equipment Operations and Maintenance, Source Reduction, Dewatering: Washing of Exterior Building Surfaces.
Building Repair, Remodeling & Construction	Sediment, Oil & Grease, Toxic Materials, Heavy Metals	**Minimum BMPs -** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs -** Building & Grounds Maintenance, Building Repair, Remodeling and Construction, Construction, Demolition and Excavation Operations That Disturb Ground Surfaces Less Than One Acre, Dewatering: Groundwater, Dewatering: Utility Vault, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations, and Maintenance, Project Closeout Requirements, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance, Washing of Exterior Building Surfaces.
Construction, Demolition & Excavation Operations for Projects That Disturb Ground Surfaces Less Than One Acre	Sediment, Nutrients, Oil & Grease, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Building & Grounds Maintenance, Building Repair, Remodeling and Construction, Construction, Demolition and Excavation Operations That Disturb Ground Surfaces Less Than One Acre, Dewatering: Groundwater, Dewatering: Utility Vault, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations, and Maintenance, , Project Closeout Requirements, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance, Washing of Exterior Building Surfaces.

Industrial Activity	Pollutant	
Dewatering: Groundwater	Sediment, Nutrients, Oil & Grease, Fuel, Metals, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Building & Grounds Maintenance, Dewatering: Groundwater, Elimination of Non-Storm Water Discharges, Outdoor Process Equipment Operations & Maintenance, Source Reduction.
Dewatering: Utility Vault	Sediment, Nutrients, Oil & Grease, Fuel, Metals, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Building & Grounds Maintenance, Dewatering: Utility Vault, Elimination of Non-Storm Water Discharges, Outdoor Process Equipment Operations & Maintenance, Source Reduction.
Elimination of Non-Storm Water Discharges	Sediment, Nutrients, Oil & Grease, Floatable Materials, Heavy Metals, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Dewatering: Groundwater, Dewatering: Utility Vault, Elimination of Non-Storm Water Discharges: Source Reduction, and Transportation Control Measures.
Fire Department Equipment Testing and Training	Fuel, Oil & Grease	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Fire Department Equipment Testing, Fleet Parking, Outdoor Process Equipment Operations and Maintenance, Source Reduction.
Fire-fighting Activities	Sediment, Nutrients, Oil & Grease, Floatable Materials, Heavy Metals, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Fire Department Equipment Testing, Fleet Parking, Outdoor Process Equipment Operations and Maintenance, Source Reduction.
Fleet Parking	Fuel, Oil & Grease	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, and Vehicle and Equipment Maintenance.
Fuel Tank Vehicles	Sediment, Oil & Grease, Jet Fuel, Toxic Materials,	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Aircraft Exhaust and Fueling, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations and Maintenance, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance and Repair.

Industrial Activity	Pollutant	
Golf Course Maintenance	Sediment, Nutrients, Oil & Grease, Fuel, Metals, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Building and Grounds Maintenance, Building Repair, Remodeling and Construction, Construction, Demolition, and Excavation Operations That Disturb Less Than One Acre of Ground Surface, Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Golf Course Maintenance, Outdoor Process Equipment Operations & Maintenance, Source Reduction, Vehicle & Equipment Washing, Vehicle & Equipment Fueling, Vehicle Equipment Maintenance and Repair, and Washing of Exterior Building Surfaces and Outdoor Equipment.
Outdoor Process Equipment Operations & Maintenance	Oil & Grease, Fuel, Toxic Materials, Heavy Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Dewatering: Utility Vault, Elimination of Non-Storm Water Discharges, Outdoor Process Equipment Operations & Maintenance, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance, and Washing of Exterior Building Surfaces and Fixed Outdoor Equipment.
Source Reduction	Nutrients, Oil & Grease, Toxic Materials	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –**Elimination of Non-Storm Water Discharges, Source Reduction, and Transportation Control Measures.
Small Motor Oil Spill Response Procedures	Sediment, Nutrients, Oil & Grease, Fuel, Toxic Materials, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations & Maintenance, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, and Vehicle and Equipment Maintenance and Repair.
Transportation Control Measures	Sediment, Oil & Grease, Fuel, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –**Elimination of Non-Storm Water Discharges, Transportation Control Measures, and Source Reduction.
Vehicle and Equipment Fueling	Fuel, Oil & Grease	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations and Maintenance, Source Reduction, Vehicle & Equipment Fueling, Vehicle and Equipment Maintenance and Repair.
Vehicle and Equipment Maintenance and Repair	Oil & Grease, Fuel, Toxic Materials, Heavy Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Fleet Parking, Fuel Tank Vehicles, Outdoor Process Equipment Operations & Maintenance, Source Reduction, Vehicle and Equipment Washing, Vehicle and Equipment Fueling, and Vehicle and Equipment Maintenance and Repair.

Industrial Activity	Pollutant	
Vehicle and Equipment Washing	Sediment, Nutrients, Oil & Grease, Fuel, Toxic Materials, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Outdoor Process Equipment Operation and Maintenance, Source Reduction, and Vehicle & Equipment Washing.
Washing and Rinsing of Outdoor Equipment, Materials, and Displays	Sediment, Oil & Grease, Fuel, Toxic Materials, Metals	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Building and Grounds Maintenance, Building Repair, Remodeling, and Construction, Elimination of Non-Storm Water Discharges, Outdoor Process Equipment Operations and Maintenance, Source Reduction, Vehicle & Equipment Washing, Washing and Rinsing of Outdoor Equipment, Materials, and Displays, and Washing of Exterior Building Surfaces & Fixed Outdoor Equipment.
Washing of Exterior Building Surfaces & Fixed Outdoor Equipment	Sediment	**Minimum BMPs –** Employee Training Program, Erosion and Sediment Controls, Good Housekeeping, Material Handling & Waste Management, Preventive Maintenance, Quality Assurance and Record Keeping, Spill and Leak Prevention and Response, Control Devices, Secondary Containment, Water Treatment. **Site Specific BMPs –** Elimination of Non-Storm Water Discharges, Source Reduction, and Washing of Exterior Building Surfaces & Fixed Outdoor Equipment.

MINIMUM BMPS

ARC shall, to the extent feasible, implement and maintain all the following minimum BMPs to reduce or prevent pollutants in industrial storm water discharges. These minimum BMPs consist of processes, prohibitions, procedures, schedule of activities, etc., that prevent pollutants associated with industrial activity from contacting with storm water discharges and authorized non-storm water discharge. Minimum BMPs are most often comprised of low technology cost-effective measures. To maintain compliance with the IGP, facility operators must implement all the minimum BMPs at each pollutant source.

The minimum BMPs required by the IGP are as follows:

- Employee Training Program
- Erosion and Sediment Controls
- Good Housekeeping
- Material Handling and Waste Management
- Preventive Maintenance
- Quality Assurance and Recordkeeping
- Spill and Leak Prevention and Response

MINIMUM BMP:
EMPLOYEE TRAINING PROGRAM

DESCRIPTION

This BMP includes training of all personnel who are responsible for:

- Implementing activities identified in the SWPPP,
- Conducting inspections, storm water sampling and visual observations, and
- Proper management of storm water.

Training should address topics such as:

- Good housekeeping,
- Material handling procedures,
- Preventive maintenance,
- Spill response, and
- Actions necessary to implement all Best Management Practices identified in the SWPPP.

The SWPPP identifies periodic dates for this training, which is regularly offered to ARC employees, contractors, and resident agencies. Records of all training sessions are maintained for a minimum of five years. Employee training, like equipment maintenance, is a method by which to reinforce Best Management Practices. This BMP highlights the importance of training and of integrating the elements of employee training from the individual source control measures into a comprehensive training program.

TARGETED CONSTITUENTS

- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This Best Management Practice is applicable to all industrial activities at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Ensure that all team members performing the various compliance activities of the IGP are properly trained to implement the requirements of the IGP, including but not limited to:
   - BMP implementation,
   - BMP effectiveness evaluations,
   - Visual observations, and
   - Monitoring activities.
2. In the event that ARC enters Level 1 status, as described by the IGP, personnel who are responsible for implementing activities identified in the ARC SWPPP in the areas contributing to elevated discharge levels shall be trained or retrained directly by a Qualified Industrial Stormwater Practitioner (QISP).
3. Prepare or acquire appropriate training manuals or training materials.

- Environmental Compliance/Safety Trainers are employed under the ARC Safety, Health, and Medical Services Office and the EMD.
- The Storm Water Pollution Prevention training materials are prepared by a QISP.

4. Identify which personnel need to be trained, their responsibilities, and the type of training they shall receive.
   - A list of facilities at ARC that have a potential to contribute to storm water contamination is presented in the SWPPP (Figure 5).
   - APR 8500.1.14.2.1 requires all personnel and supervisors of personnel who are involved with activities that have a potential to impact storm water quality shall take Storm Water Pollution Prevention training or ARC-001-01 annually.
5. Provide a training schedule:
   - Regularly scheduled safety and environmental courses are available to all civil servants at ARC and to contract employees **both in-person and online**.
     - An instructor-led Storm Water Pollution Prevention class is **presented by a QISP certified instructor** at ARC four times each year **as requested through the EMD**.
     - In addition to the instructor-led class, the Storm Water Pollution Prevention class is offered online through the SATERN training website and is available 24 hours a day.
   - Daily project specific tailgate meetings should integrate storm water quality management with existing training programs.
6. Maintain documentation of all completed training classes and the personnel that received SWPPP training.
   - SWPPP training records must be retained on site for a period of at least five years.
   - Daily tailgate meeting records will be maintained by each individual facility and must be retained on site for a period of at least five years.
7. Promote employee ownership of problems and the solutions.
8. Integrate employee feedback into training and BMP implementation.

MINIMUM BMP:
EROSION AND SEDIMENT CONTROLS

DESCRIPTION

This BMP details required sediment and erosion control activities. This includes the planting and maintenance of vegetation, diversion of storm water run-on and run-off, use of sandbags, silt screens or other sediment control devices.

Any site where soils are exposed to water and wind can have soil erosion and sedimentation problems. Erosion is a natural process in which soil and rock materials are loosened and removed. Sedimentation occurs when soil particles are suspended in surface run-off or wind and are then deposited in streams and other water bodies.

Human activities can accelerate erosion by removing vegetation, disturbing the soil, changing natural drainage patterns, and by covering the ground with impermeable surfaces (pavement, concrete, and buildings). Impervious surfaces prevent storm water from seeping into or "infiltrating" the ground, resulting in larger amounts of water moving more quickly across the site, which can carry more sediment and other pollutants to creeks and streams. Many areas of ARC consist of marshlands and grasslands. Areas such as these do not require soil erosion, however, erosion prevention measures must be addressed throughout the rest of ARC, including during any construction and/or grounds maintenance activities.

TARGETED CONSTITUENTS

- Sediment
- Heavy Metals
- Toxic Materials

APPLICABILITY

This BMP is a minimum requirement and applicable to all building, construction, and landscaping activities at ARC. Projects that disturb ground surfaces equal to or greater than one acre must submit an NOI with the SWRCB and prepare a project specific SWPPP that meets the requirements of NPDES General Permit No. CAS000002: State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. For each erodible surface facility location identified in the SWPPP:
    - Implement effective wind erosion controls:
        - Retain as much vegetation (plants) on-site as possible.
        - Minimize the time that soil is exposed.
        - Apply water to exposed areas to control dust.
        - Cover stockpiles to protect from wind erosion.
    - Provide effective stabilization for inactive areas, finished slopes, and other erodible areas prior to a forecasted storm event.
        - Stabilize the disturbed soils as soon as possible by planting approved vegetation or hydro seed mix. EMD must approve vegetation and seed mix prior to planting.
        - Place filtering media (e.g., straw bales, rocks, silt fences, etc.) around the base of each stockpile or at the storm drain inlet to remove materials from rainwater run-off, and
        - Remove sediment from storm water run-off before it leaves the site.
    - Maintain effective perimeter controls and stabilize all site entrances and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site.

- Divert run-on and storm water generated from within the facility away from all erodible material:
    - Slow down the run-off flowing across site (regrading, silt fences, planting).
    - Prevent run-off from flowing across disturbed areas (divert the flow to vegetated areas).
    - Provide drainage ways for the increased run-off (use grassy swales rather than concrete drains).
- If sediment basins are implemented, ensure compliance with the design storm standards in Section X.H.6 of the IGP. Identify areas which, due topography, activities, or other factors, have a high potential for significant soil erosion, and identify structural, vegetative, and / or stabilization measures used to limit erosion.

MINIMUM BMP:
GOOD HOUSEKEEPING

DESCRIPTION

Good housekeeping practices are designed to maintain a clean and orderly work environment. Often the most effective first step towards preventing pollution in storm water from industrial sites simply involves using good common sense to improve the facility's basic housekeeping methods. Poor housekeeping can result in more waste being generated than necessary and an increased potential for storm water contamination. A clean and orderly work area reduces the possibility of accidental spills caused by mishandling of chemicals and equipment, thereby reducing safety hazards. Well-maintained material and chemical storage areas should minimize discharges of materials/pollutants that could contaminate storm water. Simple procedures can be used to promote good housekeeping, including improved operation and maintenance of industrial machinery and processes, material storage practices, material inventory controls, routine and regular clean-up schedules, maintaining well-organized work areas, and educational programs. It is the policy of ARC that facility managers as well as line supervisors are responsible for ensuring that personnel are educated in proper environmental hazards management, including storm water pollution prevention.

TARGETED CONSTITUENTS

- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Observe all outdoor areas associated with industrial activities including but not limited to:
   - Storm water discharge locations,
   - Drainage areas,
   - Conveyance systems,
   - Waste handling/disposal areas, and
   - Perimeter areas impacted by off-facility materials or storm water run-on to determine housekeeping needs.
2. Any identified debris, waste, spills, tracked materials, or leaked materials shall be cleaned and disposed of properly.
3. Minimize or prevent material tracking.
4. Minimize dust generated from industrial materials or activities.
5. Ensure that all facility areas impacted by rinse/wash waters are cleaned as soon as possible.
6. Cover all stored industrial materials and stockpiles that can be readily mobilized by contact with storm water.
7. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper, etc.) that can be transported or dispersed by the wind or contact with storm water:

- Wind and rain can transport stockpiled materials into the storm drain system. To eliminate this hazard, cover materials such as hazardous materials, debris, and sand piles that must remain outdoors.

8. Prevent disposal of any rinse/wash waters or industrial materials into the storm water conveyance system.
9. Minimize storm water discharges from non-industrial areas (e.g., storm water flows from employee parking area) that contact industrial areas of the facility, and
10. Minimize authorized Non-Storm Water Discharges (NSWDs) from non-industrial areas (e.g., potable water, fire hydrant testing, etc.) that contact industrial areas of the facility.
11. Conduct formal monthly observations of all buildings and surrounding areas to ensure.
    - Outside areas are cleaned and organized,
    - Drips, leaks, or evidence of such, from equipment or pipes are contained,
    - There is adequate space in work areas to minimize spill potential,
    - Wastes are removed regularly,
    - Walkways and passageways are easily accessible,
    - Walkways and passageways are free of materials that could be spilled,
    - Evidence of dust from painting, sanding, or other industrial activities are cleaned up and properly disposed of, and
    - Cleanup procedures for spilled materials are accessible and utilized.
12. An inspection log will be maintained in order to meet environmental reporting requirements at ARC.
    - A formal annual inspection of industrial areas at ARC shall be conducted in accordance with the Quality Assurance and Recordkeeping BMP as required by the IGP.
13. Conduct annual inventory of chemical substances, including hazardous materials and pollutants that are present on-site. This inventory shall meet the requirements of the OSHA-required inventory of chemicals and toxic substances.
14. Maintain a current file of all Safety Data Sheets (SDSs) for chemicals and toxic substances.
15. Label chemical containers in accordance with OSHA, EPA, DOT, and other applicable federal, state, and local requirements.
16. Maintain dry and clean floors and ground surfaces by using brooms, shovels, vacuum cleaners, and cleaning machines.
17. Regularly pickup and dispose of garbage, debris, and waste material.
18. Make sure equipment is working properly.
19. Routinely inspect for leaks or conditions that could lead to discharges of chemicals or contact of storm water with raw materials, intermediate materials, waste materials, or products.
20. Ensure that all employees understand spill cleanup procedures in accordance with the Employee Training Program BMP and the IGP.
21. Inform on-site contractors of ARC policies. Include appropriate provisions in their contract to make certain proper housekeeping and disposal practices are implemented.
22. Discuss BMP implementation during daily tailgates/briefings.
23. Improper storage can result in the release of materials and chemicals that can cause storm water run-off pollution. Proper storage techniques include the following:
    - Maintain an up-to-date inventory of all materials (hazardous and non-hazardous). This inventory helps to keep material costs down caused by overstocking, enables the tracking of materials stored and handled on-site, and identifies which materials and activities pose the most risk to the environment.
    - Clearly mark on the inventory each hazardous material that requires special handling, storage, use, and disposal considerations.
    - Keep the work site clean and orderly by removing debris in a timely fashion and sweeping the area regularly.
    - Adhere to the Material Handling and Waste Management BMP.
24. Make sure that nearby storm drains are well-marked to minimize the chance of inadvertent disposal of liquids.
25. Do not dump waste paints or other waste liquids down the storm drain. Nothing but clean rainwater may enter the storm drainage system.
26. Washing concrete trucks over the storm drain or onto the ground is prohibited.

27. Cleaning equipment or tools over catch basins or onto the ground is prohibited.

MINIMUM BMP:
MATERIAL HANDLING AND WASTE MANAGEMENT

DESCRIPTION

This BMP includes the procedures or processes to prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with storm water during a storm event.

Accidental releases of materials from underground liquid storage tanks, aboveground storage tanks, drums, containers, and dumpsters, or from improper handling, storage, or disposal of waste/recyclable materials present the potential for contaminated storm waters with many different pollutants. Materials spilled, leaked, or released from storage containers and dumpsters may accumulate in soils or on the surfaces. The materials may then be carried away by storm water run-off.

This BMP addresses the loading, unloading, and storage of industrial materials, waste (including hazardous wastes), and recyclable materials. Loading or unloading of materials occurs in two ways: relocation of solids or liquids in containers, or direct liquid transfer. Materials leaked, spilled, or lost during loading/unloading can collect in the soil or on other surfaces and are then carried away by run-off. Rainfall can also wash pollutants from machinery used to unload or move materials, and from industrial equipment and materials exposed to rainfall.

Material transfers take place throughout ARC, including NASA Ames Supply Support Facility at N-255, the Naval Air Reserve Hazardous Materials Warehouse at Moffett Federal Airfield Facility M045 and the California Air National Guard Facilities M681 and M682.

In some locations throughout ARC, hazardous materials are stored outdoors in secondarily contained and covered chemical storage facilities or lockers. Standard Operating Procedures (SOPs) for each of the materials prohibit contact with storm water run-off in the event of an accident or spill.

Hazardous waste is temporarily stored at various satellite and 90-day accumulation areas throughout ARC before being transferred to the ARC Hazardous Waste Processing Facility at N-265 and Moffett Federal Airfield Facility M950. Hazardous waste is then categorized and packaged for shipment to an approved, off-site Treatment, Storage, and Disposal, Facility (TSDF). The containment structure of the accumulation areas prohibits materials from contacting storm water runoff. Rainwater captured within the containment structures is pumped to portable holding tanks and the water is characterized. The water is either discharged to the sanitary sewer system or managed as a hazardous waste, as determined from the characterization.

TARGETED CONSTITUENTS

- Floatable Materials
- Heavy Metals
- Oil and Grease
- Oxygen Demanding Substances
- Toxic Materials

APPLICABILITY

This BMP is applicable to all industrial activities at ARC, including any area where liquid materials are stored outside. It should be noted that the storage of reactive, ignitable, or flammable liquids must comply with the California Health and Safety Code, the Santa Clara County Hazardous Materials Storage Ordinance, and the Local Fire code.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with storm water during a storm event.
    - Prevent or reduce the discharge of pollutants to storm water from outdoor loading/unloading of materials through implementation of the following:
        - When materials are received, they shall remain in the travel path only for a time reasonably necessary to transport the materials but no longer than 24 hours,
        - Use a written operations plan that describes procedures for loading and/or unloading,
        - Secure lids/caps on all containers when not actively transferring materials into/out of them to reduce the chance of a spill,
        - Have an emergency spill cleanup plan readily available,
        - Employees trained in spill containment and cleanup should be present during material loading/unloading,
        - Establish spill kits for quick deployment of cleanup materials. Locate spill kits next to or near each loading/unloading area and regularly train employees in their use,
        - Park delivery vehicles so that spills or leaks can be contained, and
        - Cover the loading/unloading docks to reduce exposure of materials to rain.
    - Using engineering safeguards and thus reducing accidental releases of pollutants can prevent operator errors. Examples of engineering safeguards include:
        - Overflow protection devices on tank systems to warn the operator to automatically shut down transfer pumps when the tank reaches full capacity,
        - Protective guards (bollards) around tanks and aboveground piping to prevent vehicle or forklift damage, and
        - Clearly tagging or labeling all values to reduce human error.
    - Proper use of pesticides and fertilizers will reduce the risk of loss to storm water:
        - Pesticide applicators must be licensed with the California Department of Pesticide Regulation and county agricultural commissioners,
        - No person shall pollute water supplies or waterways while loading, mixing, or applying pesticides on ARC property,
        - No person shall transport, handle, store, load, apply or dispose of any pesticide, container, or apparatus in such a manner as to pollute water supplies or waterways, or cause damage or injury to land humans, plants, or animals,
        - Pesticides / fertilizers should not be applied during the wet season as they may be carried from the site by the next storm,
        - Avoid over-watering not only to conserve water but to avoid the discharge of water which may have become contaminated with nutrients and pesticides,
        - Store pesticides and application equipment in a responsible manner, and
        - Properly dispose of the used containers.
    - Storm water from parking lots may contain undesirable concentrations of oil, grease, suspended particulates, and metals such as copper, lead, cadmium, and zinc, as well as the petroleum byproducts of engine combustion. Deposition of air particulates, generated by the facility or by adjacent industries, may contribute significant amounts of pollutants. Therefore, the following maintenance operations shall occur:
        - Sweeping of main streets shall be conducted monthly and sweeping of parking lots shall be conducted quarterly. Sweeping should be conducted with a vacuum sweeper, rather than a mechanical brush sweeping device which is not as effective at removing the fine particulates,
        - Cleaning of catch basins and building laterals shall be conducted annually,
        - Maintain label on storm drain inlets and catch basins stating, “No Dumping – Flows to Bay” to minimize inadvertent dumping of liquid wastes, and
        - Debris will be disposed of off-center at an approved landfill site.
    - The NASA ARC Site Contingency Plan is the guideline for emergency response to incidents involving hazardous materials/hazardous waste and/or hazardous waste constituents. The emergency coordination and notification for incidents involving hazardous waste and/or hazardous materials shall be in accordance with federal, state, and local statutory and regulatory

requirements. Contact the EMD immediately for all hazardous waste and/or hazardous materials incidents.

2. Cover waste disposal containers like trash cans and dumpsters, and industrial material storage containers during precipitation events and when not in use.
3. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper, or similar) that can be transported or dispersed by the wind or contact with storm water.
    - Provide secondary containment for liquids unless a site-specific determination has been made by the Environmental Management Division and an alternative plan has been established.
    - Cover industrial materials and/or waste containers that hold industrial materials during rain events and when not in use. Protect from rainfall, run-off, and wind dispersal by implementing controls such as:
        - Store materials indoors or in a chemical storage locker,
        - Cover the storage area with a roof, and
        - Minimize storm water run-on by enclosing the area or providing a berm.
    - Storage of oil and hazardous materials, wastes, and recyclables must meet specific federal, state, and local standards including:
        - Spill Prevention Control and Countermeasure (SPCC) Plan,
        - Secondary containment, integrity, and leak detection monitoring, and
        - Emergency preparedness plans.
    - Hazardous materials shall be properly stored:
        - Hazardous materials should be placed in a designated area,
        - The designated storage area should be covered with a roof,
        - Designated areas should be paved, free of cracks and gaps and liquid tight in order to contain leaks and spills,
        - Liquid materials should be secondarily contained to hold either 10 percent of the volume of all the containers or 110 percent of the volume of the largest container, whichever is greater,
        - Drums stored in an area where unauthorized persons may gain access must be secured to prevent accidental spillage, pilferage, or any unauthorized use, and
        - Employees trained in emergency spill cleanup procedures shall be present when dangerous waste, liquid chemicals or other wastes are loaded or unloaded.
    - Hazardous and Universal waste materials and recyclables must be segregated according to hazard class, stored in secondary containment to prevent accidental release, labeled according to the container's contents and the material's hazard, and accurately inventoried for reporting to the EMD and to federal, state, and local regulatory agencies.
4. Divert run-on and storm water generated from within the facility away from all stockpiled materials.
5. Clean all spills of industrial materials or wastes that occur during handling in accordance with the spill response procedures identified in the IGP:
    - Hazardous Substance Plans are available in facilities where hazardous materials are present. The Hazardous Substance Plan details the chemical inventory of the building, hazardous substance spill procedure, and hazardous chemicals training.
    - Establish procedures and/or controls to minimize spills and leaks,
    - Develop and implement spill and leak response procedures to prevent industrial materials from discharging through the storm water conveyance system,
    - Spilled or leaked industrial materials shall be cleaned promptly and disposed of properly,
    - Identify and describe all necessary and appropriate spill and leak response equipment, location(s) of spill and leak response equipment, and spill or leak response equipment maintenance procedures,
    - Identify and train appropriate spill and leak response personnel, and
    - Refer to the Spill and Leak Prevention and Response BMP for additional information.
    - Observe and clean as appropriate, any outdoor material or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes.
6. Conduct daily, weekly, monthly, or annual inspections as outlined in the Quality Assurance and Recordkeeping BMP,

- All hazardous materials storage areas and hazardous waste accumulation areas must be inspected weekly. Hazardous materials and hazardous waste inspections must be documented. Documentation must be kept on file for a period of five (5) years. Inspections must include the following:
    - A check for external corrosion and structural failure,
    - A check for spills and overfills due to operator error,
    - A check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves),
    - A check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice-versa,
    - Visual inspection of new tank or container installation, loose fittings, loose valves, poor welding and improper or poorly fitted gaskets, and
    - Inspect tank foundations, connections, coatings, tank walls and exposed piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
    - A check that all materials are correctly segregated.
    - A check that all hazardous materials/waste storage areas are clearly identified, with a description of the hazard class(es) of the materials in the storage area.
    - A check that all containers (and secondary containment, if needed) are properly labeled to identify the material/waste hazard.
    - A check that the secondary containment is free of liquid and/or debris.
    - A check that all containers are in good condition.
    - A check that the current SDSs for all hazardous materials in the facility are available on site and easily accessed.
    - A check that the hazardous materials inventory for the facility is current.

7. Train employees in standard operating procedures and small spill cleanup techniques, as outlined in the Employee Training Program BMP.
    - It is the responsibility of managers and supervisors at ARC to be familiar with the Employee Training Program BMP, and to ensure employee training in these areas:
        - Safe handling of hazardous materials in the employee's workplace including spill response, segregation, and secondary containment,
        - Proper storage of industrial materials,
        - Proper disposal of hazardous waste including sewer discharge prohibitions, pickup procedures,
        - Spill Prevention Control and Countermeasures (when storing/transferring oil products),
        - Storm Water Pollution Prevention (when performing work outdoors), and
        - Emergency Response and First Responder Training.

MINIMUM BMP:
PREVENTIVE MAINTENANCE

DESCRIPTION
Preventative maintenance includes the regular inspection and maintenance of structural storm water controls (catch basins, oil water separators, etc.) as well as other facility equipment and systems. Certain normal maintenance activities can enhance water quality if they are carried out more frequently and/or in a more deliberate fashion.

TARGETED CONSTITUENTS
- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY
This Best Management Practice is applicable to all industrial activities at ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
1. Identify all equipment and systems used outdoors that may spill or leak pollutants:
   - The table titled “Summary of Moffett Field Industrial Activities and BMPs”, presented in the ARC SWPPP, identifies the industrial areas at ARC that have equipment or materials that may spill or leak pollutants into the storm water system.
2. Observe the identified equipment and systems to detect leaks, or identify conditions that may result in the development of leaks:
   - Equipment to be inspected as part of the Preventative Maintenance BMP includes, but is not limited to requirements such as:
     - Pipes,
     - Storage tanks and bins,
     - Process handling equipment,
     - Equipment and supplies stored in outdoor locations,
     - Storm water management devices (oil/water separators, catch basins, and other structural Best Management Practices),
     - Pumps,
     - Pressure vessels,
     - Secondary containment devices,
     - Fuel dispensing pumps, and
     - Fuel dispensing nozzles.
3. Establish an appropriate schedule for maintenance of identified equipment and systems:
   - Inspections schedules are outlined in the Quality Assurance and Recordkeeping BMP.
4. Establish procedures for prompt maintenance and repair of equipment, and maintenance of systems when conditions exist that may result in the development of spills or leaks.
   - Leaks from equipment must be contained and cleaned up immediately upon discovery. Refer to the Spill and Leak Prevention and Response BMP for additional guidance.
   - Equipment should be inspected each day before use. If any part of the equipment is found to be deficient, it should be locked-out and repaired prior to use.

- Government owned equipment needing maintenance should be promptly reported to the vehicle maintenance shop located within ARC.
- Vehicles that do not qualify for servicing at the on-site maintenance shop should be promptly maintained by the vehicle owners or vendors.
- Spill Response procedures are established in the Spill and Leak Prevention and Response BMP.
- Replace equipment coverings when they become brittle/broken to avoid mobilization of materials into the storm drainage system.

5. Prevent or reduce the discharge of pollutants to storm water from buildings and grounds maintenance by:
   - Washing and cleaning up with as little water as possible (wash water is not allowed to be discharged to the ground, even when no soap is used),
   - Preventing and cleaning up spills immediately,
   - Keeping debris from entering the storm drains, and
   - Maintaining the storm water collection system.
6. Conduct an inventory of each facility, system, and/or equipment that upon failure could result in discards which may contaminate storm water run-off.
7. Conduct monthly informal inspections of the inventoried equipment that could result in storm water contamination. Review the Quality Assurance and Recordkeeping BMP for inspection and recordkeeping requirements. Formal inspections conducted for hazardous materials storage, or spill prevention programs are considered equivalent and therefore would fulfill this requirement.
8. Perform cleanout of catch and settling basins throughout the storm water discharge system annually, as well as periodic cleanout activities as needed to prevent nutrient contamination of the storm water.

MINIMUM BMP:
QUALITY ASSURANCE AND RECORDKEEPING

DESCRIPTION

This BMP includes the procedures to ensure that:

- All elements of the SWPPP and Monitoring Program are adequately conducted,
- All records of inspections, spill maintenance activities, corrective actions, visual observations, etc., are developed, retained, and provided, as necessary, to the appropriate facility personnel,
- Tracking and follow-up procedures are described to ensure adequate corrective actions are taken and SWPPP updates are made.

TARGETED CONSTITUENTS

- Sediments
- Heavy Metals
- Toxic Materials
- Floatable Materials
- Oxygen Demanding Substances
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC.

AUTHORITY

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REQUIREMENTS

1. Develop and implement management procedures to ensure that appropriate staff implements all elements of the SWPPP, including the Monitoring Implementation Plan.
   - Identify buildings, facilities, and conditions at ARC that have a potential to contaminate storm water. This list shall be included in the SWPPP and BMP Handbook.
2. Develop a method of tracking and recording the implementation of BMPs identified in the SWPPP.
   - Identify all BMPs implemented at ARC. This list shall be included in the SWPPP and BMP Handbook.
   - An Annual Comprehensive Facility Compliance Evaluation (Annual Evaluation) of all facilities with a potential pollutant source will be conducted by EMD in accordance with the IGP.
3. Perform daily inspections of secondary containment units during storm events:
   - Check that the secondary containment can contain the full volume of received rainwater, without overflow or failure.
   - Check the rainwater in the secondary containment structure for signs of contamination from industrial materials, such as an oily sheen.
   - If the rainwater does not show any signs of contamination, it can be released to the ground. The valve used to release the water MUST be returned to the closed position after releasing the rainwater.
   - Each time rainwater is released from secondary containment, the water quality and release date must be recorded in a Rainwater Discharge Log.
   - Check the containment for debris or materials that could reduce the volume that can be contained.
   - Check the water in the containment area for signs of contamination such as an oily sheen.
   - Check that the containment drain valve is in the closed position.
   - A check for external corrosion and structural failure,
   - A check for spills and overfills due to operator error,

- A check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves),

4. Perform weekly visual inspections of industrial facilities that are exposed to rain. Verify that measures used to eliminate storm water pollution are working effectively by inspecting the following:
   - Check for external corrosion and structural failure,
   - Check for spills and overfills due to operator error,
   - Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves),
   - Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice-versa,
   - Inspect tank foundations, connections, coatings, tank walls and exposed piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
5. Check for proper labeling of the industrial materials stored in the facility.
6. Perform monthly visual inspections of industrial facilities that are exposed to rain. Verify that measures used to eliminate storm water pollution are working effectively by inspecting the following, in addition to the elements inspected on a weekly basis:
   - Check the interstitial space of a double-walled tank system. Check to see if moisture is accumulating in this space, which may indicate a leak of the inner tank, or a breach of the outer tank.
   - A visual inspection of the facility fire extinguisher. Look to see that the tank is pressurized and in good condition.
   - Check the spill kit. Inspect the contents of the spill kit for completeness, degradation, and usefulness.
   - Check that the Spill Log and Rainwater Discharge log are being updated as required by the IGP.
7. Visually inspect new tank or container installations for the following:
   - Loose fittings, valves,
   - Poor welding,
   - Improper or poorly fitted gaskets, and
   - Cracks or defects in the secondary containment.
8. Specific red flags to look for when visually inspecting industrial areas exposed to rain include:
   - Corroded drums,
   - Drums without plugs or covers,
   - Corroded or damaged tanks, tank supports or tank drain plugs,
   - Torn bags or bags exposed to rainwater,
   - Corroded or leaking pipes,
   - Leaking valves or fittings,
   - Leaking pumps / hose / nozzle connections,
   - Broken / cracked dikes, walls, or other containment systems,
   - Chemicals / dust / materials blown by wind,
   - Improperly maintained or defective dry chemical conveying systems, and
   - Recent or ongoing construction activities.
9. Records and internal reports are performed regularly as determined by the federal, state, and local standards. Maintain the BMP implementation records for a minimum of five (5) years. Formal inspections conducted for hazardous materials storage, or spill prevention programs are considered equivalent and therefore would fulfill this requirement.
   - BMP implementation records include such information as:
   - The location of stored materials is proper whether indoors or in a chemical storage locker,
   - Are all materials correctly segregated,
   - Are all containers labeled to identify the material / waste and hazard,
   - Is the secondary containment free of liquid or debris,
   - Are all containers in good condition,
   - Are SDSs available for all hazardous materials in inventory,
   - Spill logs,
   - Rainwater Discharge Logs,
   - Training records,

- Spill Response Reports, and
- Any documents related to spill cleanup activities.

MINIMUM BMP:
SPILL AND LEAK PREVENTION AND RESPONSE

DESCRIPTION
This Best Management Practice provides spill clean-up procedures and necessary clean-up equipment based upon the quantities and locations of significant materials that may spill or leak. Spills and leaks together are one of the largest industrial sources of storm water pollutants, and in most cases are avoidable.

The most common causes of unintentional releases and spills include the following:
- Lack of awareness regarding proper hazardous materials handling procedures,
- External corrosion and structural failure of storage containers,
- Improper equipment or facility installation,
- Spills and overfills due to operator error,
- Failure of piping systems (pipes, pumps, couplings, hoses, valves), and
- Leaks during pumping of liquids or gases from trucks to a storage facility and vice-versa.

Establishing standard safety and spill prevention operating procedures coupled with an effective employee training program can reduce these accidental releases. Avoiding spills and leaks is preferable to cleaning them up after they occur, not only from an environmental standpoint, but also because spills cause increased operating costs and lower productivity.

TARGETED CONSTITUENTS
- Floatable Materials
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY
This Best Management Practice is applicable to all industrial activities at ARC.

AUTHORITY
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REQUIREMENTS
1. Establish procedures and/or controls to minimize spills and leaks,
   - Hazardous Substance Business Plans are available in facilities where hazardous materials are present. The Hazardous Substance Business Plan details the chemical inventory of the building, hazardous substance spill procedure, and hazardous chemicals training.
   - Post liquid transfer instructions at each site where liquids and gasses are pumped from trucks to a storage facility and vice-versa.
   - Take steps to immobilize transport trucks during liquid transfer activities.
   - Transport truck operators are required to perform a vehicle walk around prior to pulling away from the material transfer site.
2. Develop and implement spill and leak response procedures to prevent industrial materials from discharging through the storm water conveyance system.
   - Spilled or leaked industrial materials shall be cleaned promptly and disposed of properly,
   - In the event of a spill near a storm drain:
     - Block, dike, divert, and/or cover the storm drain to prevent a release from entering the storm water system.
   - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
     - Spill could enter or has entered a storm drain or storm ditch,

  - Spill is a health hazard,
  - Spill is a fire hazard,
  - Spill may directly contaminate the environment or property, or,
  - If the spill cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.
- The NASA ARC Site Contingency Plan is the guideline for emergency response to incidents involving hazardous materials/hazardous waste and/or hazardous waste constituents. The emergency coordination and notification for incidents involving hazardous waste and/or hazardous materials shall be in accordance with federal, state, and local statutory and regulatory requirements. Contact EMD for additional information.

3. Identify and describe all necessary and appropriate spill and leak response equipment, location(s) of spill and leak response equipment, and spill or leak response equipment maintenance procedures:
   - Hazardous materials are required to be segregated according to hazard class, stored in secondary containment to prevent accidental release, labeled according to the container's contents and the material's hazard, and accurately inventoried for reporting to the EMD, and to federal, state, and local regulatory agencies.
   - Hazardous materials storage areas are required to be equipped with emergency spill response equipment appropriate to the types of materials present.
   - The hazardous materials storage areas are required to be inspected weekly to ensure that storage requirements are being satisfied.
   - Each facility has a Hazardous Material Business Plan (HMBP), which details the chemical inventory of the building, hazardous substance spill procedure, and the locations of cleanup equipment.
4. Identify and train appropriate spill and leak response personnel.
   - It is the responsibility of managers and supervisors at ARC to ensure employees are trained in these areas and as outlined in the Employee Training Program BMP:
     - Safe handling of hazardous materials in the employee's workplace including spill response, segregation, and secondary containment,
     - Proper disposal of hazardous waste including sewer discharge prohibitions,
     - Waste pickup procedures, and
     - Emergency Response and First Responder Training.

ADVANCED BMPS

Where the Minimum BMPs, as identified above are not effective, the implementation of Advanced BMPs shall be evaluated. Advanced BMPs generally consist of structural devices that reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

The following Advanced BMPs shall be implemented at ARC where appropriate:

- Control Devices
- Overhead Coverage
- Retention Ponds
- Secondary Containment Structures
- Water Treatment

ADVANCED BMP: CONTROL DEVICES

DESCRIPTION

This BMP includes berms or other devices that channel or route run-on and run-off storm water away from pollutant sources.

TARGETED CONSTITUENTS

- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC.

AUTHORITY

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REQUIREMENTS

1. Identify conditions at ARC where control device channels or reroutes storm water.
2. Visually inspect and verify that the control device integrity has not been breached.
3. Maintain the storm water drainage system, both the east and west side drainage systems.
4. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES

ADVANCED BMP: OVERHEAD COVERAGE

DESCRIPTION

This BMP includes structures that provide horizontal coverage of materials, chemicals, and pollutant sources from contact with storm water and authorized non-storm water discharges. Materials spilled, leaked, or lost from storage containers may accumulate in soils or on the surfaces and be carried away by storm water run-off. It should be noted that the storage of reactive, ignitable, or flammable liquids must comply with fire codes.

TARGETED CONSTITUENTS

- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC where materials are stored outdoors.

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REQUIREMENTS

1. Identify horizontal covered structures at ARC that contain materials with the potential to contaminate storm water. This list shall be included in the SWPPP.
2. Prevent or reduce the discharge of pollutants to storm water from outdoor storage areas by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.
3. Hazardous Material Business Plans (HMBP) are available at each building where hazardous materials are present. The HMBP details the chemical inventory of the building, hazardous substance spill procedure, and hazardous chemicals training.
4. Weekly inspections will be conducted for hazardous material storage locations. Special attention will be given to storm water in these locations and proper disposal of storm water.
    - If rainwater accumulates in the covered area but does not contain a visible sheen and has not come in contact with any industrial materials, it is permissible to discharge the accumulated water onto a grassy or otherwise vegetated area. The discharge of clean rainwater must be recorded in a Rain Water Discharge Log.
    - If grassy or vegetated areas are not in the proximity of the covered area, it may be permissible for the water to be discharged to the sanitary sewer system. EMD must be notified and grant approval prior to any discharge of rainwater to the sanitary sewer system.
    - If water in the covered area does exhibit a visible sheen, or if the potential for pollutants is present, the water must be removed from the area and containerized in drums, tanks, totes, etc. Contact the EMD to request sampling and analysis and proper disposal procedures.
    - In the event of spilled materials:
        - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
            - Spill could enter a storm drain or storm ditch,
            - Spill is a health hazard,
            - Spill is a fire hazard,
            - Spill may directly contaminate the environment or property, or,

        - If the spill cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.
    - If the rainwater overflows the covered area:
        - Block, dike, divert, and/or cover the storm drain to prevent a release from entering the storm water system.
        - Contact EMD.
        - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if the rainwater has a visible sheen, or if the potential for pollutants is present.
5. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES

ADVANCED BMP: RETENTION PONDS

DESCRIPTION
This BMP includes basins, ponds, surface impoundments, bermed areas, and similar physically confined areas which do not allow storm water to discharge from the facility.

TARGETED CONSTITUENTS
- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY
This BMP is applicable to the Storm Water Settling Basin and the Storm Water Retention Ponds located on the northwest end of ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
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REQUIREMENTS
1. The Storm Water Settling Basin passively treats storm water run-off. The storm water flows through the settling basin and pollutants are removed as they adhere to particulates in the water. These particulates then settle out and form sludge at the bottom of the settling basin. An absorbent boom is strung across the settling basin to help trap floating contaminates.
2. Maintenance of the Storm Water Settling Basin will include:
   - Removal of accumulated sediment should be cleaned before the wet weather season, by mid-August.
   - Sampling of the sediment and including the results in the Settling Basin Sludge Report.
   - Replacement of the absorbent boom when it is full of oil and visibly heavier, and floats lower in the water.
   - Sample storm water at the effluent location twice during the first half of the reporting year (July 1-December 31), and twice during the second half of the reporting year (January 1-June 30).
   - Results will be uploaded to the Storm Water Regional Control Board's (SWRCB's) Storm Water Multiple Application and Report Tracking System (SMARTS) web-based database via Ad Hoc reports within 30 days of receiving the analytical report. The Ad Hoc reports will be included in the Storm Water Annual Report.
3. The Storm Water Retention Pond collects and passively treats storm water run-off. It is essentially a small lake with rooted wetland vegetation along the perimeter. The permanent pool of water provides a quiescent volume for continued settling of particulate contaminants and uptake of dissolved contaminants by aquatic plants between storms. The wetland vegetation is present to improve the removal of dissolved contaminants and to reduce the formation of algal mats. The Storm Water Retention Pond helps where the removal of the dissolved constituent fraction is of concern, particularly nutrients and metals. Dissolved contaminants are removed by a combination of processes: physical adsorption to bottom sediments and suspended fine sediments, natural chemical flocculation, and uptake by aquatic plants.
4. In addition to the minimum BMPs, other applicable BMPs include:
   - CONTROL DEVICES
   - WATER TREATMENT

ADVANCED BMP:
SECONDARY CONTAINMENT STRUCTURES

DESCRIPTION

This BMP includes containment structures around storage tanks and other areas for the purpose of collecting any leaks or spills. Secondary containment is defined as a level of containment external to, and separate from, the primary containment.

The Santa Clara County Hazardous Materials Storage Ordinance promotes the protection of life, health, resources, and property through prevention and control of unauthorized discharges of hazardous materials. An integral portion of this ordinance involves the use of secondary containment. Complying with local regulations and adopting the requirements listed on the following page to ensure secondary containment areas are clean and pollutant-free and enable the discharge of rainwater from these areas with minimal effort. If operators have any questions or concerns regarding secondary containment, or removal of rainwater from secondary containment, contact the EMD.

TARGETED CONSTITUENTS

Listed below are the targeted constituents that should be prevented from contaminating rainwater that enters secondary containments.

- Heavy Metals
- Toxic/Hazardous Materials
- Oil and Grease
- Oxygen Demanding Substances
- Heavy, Solid, Fibrous Matter, or Viscous Substances

APPLICABILITY

This BMP is applicable to all locations where secondary containments exist throughout ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

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REQUIREMENTS

The following procedures have been developed to ensure that rainwater, which collects in secondary containment, is handled in an appropriate manner. Operators must follow these procedures to ensure that any discharges of rainwater from secondary containments to the environment comply with all applicable regulations:

1. All primary containment must be product tight.
2. In the case of an installation with one primary container, the secondary containment must be large enough to contain at least 110 percent of the volume of the primary container.
3. In the case of a storage facility with multiple primary containers, the secondary container must be large enough to contain 150 percent of the volume of the largest primary container placed in it, or ten percent of the aggregate internal volume of all primary containers in the storage facility, whichever is greater.
4. If the storage facility is open to rainfall, then the secondary containment must be able to additionally accommodate the volume of a 24-hour rainfall as determined by a 100-year storm history. National Oceanic and Atmospheric Administration (NOAA) estimates this to be 4 inches using reported data from the Moffett Field weather station.
5. Laminated, coated, or clad materials are single-walled and must not be considered to fulfill the requirements of both primary and secondary containment.
6. Rainwater that accumulates in secondary containments shall be removed as soon as possible, pursuant to local regulatory requirements:

- If rainwater accumulates in secondary containment but does not contain a visible oily sheen and has not come in contact with any other contaminants, it is permissible to discharge the accumulated water onto a grassy or otherwise vegetated area.
- A Rainwater Discharge Log must be maintained on site and each release of rainwater must be recorded on the log.
- The disposal of rainwater from secondary containment areas into the sanitary sewer system must be approved by the EMD and the local regulatory agency.
- If grassy or vegetated areas are not in the proximity of the secondary containment structure, it may be permissible for the water to be discharged to the sanitary sewer system. However, EMD must be notified and a permit to discharge must be granted prior to any discharge of rainwater to the sanitary sewer.
- If water in the secondary containment does exhibit a visible sheen, or if the potential for pollutants is present, the water shall be removed from the secondary containment and containerized in drums, tanks, totes, etc. Contact the EMD to request sampling and analysis and proper disposal procedures.

7. In some cases, advanced secondary containment devices may be incorporated within a facility's storm drainage system. These containment devices must receive prior approval by the EMD and shall be identified with distinctive markings. An inline BMP management plan must be submitted to EMD prior to installing the inline BMP.
8. Protect hazardous materials and hazardous material storage areas from rainfall, run-off, and wind dispersal when possible.
9. Perform regular inspections to ensure that secondary containment areas are free of spilled materials, trash, and rubbish.
10. Train personnel in good housekeeping techniques, standard operating procedures and any other training which may apply.
11. In the event of spilled materials:
    - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
        - Spill could enter or has entered a storm drain or storm ditch,
        - Spill is a health hazard,
        - Spill is a fire hazard,
        - Spill may directly contaminate the environment or property, or,
        - If the spill cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.
    - If the rainwater overflows the covered area:
        - Block, dike, divert, and/or cover the storm drain to prevent a release from entering the storm water system.
        - Contact EMD.
        - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if the rainwater has a visible sheen, or if the potential for pollutants is present.
12. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES
    - SOURCE REDUCTION

ADVANCED BMP: WATER TREATMENT

DESCRIPTION

This BMP includes groundwater treatment systems, inlet controls, infiltration devices, oil/water separators, retention ponds, vegetative swales, etc., that reduce the pollutants in storm water discharges and authorized non-storm water discharges.

TARGETED CONSTITUENTS

- Sediments
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC.

AUTHORITY

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REQUIREMENTS

1. Identify buildings, facilities, and conditions at ARC that have a potential for malfunction and contaminate storm water. This list shall be included in the SWPPP.
2. Control potential pollutants before discharging water to the storm drain system with the use of oil-absorbent booms. The absorbent material preferentially absorbs oil and does not fill with water. It can be used on storm water with small concentrations of oily materials. When the boom is spent, it is full of oil and visibly heavier, and floats lower in the water. The booms are inexpensive enough that they may easily be replaced whenever the absorbent is saturated.
3. Maintain oil/water separators regularly to retain its effectiveness and to avoid spilling oily wastes. The separator should be pumped out periodically and replaced with clean water. The separator should be cleaned once before the wet weather season, by mid-September, and then periodically between storms. For inlets that don't carry much flow, three cleanings per year are sufficient: once before the rainy season to remove materials that have accumulated, once after the first major storm, and once at the end of the rainy season to prevent slow loss or evaporation of the collected oily wastes. If flows are heavy, monthly cleaning may be necessary.
4. Effluent from groundwater treatment systems that discharge to the storm drain system must comply with general National Pollutant Discharge Elimination System (NPDES) permit requirements.
    - Inspect the facility weekly for external corrosion, structural failure, failure of piping system, leaks or spills, loose fittings, loose valves, and other physical damage that may weaken the treatment system,
    - Functional tests should be performed regularly on equipment to ensure that alarm systems are working properly, and
    - Sampling of influent and effluent waters for constituents of concern shall be done regularly per NPDES permit requirements.
5. Building 191, Gate 14A, and Gate 14B pump stations are located along North Patrol Road Ditch, which runs parallel to the Northern Channel. During normal operations, storm and surface waters are pumped out of the Building 191 concrete vault and into the eastward-flowing Northern Channel. During large rain events, pumps located at Gates 14A and 14B will be used to pump water directly into the Northern Channel to avoid flooding. Building 191 operates with one main and one auxiliary pump,

Gate 14A operates with one main pump, and Gate 14B operates with one main pump and one auxiliary pump. Water level dictates how many pumps are operated.

- Immediately alert EMD if the pumps at Gate 14A or 14B are activated.
- Inspect the facility daily for equipment failure, failure of the piping system, leaks or spills, loose fittings, loose valves, and other physical damage that may weaken the pumping system,
- Functional tests should be performed regularly to ensure that systems are working properly.
- Sample storm water at the effluent locations twice during the first half of the reporting year (July 1-December 31), and twice during the second half of the reporting year (January 1-June 30).
- Results will be uploaded to the SWRCB's SMARTS web-based database via Ad Hoc reports within 30 days of receiving the analytical report. The Ad Hoc reports will be included in the Storm Water Annual Report.

6. In addition to the minimum BMPs, other applicable required BMPs include:
   - CONTROL DEVICES
   - SOURCE REDUCTION

SITE-SPECIFIC BMPS

As of August 2022, 22 industrial activities with a potential for contaminating storm water have been identified at ARC. Site-Specific BMPs consist of industrial activities that could affect the quality of storm water. Table A summarizes each industrial activity, potential pollutants, potential pollutant sources, and assigns BMP(s) to minimize or eliminate any pollutant discharges. Each Site-Specific BMP includes a description of the associated industrial activity, a list of associated targeted pollutants, a description of the applicability of the BMP, and an outline of the BMP requirements.

The following Site-Specific BMPs shall be implemented at ARC when applicable:

- Aircraft Exhaust and Fueling
- Aircraft Maintenance
- Aircraft Washing and Rinsing
- Building and Grounds Maintenance
- Building Repair, Remodeling, and Construction
- Construction, Demolition, and Excavation Operations That Disturb Ground Surfaces Less Than One Acre
- Dewatering: Groundwater
- Dewatering: Utility Vault
- Elimination of Non-Storm Water Discharges
- Fire Department Equipment Testing and Training
- Fleet Parking
- Fuel Tank Vehicles
- Golf Course Maintenance
- Outdoor Process Equipment Operations and Maintenance
- Project Closeout Requirements
- Source Reduction
- Small Motor Oil Spill Cleanup Procedures
- Transportation Control Measures
- Vehicle and Equipment Fueling
- Vehicle and Equipment Maintenance and Repair
- Vehicle and Equipment Washing
- Washing and Rinsing of Outdoor Equipment, Materials, and displays
- Washing of Exterior Building Surfaces and Fixed Outdoor Equipment

SITE-SPECIFIC BMP: AIRCRAFT EXHAUST AND FUELING

DESCRIPTION

Spills from fueling aircraft or from the transfer of fuels to storage tanks can be a significant source of pollution. Fuels carry contaminants of particular concern to human health and wildlife, such as heavy metals, toxic materials, and oil and grease, which are not easily removed by storm water treatment devices. Consequently, control at the source is particularly important. Adequate control can be achieved with careful design of the initial installations, retrofitting of existing installations, and proper spill control and cleanup procedures.

TARGETED CONSTITUENTS

- Oil and Grease
- Petroleum Products
- Antifreeze
- Toxic Materials
- Heavy Metals

APPLICABILITY

This BMP is applicable to all industrial and airfield activities at ARC, including NASA Fueling Pits, High Speed Fueling Hydrants, Aircraft Tarmac, Moffett Federal Airfield, California Air National Guard, and airfield apron locations.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

7. Prevent fuel spills and leaks and reduce their impacts to storm water.
    - All aircraft fueling will use single point closed fueling equipment to prevent vapor release during fueling. Aircraft which can only utilize over-the wing fueling are exempted from this requirement.
    - All aircraft fueling activities will take place on the concrete ramp to provide protection to the environment in case of spills or leaks.
    - Storm drains located in the vicinity of aircraft fueling activities shall be equipped with safety valves that remain in the normally closed position. During rain events, catch basins will be visually inspected for contaminants prior to opening the valve to release rainwater. Document discharges of storm water from secondary containment devices in accordance with the Minimum BMP: Quality Assurance and Recordkeeping.
    - Mobile fueling trucks provide fuel the H211 aircraft but all fueling activities will take place on the concrete ramp.
    - Clean up of any fuel overflows and spills are done by using dry cleanup methods. Spills are characterized by the actual cleanup requirements and size of spill. Only persons trained in fuel spill cleanup can provide spill response.
    - Post signs that instruct pump operators not to "top off" or overfill gas tanks. Keep dry cleanup materials in the fueling area and instruct employees in the dry cleanup methods described in Sections 4, 5, and 6, as seen below.
    - Assign someone responsibility to visually inspect the area daily for gasoline, motor oil, or other fluids that may have leaked.
8. NASA Aircraft Fueling and Defueling:
    - Follow NASA aircraft fueling and defueling procedures.
    - Block any storm drains in the vicinity with appropriate BMPs.
9. AvPorts aircraft fueling operations:

- Adhere to the National Air Transportation Association Refueling and Quality Control Procedures for Airport Service and Support Operations.
- Fuel Spills/Leaks: preventative measures, response, and reporting (Refer to HR Employee Training Records, Section C, and PV-MFA SPCC):
  - Preventative measures-Safety & Spill Equipment and Training,
    - Drain cover over storm drain 24/7 except during rain-back up cover located in Emergency Spill Cart.
    - Emergency Spill Cart stocked with enough supplies and equipment to contain and clean up a 300-gal fuel spill.
    - Air Powered Fuel Vacuum connected to 55-gal steel drum.
    - Refueling Trucks contain their own spill kit that can contain and clean up a 100-gal fuel spill.
    - Airport vehicles 1, 2, and 3 also contain their own 100-gal spill kits.
    - Additional 55-gal drums, spill mats, absorbent, etc. located in the Haz-Mat building and Conex Box 1 & 3.
    - 25-gal mixing tubs, drip pans, 5-gal buckets, 2-gal pails.
    - First Aid-each refueler and vehicle contain a first aid kit and portable eyewash bottles.
    - Five 150 lb. halon fire extinguishers located between each refueler with additional located along the ramp.
    - Each refueler has two 20 lb. PK fire extinguishers on board and readily available.
    - Each vehicle has a 10 lb. ABC fire extinguisher on board and readily available.
    - Refuelers Inspected, PM, QC, and stocked daily, weekly, monthly, and annually.
    - Hazmat Building-secondary containment.
    - Bi-Annual NATA Safety 1st Professional Line Service & Line Fuel Service Certification.
    - Training Fueling Procedures, Fuel QC, Fueling Safety, Fuel Spill Control, Fire Safety.
    - Annual Fire Extinguisher training and certification.
    - Annual Hazmat Communication-compliance, documentation & reporting, storage, cleanup & prevention.
    - Airfield Maintenance Personnel are responsible for all fuel transfers, QC, Maintenance, Compliance, & Training.
  - Response to a spill,
    - Immediately STOP fueling operation: release “dead-man control”, close all valves, and activate emergency shutoff.
    - Generously and quickly apply spill kit materials to contain and prevent flow to storm drain and environment.
    - NO call for help if spill/leak can be contained, controlled, and cleaned up by two people in under 30 min.
    - Immediately call for help if cannot contain, control, or clean up and/or enters storm drain or environment,
      - NASA Dispatch 650-604-5555
      - Moffett Air Traffic Control 650-603-9868 or VHF 119.55 or UHF Ch. 1
      - AvPorts Airfield Operations 650-386-0677 or UHF Ch. 2 or 3
      - Command Consulting Group 650-386-0700 or UHF Ch. 4 or 5
      - Clean Harbors Emergency Spill Response & Recovery 800-645-8265
    - Soiled spill kit materials will be cleaned up/swept up and then transferred to drums with lids secured.
    - Drums will be stored in the Haz-Mat Building.
    - Immediately place Hazmat labels on drums-include start date, contact and address, description of contents.
    - Contact Environmental Vendor, Clean Harbors to schedule pickup.
  - Reporting (Refer to Spill Log SOP and PV-MFA SPCC).
    - All spills/leaks will be recorded in the Spill Report Log.
    - Reportable Spills/Leaks and Incident Reporting are those requiring an Immediate call for help if cannot contain, control, or clean up and/or enters storm drain or environment.
    - Retain Reports and Records for SPCC, SWPPP, EPA, and other Agency compliance and notifications.

10. Reportable Spill
- A reportable spill is any actual or threatened release of a hazardous material that enters the environment. Examples include:
    - A spill enters a storm drain or ditch.
    - A spill enters the sanitary sewer.
    - A spill contacts soil.
    - Potential injury
- A spill that results in real or potential injury to persons or the environment is considered reportable.
- A release of a gas, mist or fume which impacts soil, water, or biota.
- A spill that cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.

11. In the Event of a Reportable Spill
- Evacuate and deny entry to the affected area. Create barriers or designate guards to control access and traffic.
- Call 911 or 650-604-5555 and provide all available information. NASA Dispatch will dispatch the on-site spill response team.
- NASA Dispatch will also notify the EMD, who will make the necessary regulatory agency notifications.

12. Non-Reportable Spill
- A non-reportable hazardous materials spill is one that:
    - Does not escape to the environment.
    - Will not pose a health risk to individuals in the immediate area.
    - Can be controlled and contained with on-hand spill response materials appropriate to the task.
    - The properties of the material are well known to the person(s) who will be controlling and containing the spill.
    - The person(s) controlling and containing the spill have had appropriate training.
    - To control and contain the spill requires less than 1/2 hour for two people.
    - Record the event.
- In the event of a small, non-reportable, (but still recordable) spill:
    - Contain and control the spill with available appropriate spill response equipment.
    - Manage spill containment materials as hazardous waste.
    - Record the event.

13. In addition to the minimum BMPs, other applicable BMPs include:
- ELIMINATION OF NON-STORM WATER DISCHARGES
- SOURCE REDUCTION

SITE-SPECIFIC BMP: AIRCRAFT MAINTENANCE

DESCRIPTION

Aircraft maintenance is performed both indoors and outdoors in various locations throughout ARC. This Best Management Practice addresses aircraft maintenance activities performed at ARC, including aircraft operations at N248, AvPorts airport operations at M158 and N211, and CANG aircraft operations at the 129th Rescue Wing facilities.

TARGETED CONSTITUENTS

- Heavy Metals
- Toxic Materials
- Hydraulic Fuel
- Oil and Grease
- Petroleum Products
- Antifreeze

APPLICABILITY

This BMP is applicable to all industrial and airfield activities at ARC, including N249 (OARF), M158, and M662.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent fuel spills and leaks, and reduce their impacts to storm water by:
    - Install vapor recovery nozzles to help control drips as well as air pollution,
    - Use a paved area or provide a concrete slab for the fueling area. Concrete is preferred because fuel and oils cause asphalt to deteriorate,
    - Clean up fuel overflows and spills using dry methods,
    - Do not allow spills to run off or evaporate,
    - Do not flush the spill away with a hose. Spread adsorbent material, sweep it up with a broom, and dispose of it as hazardous waste,
    - Keep dry cleanup materials in the fueling area, and instruct employees in the dry clean up methods described below, and
    - Assign someone responsibility to check the area every day for jet fuel, gasoline, motor oil or other fluids that may have leaked.
2. Comply with the Spill and Leak Prevention and Response BMP.
    - **All** spills, regardless of size, must be recorded in the spill log. Spilled or leaked industrial materials shall be cleaned promptly and disposed of properly,
    - In the event of a spill near a storm drain:
        - Block, dike, divert, and/or cover the storm drain to prevent a release from entering the storm water system.
    - **Small spills** are those which can be wiped up with a shop rag. Store shop rags in a covered rag bin indoors. Do not saturate rags with gasoline, solvents, or other volatile liquids,
    - **Medium spills** are too large to wipe up with a rag.
        - Contain and soak up a liquid using dry absorbent material.
        - Absorbent “snakes” may be used as temporary booms to contain and soak up the liquid.
        - Sweep up the used absorbent and snakes and dispose of them appropriately.
        - When sweeping up absorbent materials, be careful not to kick up dust, doing so may introduce contaminants into the atmosphere.

    - Do not use a leaf blower, or similar powered equipment to sweep up used spill kit materials.
- **Large spills** must be contained and then cleaned up.
    - Shut off or plug storm drain inlets or sewer inlets where the spill may enter.
    - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
        - Spill could enter a storm drain or storm ditch,
        - Spill is a health hazard,
        - Spill is a fire hazard,
        - Spill may directly contaminate the environment or property, or,
        - If the spill cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.
        - For non-hazardous spills, take steps to contain and clean up the liquid, and minimize the wash water used in cleanup.
- Report medium and large spills and leaks to the EMD immediately.

3. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
4. Follow facility operating procedures for fueling and defueling procedures.
5. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - AIRCRAFT FUELING
    - VEHICLE AND EQUIPMENT FUELING

SITE-SPECIFIC BMP:
AIRCRAFT WASHING AND RINSING

DESCRIPTION
In order to ensure a high quality of storm water effluent at NASA ARC, the following BMP for the washing and rinsing of aircraft has been developed. If any questions arise concerning the following information, please contact the EMD.

TARGETED CONSTITUENTS
Listed below are the targeted constituents that should be prevented from entering the storm drain system during washing procedures.

- Heavy Metals
- Toxic / Hazardous Materials
- Oxygen Demanding Substances

APPLICABILITY
This BMP is applicable to all locations where planes are washed throughout ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
The following procedures have been developed to ensure that no contaminants enter the storm drain system during the washing or rinsing of aircraft. Operators must follow these procedures to ensure that the quality of storm water discharges from ARC is not adversely impacted.

1. Train personnel in good housekeeping techniques, standard operating procedures, and any other training which may apply.
2. Protect all storm drain inlets from potentially contaminated run-off generated by washing. Storm drain inlets should be securely covered with visqueen, plastic or other such material, prior to any washing activities.
3. Follow the posted procedures for proper operation of the wash rack. This will ensure that the automatic valve will divert wash water to the sanitary sewer instead of the storm drainage system.
4. Use of soaps during washing activities is discouraged. If soap is necessary, use only biodegradable soap products. Contact the EMD prior to use of any product so that the Safety Data Sheet (SDSs) may be reviewed.
    - Soap is **not** permitted to be discharged into the storm drain, even if it is biodegradable. Measures must be taken to protect the storm drain throughout the washing activities.
5. After washing/rinsing the aircraft, flush the run-off into the sanitary sewer. If the run-off is not properly rinsed into the sanitary sewer, the contaminants washed off the aircraft will sit on the pavement until the next rainfall and be washed down the storm drain, which is a violation of the Industrial General Permit.
6. If run-off from the washing activities enters the storm drainage system, call 911 immediately.
    - Report the event to EMD.
    - The Spill and Leak Prevention and Response BMP provides additional information on responding to a spill.
7. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
8. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES
    - SOURCE REDUCTION

SITE-SPECIFIC BMP: BUILDING AND GROUNDS MAINTENANCE

DESCRIPTION

This BMP is required for landscaping activities, cleaning of parking lots and pavement other than in the areas of industrial activity, and the cleaning of the storm drainage system. Certain nominal maintenance activities can generate materials that must be properly disposed. Other maintenance activities can enhance water quality if they are carried out more frequently and/or in a more deliberate fashion.

This required site-specific BMP on NASA occupied property must be implemented by the NASA ARC Plant Engineering Branch. Facility maintenance is performed in accordance with the guidelines developed by the ARC Plant Engineering Branch, including an Environmental Pollutant Plan, a Maintenance Support Services, and Construction Report Requirement. This required site-specific BMP on leased NASA property or within the NASA ARC SWPPP discharge area must be implemented by NASA leaseholders and partners in relevant occupied areas.

TARGETED CONSTITUENTS

- Heavy metals
- Oil and grease
- Nutrients
- Hydraulic fluid
- Fuel products
- Pesticides
- Herbicides
- Sediments

APPLICABILITY

This BMP is applicable to all landscaped and industrial activity areas at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent or reduce the discharge of pollutants to storm water from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the storm water collection system.
2. All persons shall:
   - Not pollute water supplies or waterways while loading, mixing, or applying pesticides and fertilizers.
   - Transport, handle, store, load, apply, and dispose of any pesticides, containers, or apparatus in such a manner as to not pollute water supplies or waterways, or cause damage or injury to land humans, plants, or animals.
3. Pesticide applicators must be licensed with the California Department of Pesticide Regulation and county agricultural commissioners.
4. Records of pesticide application location, date, product, and amount used are to be kept onsite and made available upon request.
5. Pesticides and fertilizers shall not be applied during the wet season to prevent runoff to the storm water discharge. Follow manufacturer's instructions for proper application. Consider limited use of irrigation system instead of rainfall if watering is a required step in the application process.

6. Over-watering and irrigation overflow is not permitted. Minimizing overflow helps avoid the discharge of water into the stormwater system which may have become contaminated with nutrients and pesticides.
7. Store pesticides and application equipment in a responsible manner which avoids spills and runoff to the stormwater system.
8. Unused pesticide and fertilizer shall not be disposed of to soil, landscaping, or the stormwater system.
9. Properly dispose of the used pesticide and fertilizer containers.
10. Use integrated pest management where appropriate.
11. Sweeping of main streets should be conducted monthly and sweeping of parking lots quarterly.
    - Sweeping should be conducted with a vacuum sweeper, rather than a mechanical brush sweeping which is not as effective at removing fine particulates.
    - If using a blower or sweeper, debris must not be directed towards or into a storm drain.
12. Full removal of solids accumulation within of catch basins and building laterals shall be conducted at least annually and more frequently as needed to prevent nutrient and metal contamination of the storm water.
13. Maintain label on storm drain inlets and catch basins stating, “No Dumping – Flows to Bay” to minimize inadvertent dumping of liquid wastes.
14. Proper disposal of wash water, sweepings, and sediments is required. Only clean storm water may enter storm drains.
15. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
16. Maintain equipment on a regular schedule to prevent the release of vehicle fluids (e.g., hydraulic oil, fuel, antifreeze).
17. In addition to the minimum BMPs, other applicable required BMPs include:
    - VEHICLE/EQUIPMENT MAINTENANCE and REPAIR
    - VEHICLE AND EQUIPMENT WASHING
    - BUILDING REPAIR, REMODELING and CONSTRUCTION

SITE-SPECIFIC BMP: BUILDING REPAIR, REMODELING, AND CONSTRUCTION

DESCRIPTION

Building repair, remodeling, and/or construction activity may vary from minor and normal building repair to major remodeling or the installation of a new facility on currently open space. These activities can generate pollutants that can reach storm water if proper care is not taken. The sources of these contaminants may be solvents, paints, paint, and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation.

TARGETED CONSTITUENTS

- Sediment
- Heavy Metals
- Toxic Materials
- Floatable Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all facilities at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent or reduce the discharge of pollutants to storm water from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, covering and/or diking storm drain catch basins, utilizing good housekeeping practices, using safer alternative products, and training employees.
2. Each job site should be managed in such a manner to avoid discharges of prohibited substances to the storm drain system.
3. Routine inspection of job site should be performed to ensure that construction, demolition, and excavation materials (liquid or solid) are not entering the storm drain system.
4. Keep the job site tidy and clean up debris regularly.
5. Storm drain catch basins should be covered to prevent pollutants and sediments from entering the storm drain system.
6. Special precautions should be employed if rain is forecast or if water is applied. These precautions should include, but are not limited to:
   - Increased monitoring frequency for storm drains and to rectify ongoing releases or to identify and prevent any possible release, and
   - Reduction in activities that can cause material to come into contact with rainwater.
7. Painting operations should follow:
   - Application of lead-based paint is prohibited,
   - Treat a paint spill as a chemical spill. The Spill and Leak Prevention and Response BMP provides additional information on responding to a spill.
   - Painting operations should be properly enclosed or covered to avoid drift,
   - Use temporary scaffolding to hang drop cloths or draperies to prevent drift. Use application equipment that minimizes overspray,
   - If painting requires scraping or sand blasting of the existing surface, use a ground cloth to collect the chips. Dispose of the residue properly,

- If the paint contains lead or tributyl tin, it requires classification as a hazardous waste. Contact EMD for proper disposal of paint (and materials used) classified as hazardous waste.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100% effective. Dried paint will erode from a surface and be washed away by storms, and
- Properly store or dispose leftover paints. Liquid chemicals must be stored inside of secondary containment.
- For water-based paints, paint out brushes to the extent possible, and rinse into a drain that goes to the sanitary sewer. Never pour paint down a storm drain.
- For oil-based paints, paint out brushes to the extent possible and clean with thinner or solvent in a proper container. Filter and reuse thinners and solvents. Dispose of excess liquids as hazardous waste.
- **Prior to the closeout of this project all waste and materials must be removed from site and returned to original condition or approved condition per the project Record of Environmental Considerations (REC). Closeout approval from EMD is contingent on receiving notification from the project including pictures of all outdoor work/staging areas submitted to EMD.**

8. In addition to the minimum BMPs, other applicable BMPs include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES
   - SOURCE REDUCTION
   - PROJECT CLOSEOUT REQUIREMENTS

SITE-SPECIFIC BMP: CONSTRUCTION, DEMOLITION AND EXCAVATION OPERATIONS THAT DISTURB GROUND SURFACES LESS THAN ONE ACRE

DESCRIPTION

Construction, demolition, and excavation projects generate a great deal of dust, debris, waste materials and wastewaters that when improperly managed can result in prohibited discharges to the storm drainage system. Various construction projects occur at ARC throughout the year. This BMP applies to construction, demolition, and excavation projects that disturb ground surfaces less than one acre. Projects that disturb ground surfaces equal to or greater than one acre must submit an NOI with the SWRCB and prepare a project specific SWPPP that meets the requirements of NPDES General Permit No. CAS000002: State Water Resources Control Board General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

TARGETED CONSTITUENTS

- Sediment
- Heavy Metals
- Toxic Materials
- Floatable Materials
- Oil and Grease
- Petroleum Products
- Contaminated Groundwater

APPLICABILITY

This BMP is applicable to all construction, demolition, and excavation activities at ARC that disturb ground surfaces less than one acre.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Provide a sign in sheet verifying SWPPP training within first two weeks of project. After the initial training, each construction project is required to provide sign in sheets quarterly and with annual updates. Contact the EMD for the latest version of the training program and to submit sign in sheets.
2. Each job site should be managed in such a manner to avoid discharges of prohibited substances to the storm drain system.
3. Routine inspection of the job site should be performed to ensure that construction, demolition, and excavation materials (liquid or solid) are not entering the storm drain system.
4. Cleaning equipment or tools over catch basins is prohibited.
5. Obtain Industrial Wastewater Sewer Discharge Training before discharging industrial wastewater.
6. Keep the job site tidy and clean up debris regularly.
7. Storm drain catch basins shall be covered to prevent pollutants and sediments from entering the storm drain system.
8. Special precautions should be employed if rain is forecast or if water is applied. These precautions should include, but are not limited to:
    - Increased monitoring frequency for storm drains and to rectify ongoing releases or to identify and prevent any possible release, and
    - Reduction in activities that can cause material to come into contact with rainwater.

9. Following all construction, demolition, and excavation activities, the job site should be swept to remove debris and residue. Catch basins should be vacuumed to remove sediment and debris, and any BMPs used to protect the storm drains must be removed at the end of the project.
10. Inspect and maintain BMPs used to protect storm drains, replace as needed.
11. Construction, demolition, and excavation materials (gravel, sand lumber, cement, chemicals, contaminated equipment, etc.) shall be stored under a roof or structure or covered with a tarp or plastic visqueen. Covered items should be secured with ropes, sandbags, bricks, etc. to prevent or minimize contact with rainwater. Place filtering media (e.g., straw bales, rocks, silt fences, etc.) around the base of each pile or at the storm drain inlet to remove these materials from rainwater run-off.
12. Do not locate stockpiles or store items near catch basins.
13. Wet concrete and concrete cutting waters should be conducted to prevent discharge to the storm drains. Blocking off or plugging drains in the vicinity may be warranted. This can be done in several ways: placing weighted plastic visqueen over drain, using sandbags or spill control PIGS, etc.
14. Equipment and machinery that contain residual concrete and concrete/asphalt cutting effluent shall not be discharged to the storm drain. Concrete/asphalt trucks are not permitted to be washed off on-site unless the wash water that will be generated is properly contained and disposed of off-site. For information on proper disposal of concrete/asphalt wash water, contact EMD.
15. Equipment and machinery that is stockpiled for later use shall be stored on pallets or other structure that prevents moisture from oxidizing the materials and covered to protect against exposure to rain. Covers should be replaced when the material begins to break down, to avoid mobilization into the storm drainage system.
16. Outdoor concrete work should be postponed if rain is forecast unless precautions are taken to prevent discharge of wet concrete and other construction debris to the storm drain.
17. During paint scraping operations, use impermeable ground cloths, such as plastic sheeting, to collect dust, paint chips, etc.
18. Use impermeable ground cloths while painting. Place in-use paint buckets in a pan or over plastic sheeting to ensure that accidental spills are not discharged to the storm drain.
19. Mixing of paint should take place indoors or in a place that is not exposed to the elements.
20. At the end of the workday, store paint buckets and other equipment away from contact with storm water in a secured, secondarily contained area.
21. Treat a paint spill as a chemical spill.
    - Capture the material before it flows to the storm drain.
    - Clean it up promptly and if the spill could enter or has entered a storm drain, call 911 immediately.
    - Report the event to EMD immediately.
    - The Spill and Leak Prevention and Response BMP provides additional information on responding to a spill.
22. Outdoor Sandblasting should comply with the following:
    - Tarpaulin or ground cloths should be placed beneath work area to capture the blasting medium and particles from the surface being cleaned,
    - Consider curtailing sandblasting on a windy day, or if rain is forecast, to minimize the amount of area that will require clean-up and to avoid sand waste from being washed into the storm drain, and
    - Vacuum work area when job is complete.
23. If sandblasting lead paint, comply with the following:
    - Obtain approval from EMD and the ARC Occupational Safety, Health, and Medical Management Office,
    - Follow measures outline in “Outdoor Sandblasting” listed above,
    - Air monitoring is required, and
    - Follow OSHA regulations for worker safety.
24. For broken lines, the operator shall immediately notify the NASA Emergency Response Team by calling 911, and initiate the following actions immediately:
    - Berm the area to prevent run-off to storm drain, and
    - Immediately block off adjacent storm drain catch basins.

25. Prior to the closeout of this project all waste and materials must be removed from site and returned to original condition or approved condition per the project Record of Environmental Considerations (REC). Closeout approval from EMD is contingent on receiving notification from the project including pictures of all outdoor work/staging areas submitted to EMD.
26. In addition to the minimum BMPs, other applicable BMPs include:
    - VEHICLE AND EQUIPMENT FUELING
    - PROJECT CLOSEOUT REQUIREMENTS
    - SOURCE REDUCTION
    - All applicable BMPs listed in Table 1 of the State of California Department of Transportation's Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide.

SITE-SPECIFIC BMP:
DEWATERING: GROUNDWATER

DESCRIPTION

Groundwater at ARC varies in quality and levels of contamination. In certain locations, the concentrations of these contaminants in the groundwater are above water quality criteria for the protection of aquatic life. The presence of contaminated groundwater at ARC is at a depth of 5 to 35-feet below ground surface and is therefore likely to be encountered during construction activities. These contaminants present a hazard that may disqualify it from discharge the storm drainage system. Therefore, this BMP was developed to keep ARC from having an Unauthorized NSWD.

TARGETED CONSTITUENTS

- Sediments
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This Best Management Practice is applicable to all locations at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Contact EMD to determine if the construction footprint is in a known area of contamination.
   - The EMD must be notified at least one week in advance of any planned dewatering activities,
2. All dewatering activities must be containerized and disposed of properly:
   - Notify the EMD for sampling parameters and approval for the proper disposal of water,
   - If water has been determined to be sewerable by the EMD, pump the water to a sanitary sewer manhole, and
   - If the water has been determined to be non-sewerable by the EMD, the water must be properly disposed of off-site.
3. In certain circumstances, the EMD may determine that the water can be discharged to vegetation. If the groundwater is proven to be free of contamination that would pose a hazard to aquatic life the following applies:
   - Before beginning dewatering activities, all storm drains in the vicinity must be protected to prevent the possibility of sediments entering any storm drain,
   - Groundwater will not be allowed to enter the storm distribution system,
   - Groundwater discharge must not pose a hazard to ground-dwelling wildlife.
   - Groundwater must be pumped to a vegetated area with enough capacity to contain the water being discharged,
   - The flow of water must be monitored, if the water flows outside of the vegetated area, dewatering activities must stop immediately, and any groundwater must be containerized and disposed of properly. Contact the EMD to discuss disposal options, and
   - After the dewatering or construction activities are complete, materials used to protect the storm drain shall be removed so that any future rainfall can enter the storm drain system as designed and permitted.
4. If possible, postpone dewatering activities if rain is forecast.
5. In addition to the minimum BMPs, other appropriate Best Management Practices include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES

SITE-SPECIFIC BMP:
DEWATERING: UTILITY VAULT

DESCRIPTION

Utility Vaults are located throughout NASA ARC with most placed below ground surface. Rainwater, surface water, and groundwater can potentially flow into these utility vaults. Although utility vault dewatering in general is an allowable discharge some circumstances exist at ARC that may disqualify the vault water from being allowed to enter the storm drainage system. The A1 aquifer lies at a depth of 5 to 35-feet below ground surface and the groundwater infiltrates into the utility vaults. Many utility vaults are in areas where the concentrations of contaminates in the groundwater are above water quality criteria for the protection of aquatic life. Therefore, this BMP was developed to keep ARC from having an Unauthorized NSWD.

TARGETED CONSTITUENTS

- Sediments
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This Best Management Practice is applicable to all locations where utility vaults exist throughout ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

6. Contact EMD to determine if the utility vault is in a known area of contamination.
    - The EMD must be notified at least one week in advance of any planned dewatering of utility vaults,
7. All dewatering activities **inside** of the delimited zone must be containerized and disposed of properly:
    - Before beginning dewatering activities, all storm drains in the vicinity must be protected to prevent the possibility of sediments entering any storm drain,
    - During dewatering of the utility vault, pump to a holding container,
    - After the dewatering activities are complete, materials used to protect the storm drain should be removed so that any future rainfall can enter the storm drain system as designed and permitted,
    - Notify the EMD for sampling parameters and approval for the proper disposal of water,
    - If water has been determined to be sewerable by the EMD, pump the water to a sanitary sewer manhole, and
    - If the water has been determined by the EMD to be non-sewerable, the water must be properly disposed of off-site.
8. The following steps are required at vaults **outside** of the delimited zones as determined by the EMD:
    - Water in the vault must be inspected for the presence of oil (sheen). If there is any evidence of the presence of oil the water must be containerized and disposed of properly following the procedures dewatering activities inside of the delimited zone listed above,
    - Before beginning dewatering activities, all storm drains in the vicinity must be protected to prevent the possibility of sediments entering any storm drain,
    - Vault water will not be allowed to enter the storm distribution system,
    - Water must be pumped to a vegetated area with enough capacity to contain the water being removed from the vault,

- The flow of water must be monitored, if the water flows outside of the vegetated area, dewatering activities must stop immediately, and any rainwater inside the vault must be containerized and disposed of properly, and
- After the dewatering activities are complete, materials used to protect the storm drain should be removed so that any future rainfall can enter the storm drain system as designed and permitted.

9. If possible, postpone dewatering activities if rain is forecast.
10. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES

SITE-SPECIFIC BMP: ELIMINATION OF NON-STORM WATER DISCHARGES

DESCRIPTION

The IGP generally **prohibits discharges of *anything but storm water* to the storm drainage system**. There are many ways in which non-storm water from industrial plants can enter the storm drainage system. In most cases, the discharge results from practices, which are now illegal, even though they may be inadvertent or may have been permissible in the past. Industrial process water, building wastewater and water from other sources are prohibited, with a few exceptions. Inspect your work area(s) to be sure no unauthorized discharges enter the storm drains.

Unauthorized discharges take two forms. **Illicit connections** are improper permanent connections that allow wastewater to enter the storm drains, including some that may have been allowed in the past. Connections that allow sanitary or process wastewater to enter the storm drain are prohibited, including all storm drain connections from indoor drains and sinks. **Illegal dumping** is water that has been exposed to industrial activities, and then released to the properly connected storm drainage system. Pollutants may be introduced to the storm drains inadvertently, by routine practices that discharge water outdoors, or by routinely discharging wastes, wash water and other materials to storm drains, catch basins and other conveyance facilities. A large part of this improper discharge results from employees' lack of understanding, coupled with a lack of readily available proper routes of discharge.

Authorized Non-Storm Water Discharges (NSWDs) to the storm water collection system may include fire-hydrant and fire prevention or response system flushing, some potable water sources, air conditioning and compressor condensate, irrigation drainage and landscape watering provided all pesticides, herbicides and fertilizers have been applied in accordance with the manufacturer's label, uncontaminated groundwater, and incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but not intentional discharges from the cooling tower.

All other discharges of water to the storm drainage system are strictly prohibited by the IGP and the State of California. Examples of non-storm water discharges at NASA ARC that are NOT permitted to discharge into the storm drainage system include: any water used directly in the manufacturing process (process water), cooling equipment condensate containing coolant, vehicle and equipment wash water, sanitary wastes, or other wastewaters.

TARGETED CONSTITUENTS

- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Provide well-marked proper disposal or collection methods for wastewater wherever you frequently use wash water, discharge cooling water, or produce a liquid waste that might otherwise reach the storm drain.
2. Employee training should especially emphasize proper disposal of non-storm water. Educate employees to understand that storm drains connect directly to streams and the bay without treatment.
3. Maintain label on storm drain inlets and catch basins stating, “No Dumping – Flows to Bay” to minimize inadvertent dumping of liquid wastes.
4. Periodically inspect and maintain storm drain inlets. Full inspection of storm water conveyance system shall occur every five years.
5. Vacuum catch basins and building laterals annually and properly dispose of wastewater.
6. Illicit connections to the storm drain system must be corrected as soon as possible. Upon discovery of an illicit connection, immediately notify the EMD. Report schedule for correcting illicit connections to the EMD. All illicit connections will be reported to the Regional Water Quality Control Board by the EMD.
7. Recommendations for Utilities Connected to the Storm Drain:
   - Plug all floor drains,
   - Remove obsolete sinks, equipment, etc., and
   - Reroute required connections to the sanitary sewer. Notify the EMD of any industrial discharge to the sanitary sewer.
8. Ensure employees are properly trained and keep in mind that in general, the IGP prohibits discharges of anything but clean storm water to the storm drains.
9. In addition to the minimum BMPs, other applicable BMPs include:
   - CONTROL DEVICES

SITE-SPECIFIC BMP: FIRE DEPARTMENT EQUIPMENT TESTING AND TRAINING

DESCRIPTION

The Fire Department is located at Moffett Federal Airfield Facility 580. Fire-fighting trucks and associated equipment are tested periodically for light water capability as part of MFFD's efforts to comply with Federal Aviation Administration (FAA) requirements. Water and Aqueous Film Forming Foam (AFFF) released during training and equipment testing exercises must be containerized and disposed of properly as outlined below.

TARGETED CONSTITUENTS

- Heavy Metals
- Oil and Grease
- Antifreeze
- Hydraulic Fuel
- Toxic/Hazardous Materials
- Floatable Materials
- Oxygen Demanding Substances
- Sediments

APPLICABILITY

This BMP is applicable to all areas associated with testing fire equipment and training activities at NASA ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prior to and following the testing or training exercise, the area should be swept to remove debris and residue.
2. All storm drains in the vicinity of the training exercise must be covered and blocked to prevent discharge of the water from fire suppression activities into the storm drain system.
3. For training exercises:
    - Avoid training and testing operations if rain is forecast.
    - During training and testing operations, contain the water (vacuum truck, visqueen plastic, and/or berms, etc.) and pump to a holding container.
    - Hazardous components should be removed before the training exercise is to commence.
    - Contact NASA ARC Safety, Health, and Medical Services Office (Code QH) to determine if structure has any hazardous components (i.e., PCBs, lead, and/or asbestos).
        - If structure has any hazardous components, the water must be contained, sampled, and analyzed for its hazardous components to evaluate the appropriate disposal method.
        - Notify the EMD, in advance, to evaluate sampling requirements for purposes of determining the proper disposal method.
        - Samples collected will be analyzed by EMD to determine the appropriate disposal methods, and
            - If water has been determined to be sewerable by the EMD, pump the water to a sanitary sewer manhole, and
            - If the water has been determined to be non-sewerable by the EMD, contact the EMD to dispose of off-site.

- If the training water has been inspected and determined by the EMD to be clean, training water may be discharged to vegetation where feasible. If discharge of the training water to vegetation is not feasible, contact the EMD to determine if the water is sewerable.

4. Immediately report to ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
   - Contaminated training water could enter or has entered a storm drain or storm ditch.
   - Contaminated training water has or could directly contaminate the environment (dirt) or property.
   - Any AFFF is unrecoverable or reaches the environment.
5. Occupants of buildings downwind of a training burn must be notified in advance since the smoke may pose a risk. Prevailing winds at ARC are from the north.
6. In addition to the minimum BMPs, other appropriate BMPs include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES
   - OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE

SITE-SPECIFIC BMP: FIRE-FIGHTING ACTIVITIES

DESCRIPTION

The Fire Department is located at Moffett Federal Airfield Facility 580. Fire-fighting activities at NASA Ames expose the storm water distribution system to harmful pollutants and temperatures. Efforts to block nearby storm drains during fire-fighting activities will reduce ARC's impact on the sensitive wetland habitats nearby, including the onsite marshes, storm water retention pond, and the San Francisco Bay.

TARGETED CONSTITUENTS

- Heavy Metals
- Oil and Grease
- Antifreeze
- Hydraulic Fuel
- Toxic/Hazardous Materials
- Floatable Materials
- Oxygen Demanding Substances
- Sediments

APPLICABILITY

This BMP is applicable to all fire-fighting activities at NASA ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

7. For firefighting activities (if safe to do so):
    - Protect nearby storm drains.
    - Contact NASA Safety, Health, and Medical Services Office (Code QH) to determine if structure has any hazardous components, i.e., PCBs, lead, and/or asbestos.
        - If structure has any hazardous components, the water must be contained, sampled, and analyzed for its hazardous components to evaluate the appropriate disposal method.
        - Notify the EMD, to evaluate sampling requirements for purposes of determining the proper disposal method.
        - Samples collected will be analyzed to determine the appropriate disposal methods, and
            - If water has been determined to be sewerable by the EMD, pump the water to a sanitary sewer manhole, and
            - If the water has been determined to be non-sewerable, contact the EMD to dispose of off-site.
8. Following fire-fighting activities, AFFF should be collected, containerized and the area should be swept to remove debris and residue.
9. Immediately report to ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
    - Contaminated water and AFFF could enter or has entered a storm drain or storm ditch.
    - Contaminated water and AFFF water could contaminate or has directly contaminated the environment (dirt) or property.
    - Any AFFF is unrecoverable or reaches the environment.
10. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES
    - OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE

SITE-SPECIFIC BMP: FLEET PARKING

DESCRIPTION

Storm water can accumulate pollutants by exposure to numerous small leaks, spills, and other discharges of parked vehicles. A designated area should be proposed for the parking of fleet vehicles. Designated parking must be at a paved and (preferably) covered facility.

TARGETED CONSTITUENTS

- Oil and Grease
- Heavy Metals
- Antifreeze
- Petroleum Products

APPLICABILITY

This Best Management Practice (BMP) is applicable to all fleet parking at NASA ARC, including, but not limited to: N251, N255, N267, B146, B544, and B684.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Inspect vehicles and equipment in the yard for fluid leaks regularly:
   - Follow the Quality Assurance and Recordkeeping BMP for inspection schedules and documentation requirements.
2. Keep the equipment yard clean and clear of debris using dry sweeping methods. Do not hose off the area or wash with water:
   - Run-off from washing and rinsing activities is not an allowable discharge to the storm drain.
   - Refer to the Washing of Exterior Building Surfaces and Fixed Outdoor Equipment BMP for additional information.
3. Develop a routine for taking actions on the report, cleaning up the spill, and repairing the leak to prevent future spills.
   - Refer to the Spill and Leak Prevention and Response BMP for additional information.
   - If absorbent material is used on a spill, sweep, and dispose of material in a timely manner.
4. Place equipment on an impermeable surface or install a drip pan beneath potential leak points.
5. Maintain the yard's storm catch basin inlet.
   - Clean the catch basin on a regular schedule, at least annually.
   - Pay attention to the kinds of potential pollutants that accumulate so that you can identify the source and take action to control the sources.
6. Construct a simple roof to minimize the amount of rainwater that contacts the equipment and install a berm to prevent run-on and run-off.
7. In addition to the minimum BMPs, other appropriate Best Management Practices include:
   - SOURCE REDUCTION

SITE-SPECIFIC BMP: FUEL TANK VEHICLES

DESCRIPTION

Releases from tank trucks during aircraft fueling, from the transfer of fuels to or from tank trucks, and from leaking equipment can be a significant source of pollution. Fuels carry contaminates of particular concern to human health and wildlife, such as heavy metals, toxic materials, and oil and grease, which are not easily removed by storm water BMPs. Consequently, control at the source is particularly important. Adequate control can be achieved through secondary containment of tank vehicles and proper spill control and cleanup procedures.

TARGETED CONSTITUENTS

- Hydraulic Fuel
- Oil and Grease
- Petroleum Products
- Antifreeze

APPLICABILITY

- NASA Fueling Pits
- Moffett Federal Airfield Fueling Pits
- Bldg. 141 - Tank Truck Filling Rack
- Bldg. 158 – Moffett Air Operations Facility

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent fuel spills and leaks, and reduce their impacts to storm water.
2. Do not park tank vehicles on unpaved surfaces.
3. Train employees in standard operating procedures and small spill cleanup techniques, as outlined in the Employee Training Program BMP.
    - It is the responsibility of managers and supervisors at ARC to be familiar with the Employee Training Program BMP, and to ensure employee training in these areas:
        - Safe handling of hazardous materials in the employee's workplace including spill response, segregation, and secondary containment,
        - Proper storage of industrial materials,
        - Proper disposal of hazardous waste including sewer discharge prohibitions, pickup procedures,
        - Spill Prevention Control and Countermeasures (when storing/transferring oil products),
        - Storm Water Pollution Prevention (when performing work outdoors), and
        - Emergency Response and First Responder Training.
4. Spill kits must be readily available for use by trained personnel.
5. Bulk storage containers onboard a vehicle or being towed that are designed for or used solely to store and transport fuel for transfer into or from an aircraft, motor vehicle, ground service equipment, or other oil storage containers must have a secondary containment system for the tank vehicle.
    - The secondary containment must be large enough to hold the entire capacity of the largest single container and to additionally accommodate the volume of a 24-hour rainfall as determined by a 100-year storm history. National Oceanic and Atmospheric Administration (NOAA) estimates this to be 4 inches using reported data from the Moffett Field weather station.
    - Containment systems such as tank truck parking "pads" may be purchased.
6. AvPorts Receiving Fuel Deliveries & Truck to Truck Transfers of Jet A Fuel

- This BMP provides detailed instructions on receiving a fuel delivery of Jet A and "topping off" other Jet A Refueling Trucks via truck-to-truck transfer.
  - The Fuel Farm is the designated paved area located on the southwest portion of the airfield's west ramp. A dirt field occupies the area to the south, and a storm drain is located to the east. Surface flow is directed towards the east.
- Capacity:
  - The refueler fleet consists of six trucks with a combined capacity of 40,000-gals of Jet A fuel. Four trucks with a capacity of 5,000-gals each are referred to as the 5K's and two trucks with a capacity of 10,000-gals each are referred to as the 10K's. **The 10K's are the ONLY trucks allowed to receive a fuel delivery!**
- Safety & Spill Equipment:
  - Verify that the Safe Drain valve is in the closed position,
  - Drain cover over storm drain with a backup cover located in Emergency Spill Cart,
  - Emergency Spill Cart stocked with enough supplies and equipment to contain and clean up a 300-gal fuel spill,
    - Air Powered Fuel Vacuum connected to 55-gal steel drum.
  - Refuelers contain their own spill kit that can contain and clean up a 100-gal fuel spill.
  - Airport vehicles 1, 2, and 3 also contain their own 100-gal spill kits.
  - Additional 55-gal drums, spill mats, absorbent, etc. located in the Haz-Mat Building and Conex Box 1 & 3,
    - Spill Supplies inspected monthly.
    - Hazmat Building has secondary containment.
  - Spill Containment Equipment,
    - 25-gal mixing tubs, drip pans, 5-gal buckets, 2-gal pails.
    - Fuel Delivery Transfer Hose.
  - PPE-safety shoes, appropriate clothing, chemical gloves, safety eyewear.
  - First Aid-each refueler and vehicle contain a first aid kit and portable eyewash bottles.
  - Five 150 lb. halon fire extinguishers located between each refueler with additional located along the ramp.
    - Each Refueler has two 20 lb. PK fire extinguishers on board and readily available.
    - Each vehicle has a 10 lb. ABC fire extinguisher on board and readily available.
- Standards, Staff Training, and Refueler PM, QC, & Testing:
  - FAA AC 150/5230-4B, ATA Spec 103, NFPA 407, NATA, PV-MFA SPCC.
  - Biannual NATA Safety 1st Professional Line Service & Line Fuel Service Certification,
    - Fueling Procedures, Fuel QC, Fueling Safety, Fuel Spill control, Fire Safety.
  - Annual fire Extinguisher training and certification.
  - Annual Hazmat Communication-compliance, documentation & reporting, storage, cleanup & prevention.
  - Airfield Maintenance Personnel are responsible for all fuel transfers, QC, Maintenance, Compliance, and Training.
  - Refuelers Inspected, PM, QC, and stocked on a daily, weekly, monthly, and annual basis.
- Failure to confirm 10K balance could lead to a catastrophic event resulting in Termination!
  - Jet A refueling trucks 5551 & 1682 are referred to as the 10K's and are the ONLY trucks allowed to receive a fuel load! Each 10K's capacity is approximately 9,800-gals and a fuel delivery approximately 8,000-gals. Thus, the minimum balance in a 10K needs to be less than 1,600-gals before you call in a load.
- Ordering Fuel:
  - Confirm the balance in the 10K,
    - Refer to your Record of Receipt and Delivery of Fuel to verify 10K balance.
    - Or as an option, use the Dipstick and Strapping Chart to verify the balance.
  - Call the fuel provider,
    - Request 8K-gals of Jet A, call back to confirm date and time of delivery.
    - ONLY pumper trucks will be used to conduct a delivery to a 10K.
- Pre-delivery **Follow the Product Receiving Record:

- Prepare the 10K,
  - Daily morning sump-QC Inspections.
  - Run truck to ensure system air pressure reaches a minimum of 80 PSI.
  - It's ok to use battery only to receive fuel if air pressure is above 80 PSI.
  - If air pressure is below 80 PSI run the engine while receiving fuel.
- Confirm spill kits are stocked and readily available.
- Confirm drain covered.
- Confirm and have PPE available (or worn), Fire Extinguishers, First Aid Kits, etc.
- Have drip pans, tubs, buckets, and pails ready.
- Inspect AvPorts Transfer Hose and have ready,
  - Hose engineered for truck-to-truck transfer (10 yr. hose-production date stamped on hose).
  - Directs fuel from delivery trucks PTO pump to 10K bottom load.
- QC testing equipment ready-Hydrometer, Specific Gravity (API) Wheel, Graduated Cylinder, Eagle Eye Tester.

- Delivery **Follow the Product Receiving Record:
  - Confirm that the battery is on and 10K has 80 PSI minimum of system air pressure and if not, run truck for transfer.
  - Escort driver to the farm and assist with positioning his pumper truck next to the 10K.
  - Bond the trucks, Ask the delivery driver where to bond on his truck- "1st thing ON & Last Thing OFF".
  - Chock tires on both trucks.
  - Place tubs, drip pans, buckets, etc. at each hose connection.
  - Conduct Safety Review with driver and review truck-to-truck transfer and Bottom Load Pre-Check.
  - Review Bill of Lading (BOL), confirm and note Jet A, specific gravity API, temp F, and net gals,
    - Confirm placards and signage on delivery tanker (1863 DOT Placard, Jet Fuel Signage).
    - ASTM 1655 Standard & Specs Jet A (39-51 API standard w/average API).
  - QC Tests-White Bucket & API,
    - Driver uses the white 2-gal porcelain pail to take a sample from each compartment on his truck.
    - Place the pail in tub to minimize spills while conducting QC tests.
    - Visual Color test-clear to straw color (clear to beer in color).
    - Visual Free Water test-undissolved water detectability-Water Codes A, B, C, D.
    - Visual Particulate test-inspect vortex for particulates-Solids Codes 1, 2, 3, 4.
    - API test-Eagle Eye Tester, Hydrometer, API Wheel, Graduated Cylinder-reading within +/-1 compared to BOL.
    - Optional Dissolved Water & Clear/Bright Tests-Monthly QC tests using the Velcon Hydrokit (Mason Jar Test).
    - Sample passes all tests-accept load and dispose of remaining sample to Reclaim Trailer.
    - If Sample does not pass-reject load and dispose of sample in Hazmat Building container.
  - Inspect Delivery Truck's Supply Hose,
    - Look for debris and abnormal wear.
    - Supply hose connects to trucks PTO pump.
  - Confirm all valves closed and connect hoses,
    - Driver connects supply hose.
    - Connect AvPorts transfer hose to 10K bottom load.
    - Delivery Driver connects the other end to their PTO pump.
  - Open Valves,
    - AvPorts personnel will OPEN 10K bottom load valve first.
    - Delivery driver will then OPEN their truck's valves.
  - Engage PTO Pump and start transferring fuel,
    - Driver will slowly engage his pump to start transferring fuel.
    - If no issues, conduct bottom load Pre-Check.

- Bottom Load Pre-Check (Safety Reviewed With Driver H.6.). Driver must be prepared to immediately place pump into neutral, stopping the transfer of fuel. Failure to engage neutral could lead to excess hose pressure causing hose connection failure resulting in a catastrophic event!
    - Move Pre-Check valve to the closed position and fuel transfer will slowly stop (30 sec. &/or 80 PSI).
    - Open valve to continue fuel transfer.
    - Record readings.
- Fuel Transfer takes about 45 min to 1 hr.,
    - The driver may have to switch between compartments allowing air to be pumped into the tank causing a loud sound, this is normal, and you can continue the transfer.
- Transfer is complete when the pumper truck starts pumping air into the 10K,
    - Driver removes any residual fuel from both hoses and directs personnel to close the bottom load valve.
    - Driver places PTO pump in neutral and closes his transfer valve.
    - Hoses are disconnected and put away.
    - Remove bonding wire and chocks- "1st thing ON & Last Thing OFF".
    - Clean and return all tubs and buckets.
    - Dispose of used rags to Hazmat Building.
    - Secure the 10K.

- Post Delivery **Follow the Product Receiving Record:
    - Review and double check your paperwork before the driver leaves.
    - Ensure you have both signed copies of the BOL and Certificate of Analysis.
    - Update the Record of Receipt and Delivery of Fuel to reflect the new balance.
    - Ensure everything is cleaned up and put away on both trucks before the driver pulls away.
    - Ensure driver leaves safely out the gate and gate secures behind them.
    - Input delivery into TOTAL FBO (Refer to TFBO Fuel Delivery SOP).
- Refueler Truck to Refueler Truck Transfer:
    - Confirm the Balance in the Refueler needing a "Top Off".
        - Refer to your Record of Receipt and Delivery of Fuel to verify balance.
        - Optional- "Dipstick" the Refueler tank and use the Strapping Chart to verify the balance.
    - Prepare the Trucks for Transfer,
        - Daily morning sump-QC Inspections.
        - Run truck to ensure system air pressure reaches a minimum of 80 PSI.
        - It is ok to use battery only to receive fuel if air pressure is above 80 PSI.
        - If air pressure is below 80 PSI run the engine while receiving fuel.
        - Confirm spill kits are stocked and readily available.
        - Confirm drain is covered.
        - Confirm and have available/wearing PPE, Fire Extinguishers, First Aid Kits, etc.
        - Have drip pans, tubs, buckets, and pails ready.
        - Position trucks for transfer.
    - Transfer,
        - Have both trucks running and ensure 80 PSI minimum of system air pressure.
        - Bond and Chock the trucks- "111st Thing ON & Last Thing OFF".
        - Place tubs, drip pans, buckets, etc. at each hose connection.
        - Confirm all valves closed then connect hose.
        - Use single point hose from the transferring refueler to connect the bottom load of the receiving refueler.
        - Note meter start numbers on Record of Receipt and Delivery of Fuel for both refueler.
        - Open Valves.
        - Engage PTO Pump and start transferring fuel by activating the "Deadman Controller".
        - Perform Bottom Load Pre-Check on the receiving refueler and record.
        - Record differential pressure, nozzle pressure, and flow rate from the transfer refueler.
        - Transfer fuel until transferring refueler stops pumping.
        - Disconnect hose and return to transfer truck.

    - Remove bonding wire and chocks- "1st Thing ON & Last Thing OFF".
  - Post Transfer,
    - Record stop meter numbers from each refueler and input on their respective Record of Receipt and Delivery of Fuel to reflect the new balance.
    - Ensure everything is cleaned up and put away on both trucks.
    - Secure the trucks.
    - Clean and return all tubs and buckets.
    - Dispose of used rags to Hazmat Building.
    - Input transfers into TOTAL FBO (Refer to RFBO SOP).
- Fuel Spills/Leaks: preventative measures, response, and reporting (Refer to HR Employee Training Records, Section C, and PV-MFA SPCC):
  - Preventative measures-Safety & Spill Equipment and Training,
    - Drain cover over storm drain 24/7 except during rain-back up cover located in Emergency Spill Cart.
    - Emergency Spill Cart stocked with enough supplies and equipment to contain and clean up a 300-gal fuel spill.
    - Air Powered Fuel Vacuum connected to 55-gal steel drum.
    - Refueling Trucks contain their own spill kit that can contain and clean up a 100-gal fuel spill.
    - Airport vehicles 1, 2, and 3 also contain their own 100-gal spill kits.
    - Additional 55-gal drums, spill mats, absorbent, etc. located in the Haz-Mat building and Conex Box 1 & 3.
    - 25-gal mixing tubs, drip pans, 5-gal buckets, 2-gal pails.
    - First Aid-each refueler and vehicle contain a first aid kit and portable eyewash bottles.
    - Five 150 lb. halon fire extinguishers located between each refueler with additional located along the ramp.
    - Each refueler has two 20 lb. PK fire extinguishers on board and readily available.
    - Each vehicle has a 10 lb. ABC fire extinguisher on board and readily available.
    - Refuelers Inspected, PM, QC, and stocked daily, weekly, monthly, and annually.
    - Hazmat Building-secondary containment.
    - Bi-Annual NATA Safety 1st Professional Line Service & Line Fuel Service Certification.
    - Training Fueling Procedures, Fuel QC, Fueling Safety, Fuel Spill Control, Fire Safety.
    - Annual Fire Extinguisher training and certification.
    - Annual Hazmat Communication-compliance, documentation & reporting, storage, cleanup & prevention.
    - Airfield Maintenance Personnel are responsible for all fuel transfers, QC, Maintenance, Compliance, & Training.
  - Response to a spill,
    - Immediately STOP fueling operation: release "dead-man control", close all valves, and activate emergency shutoff.
    - Generously and quickly apply spill kit materials to contain and prevent flow to storm drain and environment.
    - NO call for help if spill/leak can be contained, controlled, and cleaned up by two people in under 30 min.
    - Immediately call for help if cannot contain, control, or clean up and/or enters storm drain or environment,
      - NASA Dispatch 650-604-5555
      - Moffett Air Traffic Control 650-603-9868 or VHF 119.55 or UHF Ch. 1
      - AvPorts Airfield Operations 650-386-0677 or UHF Ch. 2 or 3
      - Command Consulting Group 650-386-0700 or UHF Ch. 4 or 5
      - Clean Harbors Emergency Spill Response & Recovery 800-645-8265
    - Soiled spill kit materials will be cleaned up/swept up and then transferred to drums with lids secured.
    - Drums will be stored in the Haz-Mat Building.
    - Immediately place Hazmat labels on drums-include start date, contact and address, description of contents.

    - Contact Environmental Vendor, Clean Harbors to schedule pickup.
  - Reporting (Refer to Spill Log SOP and PV-MFA SPCC).
    - All spills/leaks will be recorded in the Spill Report Log.
    - Reportable Spills/Leaks and Incident Reporting are those requiring an Immediate call for help if cannot contain control or clean up and/or enters storm drain or environment.
    - Retain Reports and Records for SPCC, SWPPP, EPA, and other Agency compliance and notifications.
7. Perform regular inspections as described in the Quality Assurance and Record Keeping BMP.
8. Call NASA Ames Research Center (ARC) Dispatch at 911 or 650-604-5555 immediately for hazardous materials spills that:
   - Cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene,
   - Could enter a storm drain or storm ditch,
   - Presents a health hazard,
   - Presents a fire hazard, or,
   - May directly contaminate the environment (spill to ground or water) or property.
9. For non-hazardous spills, take steps to contain and clean up the liquid, and minimize the wash water used in cleanup.
   - Shut off or plug storm drain inlets or sewer inlets where the spill may enter, do not allow any wash water to enter these inlets.
   - For all other hazardous materials spills contact EMD**.**
10. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - AIRCRAFT FUELING
    - VEHICLE AND EQUIPMENT FUELING

SITE-SPECIFIC BMP: GOLF COURSE MAINTENANCE

DESCRIPTION
Planetary Ventures maintains the golf course and performs maintenance on golf course vehicles and equipment. The golf course maintenance yard is located at Facility 359.

TARGETED CONSTITUENTS
- Heavy metals
- Oil and grease
- Nutrients
- Hydraulic fluid
- Fuel products
- Pesticides
- Herbicides
- Sediment

APPLICABILITY
This BMP is applicable to the golf course at NASA ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
1. Prevent or reduce the discharge of pollutants to storm water from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the storm water collection system.
2. Protect storm drains within the maintenance facility to eliminate non-storm water discharges during maintenance activities.
3. Pesticide applicators must be licensed with the California Department of Pesticide Regulation and county agricultural commissioners.
4. No person shall:
   - Pollute water supplies or waterways while loading, mixing, or applying pesticides at ARC.
   - Transport, handle, store, load, apply, or dispose of any pesticide, container, or apparatus in such a manner as to pollute water supplies or waterways, or cause damage or injury to land humans, plants, or animals.
5. Pesticides/fertilizers should not be applied during the wet season as they may be carried from the site by the next storm.
6. Avoid over-watering not only to conserve water but also to avoid the discharge of water, which may have become contaminated with nutrients and pesticides.
7. Store pesticides and application equipment in a responsible manner and properly dispose of the used containers.
8. Use integrated pest management where appropriate.
9. Wash water, sweepings, and sediments shall be properly disposed of.
10. Maintain equipment regularly to prevent the release of vehicle fluids (e.g., hydraulic oil, fuel, antifreeze).
11. Follow Vehicle and Equipment Fueling BMP for fueling and defueling storage tanks and equipment.
12. In addition to the minimum BMPs, other applicable Best Management Practices include:
    - VEHICLE/EQUIPMENT MAINTENANCE and REPAIR
    - VEHICLE AND EQUIPMENT WASHING
    - VEHICLE AND EQUIPMENT FUELING

- BUILDING AND GROUNDS MAINTENANCE

SITE-SPECIFIC BMP: OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE

DESCRIPTION

Outdoor equipment includes rooftop cooling towers or air conditioners, rooftop air vents for industrial equipment, outdoor air compressors and other service equipment. Indoor wet processes where leaks or discharges may discharge to outdoor areas, and material transfer areas, such as loading areas where forklifts or trucks may carry pollutants outdoors on their tires. Ordinary precautions, such as those below, may suffice for smaller equipment.

TARGETED CONSTITUENTS

- Oil and Grease
- Heavy Metals
- Antifreeze

APPLICABILITY

This BMP is applicable to all areas with outside process equipment at NASA ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Inspect equipment on a regular basis for leaks malfunctions, and staining on and around the equipment, and other evidence of leaks and discharges.
2. The person inspecting the equipment is responsible for promptly reporting a spill, or equipment maintenance issues.
3. Develop a routine for taking actions on the report, reporting maintenance issues before they lead to a spill, cleaning up the spill (if safe to do so), and repairing the leak to prevent future spills.
4. If absorbent material is used on a spill, dispose of the material in a timely manner.
    - Refer to the Material Handling and Waste Management BMP for guidance on proper disposal of spill control/cleanup materials.
5. Place equipment on an impermeable surface or install a drip pan beneath potential leak points.
6. Construct a simple roof to minimize the amount of rainwater that contacts the equipment and install a berm to prevent run-on and run-off.
7. Air compressors and other equipment produce small quantities of automatic blow-down water, which commonly contains lubricating oil or other potential pollutants. Blow-down water may not be discharged to any outside areas or to the storm drain system. Blow-down water must be discharged to the sanitary sewer. Contact EMD for guidance on the proper disposal of industrial wastewater.
8. Electrical Equipment should be managed to:
    - Take care in tapping oil-containing equipment,
    - Avoid drips and leaks whenever possible,
    - Place a drip pan or under electrical equipment prior to tapping. An absorbent pad with the impervious lining side down may be used instead of a drip pan if it is sufficient to capture any potential leaks.
    - Properly dispose of oil-contaminated materials.
        - Oil-contaminated materials must be bagged, labeled, and disposed of properly.
        - Any PCB contaminated absorbent materials must be bagged, labeled, and disposed of in accordance with 40 CFR 761, and
    - For all PCB containing electrical equipment, follow ARC for PCB Management. If you have any questions regarding the PCB Program, call ARC Environmental Management Department at 650-604-0927.

9. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES
    - CONTROL DEVICES
    - SOURCE REDUCTION

SITE-SPECIFIC BMP:
PROJECT CLOSEOUT REQUIREMENTS

DESCRIPTION
Construction, demolition, and excavation projects generate waste materials and when improperly managed can result in prohibited discharges to the storm drainage system. Debris and storm water BMPs left on site after the project is complete will deteriorate over time and contribute to storm water pollution runoff. Various construction and maintenance projects occur at ARC throughout the year, this BMP applies to all construction, repair, remodeling, demolition, and excavation projects at ARC.

TARGETED CONSTITUENTS
- Sediments
- Nutrients
- Floatable Materials
- Oxygen Demanding Substances
- Heavy Metals
- Toxic Materials
- Oil and Grease

APPLICABILITY
This BMP is applicable to all construction, repair, remodeling, demolition, and excavation activities at NASA ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
1. Final inspection of the job site should be performed to ensure that construction, demolition, and excavation materials (liquid or solid), and storm water BMPs have been removed from site. Areas to inspect include but are not limited to:
   - Storm water discharge locations,
   - Drainage areas,
   - Conveyance systems,
   - Waste handling/disposal areas, and
   - Perimeter areas impacted by off-facility materials or storm water run-on to determine housekeeping needs.
   - Storage and laydown areas
2. Any identified debris, waste, spills, tracked materials, or leaked materials shall be cleaned and disposed of properly prior to departure from site.
3. Chemical substances, including hazardous materials and pollutants stored on-site for the duration of the project must be removed from site or disposed of properly.
4. Following all construction, demolition, and excavation activities, the job site should be swept to remove debris and residue. Catch basins should be vacuumed to remove sediment and debris, and any BMPs used to protect the storm drains must be removed at the end of the project.
5. Demobilization activities should be managed in such a manner to avoid discharges of prohibited substances to the storm drain system.
6. Do not dump waste paints, concrete washouts, or other waste liquids down the storm drain. Nothing but clean rainwater may enter the storm drainage system.
7. Cleaning equipment or tools over catch basins or onto the ground is prohibited.
8. Keep the job site tidy and clean up debris regularly.
9. Materials or equipment cannot be left at the project site or at other areas of Ames after project completion without EMD approval.

10. In addition to the minimum BMPs, other applicable BMPs include:
    - GOOD HOUSEKEEPING
    - VEHICLE AND EQUIPMENT FUELING
    - SOURCE REDUCTION
    - All applicable BMPs listed in Table 1 of the State of California Department of Transportation's Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide.

SITE-SPECIFIC BMP: SOURCE REDUCTION

DESCRIPTION

Reducing pollutants at the source is one of the most direct ways of reducing storm water pollution. Source control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction. Source reduction can be achieved through source control, inventory control, material substitutions, and a Hazardous Waste Source Reduction Plan.

TARGETED CONSTITUENTS

- Nutrients
- Toxic Materials
- Oil and Grease

APPLICABILITY

This BMP is applicable to all industrial activities at NASA ARC.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Source control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. At a minimum, they include:
   - Good housekeeping,
   - Preventative maintenance,
   - Spill and leak prevention and response,
   - Material handling and waste management,
   - Erosion and sediment controls, and
   - Employee Training Program.
2. Inventory control and procurement of hazardous materials at ARC is managed by the EMD. Considerations given to hazardous materials procurement include materials substitution and “just-in-time” ordering.
   - Material substitution is recommended by the Hazardous Materials/Hazardous Waste Specialist.
3. The Hazardous Materials/Hazardous Waste Specialist reviews hazardous materials procurement to ensure that a less hazardous or a non-hazardous material is used in place of hazardous material whenever possible.
   - Order chemicals occurs as they are needed.
   - Choose cleaning agents that can be recycled.
   - Avoid bulk orders to reduce the amount of hazardous materials and waste present on the facility.
4. Many solvent cleaners are harmful and must be disposed of as hazardous waste.
   - Clean without using liquid cleaners (e.g., wire brush) whenever possible reduces waste.
   - Perform all liquid cleaning at a centralized station so the solvents and residues stay in one area, reducing or eliminating the chance of spills to the floor.
5. Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for re-use.
6. If possible, eliminate or reduce the amount of hazardous materials and waste by substituting with non-hazardous or less hazardous materials.
   - Use non-caustic detergents instead of caustic cleaning agents for parts cleaning.
   - Use non-caustic detergents and cleaning systems instead of caustic or organic solvent degreasers and cleaning systems,

- Replace chlorinated organic solvents (1, 1, 1-trichloroethane, methylene chloride, etc.) with non-chlorinated solvents:
    - Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly.
    - Check the list of active ingredients to see whether it contains chlorinated solvents.
    - The "chlor" term indicates that the solvent is chlorinated.

7. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES

SITE-SPECIFIC BMP:
SMALL MOTOR OIL SPILL RESPONSE PROCEDURES

DESCRIPTION
This BMP applies to small spills (less than one gallon) of motor oil only. Spills of all other materials must be performed by trained personnel.

Motor oil spills and leaks in parking lots can pose a hazard to human health and the environment when rain or landscape irrigation water washes small spills from the pavement into the storm water drainage system. Motor oils carry contaminants of particular concern to human and wildlife, such as heavy metals and oil and grease, which are not easily removed by storm water treatment devices. Swift deployment of appropriate cleanup procedures can prevent motor oil from entering the environment.

TARGETED CONSTITUENTS
- Oil and Grease
- Heavy Metals

APPLICABILITY
This BMP is applicable to all areas at ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
1. Training
   - Cleanup activities must be performed by personnel who are familiar with the hazards of motor oil (refer to product Safety Data Sheet for specific information),
   - Personnel must be current in the use of Personal Protective Equipment (PPE), and
   - Impacted personnel must check to determine if their employer has any additional training requirements before undertaking any cleanup activities.
2. Equipment
   - Clean Up Equipment/Materials
     - Dry Absorbent Material (non-clumping kitty litter, vermiculite, absorbent pads, rags, or other commercially available product designed to absorb motor oil)
     - **DO NOT USE WET PRODUCTS TO CLEAN MOTOR OIL SPILLS**
     - Stiff-bristled broom
     - Dustpan or scoop
     - Heavy-duty waste bag or bucket with sealable lid
     - Appropriate hazardous waste labels
   - PPE
     - Personnel performing cleanup activities must check with their health and safety representative for a list of appropriate PPE.
     - PPE items to consider include disposable nitrile gloves, disposable shoe covers to avoid contaminant tracking, disposable coveralls, and safety glasses.
     - Respiratory protection must be evaluated by a health and safety representative.
3. Spill Cleanup
   - General considerations
     - Delineate spill area to isolate from unauthorized personnel and to avoid spreading the contamination.
     - Placing berm of absorbent material around the spill will reduce the possibility of spreading contamination.

  - Protect all storm drains in the area. **Nothing but clean storm water may enter a storm drain**.
  - Minimize contact with the spill and clean up materials.
  - If possible, perform cleanup activities when wind is calm to avoid spreading contamination through wind dispersal.
- Cleanup Procedures
  - If gross contamination is present (pooled, mobile oil), use absorbent pads or rags to absorb easily removed product.
  - Liberally apply absorbent to the spill.
  - Work absorbent into the oil using a stiff-bristled broom being careful not to generate dust.
  - Leave in place for several hours or-if possible-overnight to allow time for the oil to be absorbed.
  - Sweep up absorbent and containerize for proper disposal.
  - Repeat if necessary, allowing the absorbent to work for 24 to 48 hours.
  - If a thin film of oil remains after absorbents are used, a light dusting of Portland cement may be useful. Follow above procedures for application.
- Waste Collection/Disposal
  - Place absorbent material in a suitable container such as a thick plastic trash bag (double lined for strength), bucket with locking lid, or recovery drums.
  - Do not overload the capacity of any container used to store contaminated absorbents.
  - Container must be securely sealed and clearly marked to indicate its contents.
  - Markings must comply with appropriate waste disposal regulations according to the proper disposal method as determined by the EMD or tenant's waste disposal team.
  - Contaminated PPE and other disposable equipment must be placed in a separate container with the contents clearly identified on the label/markings.
  - Waste storage/disposal must comply with applicable laws/regulations. Check with the appropriate waste disposal team for further guidance (EMD or tenant-specific environmental management team).

4. In addition to the minimum BMPs, other applicable BMPs include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES
   - SOURCE REDUCTION

SITE-SPECIFIC BMP:
TRANSPORTATION CONTROL MEASURES

DESCRIPTION
NASA ARC has developed a Commute Alternatives Program, which offers employees a variety of commute alternatives including bicycle commuting, carpooling, shuttle services, and subsidies for using mass transit. Implementation of Transportation Control Measures (TCMs) aims to reduce pollutant loading from urban transportation to storm water, as well as reduce air pollution and traffic congestion.

TARGETED CONSTITUENTS
- Oil and Grease
- Petroleum Products
- Antifreeze

APPLICABILITY
This BMP is applicable to all areas at ARC.

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
5. Bicycling:
   - The ARC Bicycle Program is outlined in APD 6711.1.
   - The ARC bicycle advisory committee works to make bicycle commuting to and around ARC safer and easier.
   - Bicycle storage lockers and racks are available for use throughout ARC.
   - A fleet of bicycles are placed throughout ARC for employees to use around the campus.
6. Carpooling:
   - 511 RideMatch is the regional rideshare program that connects Bay Area commuters looking to carpool.
     - 511 can be utilized by dialing 511 on your phone, or by downloading the 511 Rideshare smartphone app.
     - 511 Rideshare offers incentives for use of their program.
7. Mass Transit Subsidy:
   - NASA employees can be reimbursed for mass transit expenses through the Ames Commute Alternatives Program (ACAP).
8. A Shuttle Service:
   - A commuter shuttle service between ARC and the VTA Bayshore, and the CalTrain Mountain View Stations is provided during peak commuting hours.

SITE-SPECIFIC BMP:
VEHICLE AND EQUIPMENT FUELING

DESCRIPTION

Spills from fueling or from the transfer of fuels to storage tanks can be a significant source of pollution. Fuels carry contaminants of particular concern to human and wildlife, such as heavy metals, toxic materials and oil and grease, which are not easily removed by storm water treatment devices. Consequently, control at the source is particularly important. Adequate control can be achieved with careful design of the initial installations, retrofitting of existing installations, and proper spill prevention, control, and cleanup procedures.

TARGETED CONSTITUENTS

- Heavy Metals
- Toxic Materials
- Hydraulic Fuel
- Oil and Grease
- Petroleum Products
- Antifreeze

APPLICABILITY

- N-251 – NASA Motor Pool
- Bldg. 141 – DESC Truck Filling Station
- Bldg. 146 – DESC Filling Station

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. To prevent fuel spills and leaks, and reduce their impacts to storm water:
   - Install vapor recovery nozzles to help control drips as well as air pollution,
   - Use a paved area or provide a concrete slab for the fueling area. Concrete is preferred because fuel and oils cause asphalt to deteriorate,
   - Do not use mobile fueling of mobile industrial equipment around the facility, rather, transport the equipment to designated fueling areas,
   - Clean up gasoline overflows and spills using dry methods,
   - Do not allow spills to run off or evaporate,
   - Do not flush the spill away with a hose. Spread adsorbent material, sweep it up with a broom, and dispose of it as hazardous waste,
   - Post signs that instruct pump operators not to “top off” or overfill gas tanks,
   - Keep dry cleanup materials in the fueling area, and instruct employees in the dry cleanup methods described below,
   - Assign someone responsibility to check the area every day for gasoline, motor oil or other fluids that may have leaked, and
   - Use a damp cloth to clean the pumps and a damp mop to clean the pavement during routine cleaning rather than spraying with a hose to minimize run-off of water to the storm drain.
2. Spill cleanup from vehicle and equipment fueling should be performed in the following manner:
   - **Small spills** are those which can be wiped up with a shop rag. Store shop rags in a covered rag bin indoor. Do not saturate rags with gasoline, solvents, or other volatile liquids,
   - **Medium spills** are too large to wipe up with a rag. Contain and soak up a liquid using dry absorbent material. Absorbent “snakes” may be used as temporary booms to contain and soak up

the liquid. Sweep up the used adsorbent and snakes and dispose of them appropriately. Contact EMD for disposal information,

- **Large spills** must be contained and then cleaned up. If safe to do so, take steps to contain and clean up the liquid, and minimize the wash water used in cleanup. Shut off or plug storm drain inlets or sewer inlets where the spill may enter.

3. Comply with the Spill and Leak Prevention and Response Best Management Practice.
   - For hazardous materials spills that cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene, call NASA ARC Dispatch at 911 or 650-604-5555 immediately. For all other hazardous materials spills contact the EMD.
4. AvPorts Receiving Fuel Deliveries & Truck to Truck Transfers of Jet A Fuel must adhere to the AvPorts/Planetary Ventures Moffett Field-NUQ Standard Operating Procedures as outlined in requirement 6 of the Fuel Tank Vehicles BMP.
5. In addition to the minimum BMPs, other applicable BMPs include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES
   - SOURCE REDUCTION

SITE-SPECIFIC BMP: VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR

DESCRIPTION

Vehicle or equipment maintenance is a potentially significant source of storm water pollution at NASA ARC. Activities that can contaminate storm water include engine repair and service (parts cleaning, spilled fuel, oil, etc.), replacement of fluids, and outdoor equipment storage and parking (dripping engines).

TARGETED CONSTITUENTS

- Heavy Metals
- Toxic Materials
- Oil and Grease

LOCATION

- N-251
- N-255
- Bldg. 146
- Bldg. 544
- Bldg. 684

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment maintenance and repair by running a dry shop.
2. Train employees in standard operating procedures and small spill cleanup techniques, as outlined in the Employee Training Program BMP.
    - It is the responsibility of managers and supervisors at ARC to be familiar with the Employee Training Program BMP, and to ensure employee training in these areas:
        - Safe handling of hazardous materials in the employee's workplace including spill response, segregation, and secondary containment,
        - Proper storage of industrial materials,
        - Proper disposal of hazardous waste including sewer discharge prohibitions, pickup procedures,
        - Spill Prevention Control and Countermeasures (when storing/transferring oil products),
        - Storm Water Pollution Prevention (when performing work outdoors),
        - Industrial Wastewater Sewer Discharge Training and
        - Emergency Response and First Responder Training.
3. Eliminate/reduce the amount of hazardous materials and waste:
    - Clean without using liquid cleaners (e.g., wire brush) whenever possible to reduce waste. Prevent spills and drips of solvents and cleansers.
    - Perform all liquid cleaning at a centralized station so the solvents and residues stay in one area, reducing or eliminating the chance of spills to the floor.
    - Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for re-use.
    - Choose non-hazardous or less hazardous materials,
    - Choose cleaning agents that can be recycled,
    - Use non-caustic detergents and cleaning systems instead of caustic or organic solvent degreasers and cleaning systems,

- Replace chlorinated organic solvents (1, 1, 1-trichloroethane, methylene chloride, etc.) with non-chlorinated solvents:
    - Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly.
    - Check the list of active ingredients to see whether it contains chlorinated solvents.
    - The "chlor" term indicates that the solvent is chlorinated.
- Reduce chemical inventory by utilizing a solvent that can perform more than one task wherever possible. This will make recycling easier and reduce hazardous waste management costs.
- Do not mix waste streams. This allows for recycling of some waste streams and may reduce disposal costs.
    - Keep hazardous and non-hazardous wastes separate.
    - Do not mix use oil and solvents.
    - Keep chlorinated solvents (e.g., 1, 1, 1-trichloroethane) separate from non-chlorinated solvents (e.g., kerosene and mineral spirits).
    - Follow the Material Handling and Waste Management BMP to ensure proper storage, recycling, and waste management of hazardous materials.

4. Do not use water to clean leaks, drips, and other spills.
    - Use rags or dry absorbent for small spills,
    - Spilled or leaked industrial materials shall be cleaned promptly and disposed of properly,
    - In the event of a spill near a storm drain:
        - Block, dike, divert, and/or cover the storm drain to prevent a release from entering the storm water system.
    - Immediately call ARC Dispatch by dialing 911 or 650-604-5555 from any phone if:
        - Spill could enter a storm drain or storm ditch,
        - Spill is a health hazard,
        - Spill is a fire hazard,
        - Spill may directly contaminate the environment or property, or,
        - If the spill cannot be cleaned up by two people within 1/2 hour with cleanup materials available on the scene.
        - For larger spills, immediately call 911 or 650-604-5555 from any phone.
        - Refer to the Spill and Leak Prevention and Response BMP for guidance on spill cleanup.
    - Contact the EMD for more waste minimization ideas.
5. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
6. Keep equipment clean.
    - Don't allow excessive build-up of oil and grease that can be washed into the storm drainage system during a rainstorm.
    - When possible, protect idle equipment from exposure to rain.
    - Inspect equipment for leaks according to the inspection requirements outlined in the Quality Assurance and Recordkeeping BMP.
7. Capture all drips and leaks.
    - Utilize drip pans or impermeable ground cloths.
        - Keeps leaks off the ground reduces the potential for storm water contamination and reduces cleanup time and costs.
    - Designate a special area, away from connections to the storm or sanitary sewer discharge systems, to drain and replace motor oil, coolant, and other fluids.
        - Use a vehicle maintenance area designed to prevent storm water pollution.
    - Check all incoming vehicles for leaking oil and fluids.
    - Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts to capture and isolate waste streams that may be recycled.
    - Use a funnel when transferring liquids from one container to another.
    - If the vehicle or equipment is to be stored outdoors, oil and other fluids should be drained prior to storage.
8. Promptly transfer used fluids to the proper waste or recycling drums.
    - Don't leave full drip pans or other open containers unsupervised.

- Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
    - Used or leftover cleaning solutions, solvents, automotive fluids, and oil are toxic and should **not** be discharged to the sanitary sewer.
    - Discharges of process water or mop water must undergo an evaluation by the EMD before it can be discharged to the sewer. Contact the EMD for more information.

9. Used batteries are considered hazardous waste, however, most types of batteries can be recycled.
    - Follow ARC's battery recycling program requirements.
    - Batteries must be fully discharged prior to turning them in to the EMD.
    - Contact the EMD for additional information.
10. Used oil filters can be recycled, do not mix them in with hazardous waste. Contact EMD for additional information on recycling used oil and oil filters.
    - Place the oil filter in a funnel over the waste oil recycling or disposal collection tank to completely drain excess oil before crushing and recycling filter.
    - Store used oil filters in an appropriate container with a closed lid and proper markings.
    - Do not dispose of used oil filters in trash cans or dumpsters, they can leak oil and contaminate storm water.
11. In addition to the minimum BMPs, other appropriate Best Management Practices include:
    - VEHICLE AND EQUIPMENT FUELING
    - VEHICLE AND EQUIPMENT WASHING

SITE-SPECIFIC BMP:
VEHICLE AND EQUIPMENT WASHING

DESCRIPTION
Wash vehicles and equipment outdoors or in areas where wash water run-off can pollute storm water. Wash water can contain high concentrations of oil and grease, phosphates (detergents) and metals. These and other potentially harmful substances can pollute storm water when deposited on the ground where they can be picked up by rainfall run-off.

TARGETED CONSTITUENTS
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oil and Grease
- Petroleum Products
- Oxygen Demanding Substances

APPLICABILITY
This BMP is applicable to N-251 (NASA Motor Pool Wash Rack), Bldg. 146 (CANG Vehicle Wash Rack), and Bldg. 686 (CANG Support Equipment Wash Rack).

AUTHORITY
This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:
- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS
1. Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment washing by implementation of the following:
   - Use designated wash areas, **do not** wash vehicles on the grass, or in parking lots, roads, or driveways,
   - Berm area to contain wash area,
   - Discharge wash water to sanitary sewer with permit from the local sewer authority. Coordinate discharge with the EMD,
   - Filter wash water,
   - Educate employees on pollution prevention measures,
   - Prohibit wash water from entering the storm drain, and
   - Prohibit use of solvents.
2. Mobile Equipment that is being cleaned to be placed back into service should be washed at the following locations with permission from the EMD:
   - N-251, Motor Pool Wash Rack
   - Bldg. 146, CANG Vehicle Wash Rack
   - Golf Course Wash Rack
3. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
4. Wash racks with automatic sanitary/sewer valves (N248E and B146)
   - PRIOR TO WASHING OPERATION:
     - Lubricate the drain valves by adding approximately 50 gallons of water to the small drain in the wastewater collection basin.
     - Verify the start selector is in the “OFF” position.
     - Verify the “POWER ON” and “STORM DRAIN” indicators are illuminated.
   - BEGIN WASHING OPERATION:

- Turn the start selector to “WASH”. Water spigots will not flow until the switch is turned to wash.
- Record the start/stop meter readings (gal) in the log provided. Each wash rack is equipped with its own meter and log.
- Check that the “SANITARY DRAIN” indicator light comes on.
- Check that the “STORM DRAIN” indicator light goes out.

- DURING WASHING OPERATION:
  - Do not wash during a rain event.
  - Visually inspect the oil/water separator unit to make sure wash water is entering these vaults.
  - Check that the “SANITARY DRAIN” indicator light comes on.
- POST WASHING OPERATION:
  - Wash down soap and other cleaning agents from wash rack ground surface area into the drain before switching the valve back to “STORM DRAIN” position. Failing to thoroughly rinse the wash rack area can result in permit violations, as contaminants could be discharged into the environment during the next rain event.
  - Turn the start selector to the “OFF” position.
  - Wait 15 minutes.
  - Check that the “STORM DRAIN” indicator light comes on.
  - Check that the “SANITARY DRAIN” indicator light goes out.
  - Verify the valve position before leaving the wash rack area.
- If the wash rack malfunctions, immediately cease operations and call the Airfield Manager.

5. Vehicle wash rack at N251
   - Pull the vehicle all the way inside of the wash rack bay.
   - If the vehicle is too large to fit inside of the wash rack bay:
     - Place barriers in the gutter outside of the wash rack to stop the flow of soapy water.
     - Wash one-half of the vehicle at a time (front/back).
     - Rinse water **must not be allowed** to flow outside of the wash rack bay.
     - If wash water leaves the wash rack, it must be sweep back into the wash rack.
     - Use fresh water to rinse the soapy water from the pavement and sweep it into the wash rack.
6. In addition to the minimum BMPs, other applicable BMPs include:
   - ELIMINATION OF NON-STORM WATER DISCHARGES
   - SOURCE REDUCTION

SITE-SPECIFIC BMP: WASHING AND RINSING OF OUTDOOR EQUIPMENT, MATERIALS, AND DISPLAYS

DESCRIPTION

Wash water can contain high concentrations of oil and grease, phosphates (detergents) and metals. These and other potentially harmful substances can pollute storm water when deposited on the ground where they can be picked up by rainfall run-off. The following procedures were developed to ensure that no contaminants enter the storm drain system during the washing of equipment, materials, and displays. Operators must follow these procedures to ensure that the quality of storm water discharges from NASA Ames Research Center (ARC) is not adversely impacted.

TARGETED CONSTITUENTS

Listed below are the targeted constituents that should be prevented from entering the storm drain system during washing procedures.

- Heavy Metals
- Toxic/Hazardous Materials
- Oil and Grease
- Sediments
- Floatable Materials
- Oxygen Demanding Substances

APPLICABILITY

This BMP is applicable to washing outdoor equipment, materials, and any displays including but not limited to the display planes located west of Building 158 and west of Shenandoah Plaza.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Train personnel in good housekeeping techniques, standard operating procedures, and any other training which may apply.
2. Protect all storm drain inlets from potentially contaminated run-off generated by washing activities. Storm drain inlets should be securely covered with visqueen, plastic or other such material, prior to any washing activities.
3. Use of soaps during washing activities is discouraged. If soap is necessary, use only biodegradable soap products. Contact the EMD prior to use of any product so that the Safety Data Sheet (SDSs) may be reviewed.
    - Biodegradable soap is **not** permitted to be discharged into the storm drain. Measures must be taken to protect the storm drain throughout the washing activities.
4. If run-off from the washing activities accumulates on the storm water inlet, pump the material into an appropriate container. Contact the EMD to ascertain the proper method of disposal.
5. Run-off from the washing activities must be treated as a chemical spill. Clean up run-off from the washing activities promptly and if the spill could enter a storm drain call 911 immediately.
    - Report the event to EMD.
    - The Spill and Leak Prevention and Response BMP provides additional information on responding to a spill.
6. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
7. In addition to the minimum BMPs, other applicable BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES
    - SOURCE REDUCTION

SITE-SPECIFIC BMP: WASHING OF EXTERIOR BUILDING SURFACES and FIXED OUTDOOR EQUIPMENT

DESCRIPTION

Washing exterior building surfaces and fixed outdoor equipment can introduce contaminants into storm water. In general, water from exterior building surfaces is an allowable discharge, but this BMP must be followed to avoid violating the provisions of the IGP.

TARGETED CONSTITUENTS

- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances

APPLICABILITY

This BMP is applicable to all industrial activities associated with washing of exterior building surfaces and fixed outdoor equipment.

AUTHORITY

This Best Management Practice is required under the authority of NASA ARC Environmental Management Division (EMD). For required notifications to EMD and any questions, contact:

- Jeanne Sabin (jeanne.m.sabin@nasa.gov, 650-582-7321)
- Marcia Christlieb (marcia.j.christlieb@nasa.gov, 650-785-1776)

REQUIREMENTS

1. Contact EMD to determine if directing the wash water to vegetation will be permitted.
2. Wash water is not permitted to be discharged directly into a storm drain.
3. Minor washing of buildings and equipment without any soap or other chemical addition is permitted, **only** if all water runoff is contained within existing landscaping, and no water runoff is caused on non-permeable surfaces (including sidewalks or the road) or into the stormwater system.
4. If use of landscaping to capture water runoff is not feasible, estimate the amount of wastewater that will be generated during washing operation and arrange to have containers available.
5. If the wastewater is to be containerized,
   - Notify EMD to schedule sampling and disposal of water,
   - During washing operations, contain the water (visqueen plastic and/or berms) and pump to a holding container.
   - If water has been determined to be sewerable by the EMD, drain or pump the water to a sanitary sewer connection.
   - If the water has been determined to be non-sewerable, contact the EMD for proper disposal off-site.
6. Use of soaps during washing activities is discouraged and is not permitted if the wash water is not containerized. If soap is necessary, use only biodegradable soap products. Contact EMD prior to use of any product so that the Safety Data Sheet (SDSs) may be reviewed.
   - Biodegradable soap is not permitted to be discharged into the storm drain. Measures must be taken to protect the storm drain throughout the washing activities.
   - If soap is used, the wash water shall be containerized, tested, and disposed of properly.
   - Discharging soap into vegetation is not permitted, regardless of whether the soap is biodegradable or not.
7. Following the washing operation, the area should be swept to remove debris and residue.
8. Washing of exterior building surfaces, washing of fixed outdoor equipment, and washing when containerization is needed shall be postponed if rain is forecast.
9. Obtain Industrial Wastewater Sewer Discharge Training before discharging wastewater.
10. In addition to the minimum BMPs, other applicable required BMPs include:
    - ELIMINATION OF NON-STORM WATER DISCHARGES

- SOURCE REDUCTION

LOCATIONS of INDUSTRIAL ACTIVITIES
NASA AMES RESEARCH CENTER
2022-2023 REPORTING YEAR

Bldg. No.	Name	BEST MANAGEMENT PRACTICES ASSOCIATED WITH INDUSTRIAL ACTIVITIES																			TARGETED CONTAMINANTS											
		Aircraft Exhaust and Fueling	Aircraft Maintenance	Aircraft Washing and Rinsing	Building and Grounds Maintenance	Building Repair, Remodeling, and Construction	Construction, Demolition, & Excavation Operations That Disturb Ground Surfaces Less Than One Acre	Display Aircraft Washing and Rinsing	Elimination of Non-Storm Water Discharges	Fire Department Equipment Testing and Training	Fire-fighting Activities	Fleet Parking	Fuel Tank Vehicles	Golf Course Maintenance	Outdoor Process Equipment Operation and Maintenance	Source Reduction	Transportation Contol Measures	Utility Vault Dewatering	Vehicle and Equipment Washing	Vehicle and Equipment Fueling	Vehicle/Equipment Maintenance and Repair	Washing of Exterior Building Surfaces and Fixed Outdoor Equipment	Sediment	Nutirents	Heavy Metals	Toxic Materials	Floatable Materials	Oxygen Demanding Substances	Petroleum Hydrocarbons	Oil and Grease	Bacteria and Viruses	Plume Contaminants	Temperature	pH
Gates 14A-B	Emergency Pumping Stations								X				X		X	X				X	X								X	X				
M047	Hangar 3 Wash Rack			X					X							X									X				X	X				X
M158	Airfield Operations	X	X	X				X	X			X	X		X	X			X	X	X				X	X				X	X	X			X
M191	191 Pump Station												X		X	X				X	X									X	X				
M359	Grounds Maintenance Yard				X				X			X		X	X	X			X	X	X		X	X		X	X	X	X	X				
M545	PV Fuel Farm								X				X			X				X						X			X	X				
M580	Fire Department								X	X	X	X				X			X	X	X					X			X	X				
M679	Haz Mat Storage	X	X	X	X				X				X		X	X				X					X	X			X	X				X
M682	Haz Mat Storage								X						X	X									X	X			X	X				X
N211	NASA Hangar	X	X	X					X				X			X										X			X	X				
N221	Wind Tunnel (US Air Force)								X				X		X	X									X	X			X	X				X
N221	Wind Tunnel Courtyard (JCM)								X				X		X	X									X	X			X	X				X
N234B	ArcJet Boiler Plant								X						X	X									X	X								X
M250-N	Maintenance Operations					X			X						X	X							X	X	X	X	X		X	X	X	X		
M250-S	Maintenance Operations					X			X						X	X					X		X	X	X	X	X		X	X	X	X		X
N251	Auto Filling Station/ Motor Pool								X			X	X		X	X			X	X	X								X	X				
N255	Supply Support								X			X				X					X					X			X	X				
N265	Haz Waste Storage								X						X	X									X	X			X	X	X			X
N267	DART Training Facility								X			X			X	X									X				X	X				
N271	Reverse Osmosis Plant								X						X	X									X	X								X
VTOL Pad	Green Waste Mulching Area, Landscape Maintenance yard, and Haz Waste Storage Area				X				X			X			X	X				X			X	X			X	X	X	X				

Hangar 1 Summary Report

Introduction

Polychlorinated biphenyls (PCBs), lead and asbestos be can found in a variety of interior and exterior building materials as well as on a variety of surfaces in Hangar 1. This report summarizes the discovery of the materials, the risks associated with them, the legal issues, actions taken to date, and options for mitigation.

History of Hazardous Materials Discoveries

Polychlorinated biphenyls

Polychlorinated biphenyls have been in use at Ames and Moffett for decades, in electrical equipment such as transformers, capacitors, rectifiers and circuit breakers, in which the PCBs are fully enclosed within such equipment. The most common form of PCBs used in electrical equipment at Ames and Moffett is Aroclor 1260. Aroclor 1254 is used to a lesser extent in this equipment.

As a part of Ames' annual storm water system sampling program, the sediment in the Ames storm water settling basin is sampled each summer. The sediment is analyzed for a number of contaminants, including PCBs. In the summer of 1997, Aroclor 1268 was detected in the settling basin sediment in concentrations ranging from 53 micrograms per kilogram (µg/Kg) to 830 µg/Kg. It was the only form of PCB detected. It is unknown whether Aroclor 1268 had been present in the settling basin sediment in prior years. Aroclor 1268 is an uncommon form of PCB and analytical laboratories conducting routine PCB analyses often omit reference standards for Aroclor 1268. Aroclor 1268 is not a form of PCB found in electrical equipment and information concerning its use in other materials is limited.

Subsequent to its discovery in the summer of 1997, Aroclor 1268 was included in laboratory analyses of storm water sediment samples. In April 1999 Aroclor 1268 was found in a storm water sample taken from Manhole D1 (northwest corner of Bushnell and McCord) at 1.1 micrograms per Liter (µg/L).

In an attempt to identify the source of Aroclor 1268, sediment from 15 catch basins upstream of Manhole D1 were sampled in June 1999. All results were below detection limits for all forms of PCBs, including Aroclor 1268. In the summer of 1999 Aroclor 1268 was again detected in the storm water settling basin sediment at concentrations ranging from 28 µg/Kg to 1200 µg/Kg. Five other storm-water sampling locations upstream of Manhole D1 were added to the storm water sampling program in October 1999, including Manholes 107 and 109.

Aroclor 1268 was not detected in storm water samples from the 1999-2000 storm year. Aroclor 1268 continued to be detected in the storm water settling basin sediment in the summers of 2000, 2001 and 2002.

In February 2001 Aroclor 1268 was found in storm water samples taken from Manholes 107 and 109 as part of the routine storm-water monitoring program. Manhole 107 is located in the parking lot south of N-248, near the corner of Bushnell and Cummings Roads. Manhole 109 is

located at the northwest corner of Bushnell Road and Severyns Avenue. Aroclor 1268 was found again in Manhole 109 in February 2002.

Information that some paints could contain significant concentrations of PCBs led to the bulk sampling of the Hangar 1 roof and Galbestos coating material in July 2002. The composite roofing material sample contained 39,000,000 μg/Kg (39,000 ppm) while the composite Galbestos coating sample contained 57,000 μg/Kg.

A comprehensive sampling plan was subsequently developed to sample materials inside and outside the Hangar in October 2002. Additional sampling of the Hangar and its interior and exterior environs was performed in the winter and spring of 2002/2003. In addition, personnel air sampling for PCBs was also conducted.

Figure 1 illustrates the history of the discovery of Aroclor 1268 from 1997 through spring 2003. A summary of PCB sampling events conducted on and near Hangar 1 from October 2002 through March 2003 and their results, along with applicable regulatory limits, is shown in Tables 1 and 2.

Lead

The discovery of lead contamination was made following a request from the former Deputy Center Director, who requested Code QH to sample for possible lead contamination in November 2000. The sampling was conducted in December 2000, and found horizontal surfaces, as well as interior and exterior coatings (paint), contained lead. Historical records of activities within Hangar 1 showed that the Navy had repainted dirigibles and aircraft inside the hangar with lead coatings. This practice continued until November 1994. In December 2000, SAIC generated a report summarizing the extent of lead contamination throughout the hangar.

Environmental ambient air sampling was completed in October 2002. This study sampled ambient air both inside and outside the Hangar. Tables 1 and 2 list lead sampling events conducted from October 2002 through March 2003 and their results along with applicable regulatory limits.

Asbestos

Hangar 1 was originally constructed of asbestos panels covered by asphalt layers. The Navy transferred custodianship of Hangar 1 to NASA in 1994, providing full disclosure that this facility was constructed with asbestos. Based on this initial NAVY report, asbestos was found to be present in various building materials in Hangar 1 such as piping insulation and roofing materials.

In 1996, Code QH was tasked by Code FE to sample the hangar's roofing materials for C of F funding of a roof replacement project. Asbestos was detected in the roofing. In January 2003, various building materials composing the exterior of the Hangar were sampled and analyzed for asbestos. Nearly half of the samples contained asbestos between 0.7 and 18 per cent by weight.

A summary of the sampling results conducted on and near Hangar 1 from October 2002 through March 2003 is shown in Tables 1 and 2.

Risks/ Health Aspects

PCBs, lead and asbestos are materials that pose long-term and chronic health and environmental threats. All three are regulated by state and federal agencies. Tables 1 and 2 summarize sample results for PCBs, lead and asbestos, and list local, state and federal regulatory limits.

PCBs

PCBs are persistent in the environmental and bioaccumulate in organisms. PCBs are suspected human carcinogens. Materials that contain PCBs at or above 50 parts per million are regulated by EPA under authority from TSCA. EPA regulates use, manufacture, releases, distribution in commerce and disposal of any materials at or above this 50 ppm threshold. TSCA and EPA regulations strictly prohibit the use of PCBs in any manner other than fully enclosed.

In its PCB regulations, EPA requires that any releases of PCBs to surfaces to which the public has access must be cleaned to meet or exceed 10 µg per 100 cm^2. The clean-up standard for surfaces for industrial use from which the public is restricted is 100 µg per 100 cm^2. For remediation of contaminated sites, the EPA has set Preliminary Remediation Goals for PCBs as follows:

- residential soil: 0.22 ppm
- industrial soil: 1.0 ppm
- ambient air, residential: 0.0034 ppb [30-year, 24 hour/day lifetime exposure)
- tap water: 0.034 ppb

Site specific cleanup levels set by EPA for PCBs at Moffett Field are 1 ppm for residential sites and 0.470 ppm for ecological sites.

EPA promulgated water quality standards for priority toxic pollutants in the surfaces waters, bays and estuaries in California. EPA's water quality criterion for PCBs in fresh water is 0.014 µg/L while the water quality criterion for PCBs in salt water is 0.03µg/L.

In consent agreements for the use of former Navy ships used as museum ships, EPA has set an acceptable limit of 1 µg/m^3 in air (8-hour continuous sample).

California regulates PCBs when they are found in wastes. Under California regulations, wastes are hazardous if they contain soluble PCBs at or above 5 ppm and total PCBs at or above 50 ppm.

The Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) regulate workers' exposure to PCBs. OSHA's Permissible Exposure Limit (PEL) for workers' exposure to PCBs is 0.5 mg/ m^3 (8-hour time-weighted average). NIOSH considers PCBs to be carcinogens and has set a 10-hour dermal Recommended Exposure Limit (REL) as a time-weighted average of 0.001 mg/m^3. The American Conference of Governmental Industrial Hygienists (ACGIH) has established a dermal Threshold Limit Value (TLV) of 0.5 mg/m^3 for chlorodiphenyl (54% Chlorine) and a dermal Short-Term Exposure Limit (STEL) of 1 mg/m^3 for chlorodiphenyl (54% Chlorine).

Lead

Lead is a potential neurotoxin, the inhalation and ingestion of which can cause kidney, central nervous system, and reproductive harm. Lead can replace calcium in the skeletal system and be incorporated into the bones resulting in interference with red blood cell production and may cause skeletal disorders. Once the lead is stored in bones it can release back into the body and may continue to damage other organs. Pregnant women who are exposed to high levels of lead have been reported to increase rates of spontaneous abortions. Adult males who are exposed to high levels of lead are reported to have abnormal and decreased sperm counts. Children under the age of six are the population of greatest concern, due to their increased sensitivity to lead. Lead exposure may lead to attention disorders, learning disabilities, and synaptic damage to the brain.

Lead is a heavy metal that is a persistent bioaccumulative toxic material. The EPA regulates lead in ambient air as part of its national ambient air quality program. The EPA limit for lead in ambient air is 1.5 $\mu g/m^3$ as a quarterly average concentration. The California Air Resources Board also lists lead as a contaminant for which it has established an ambient air quality standard of 1.5$\mu g/m^3$ as a 30-day average concentration. The San Francisco Bay Area Air Quality Management District regulates lead as a hazardous air pollutant and prohibits ground level discharges of lead and lead compounds in excess of 1.0 µg/m3 averaged over 24 hours.

The Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) regulate workers' exposure to lead. OSHA's PEL for workers' exposure to lead is 50 $\mu g/m^3$ averaged over an 8-hour work shift and 30$\mu g/m^3$ for the Action Level. NIOSH's REL for lead is 0.10 mg/m^3 averaged over a 10-hour period.

The U.S. Department of Housing and Urban Development Department (HUD) guideline for lead in paint is 1 mg/m^3 in dried paint.

Asbestos

Asbestos is a carcinogen that can cause lung cancer, asbestosis, and mesothelioma. The risk of lung cancer for persons who smoke and are exposed to asbestos is over 50 times greater than the normal population. Mesothelioma, a rare form of cancer, is a disease in which malignant cells are found in the pleura lining of the chest, the lining of the abdominal cavity (the peritoneum) or the lining around the heart (the pericardium). Asbestos fibers also cause scarring of the lung tissue (asbestosis) that interferes with oxygen uptake by red blood cells. Asbestos fibers are only minimally degraded in the lungs with time and continue to cause scarring throughout an exposed person's life. OSHA limits asbestos exposure to workers to not more than 0.1 fiber/cm^3 in air over an 8-hour work shift.

Historical Actions/Mitigations

1. Code QH identified lead as a problem in late 2000. Plastic sheeting was placed on the floor of the Hangar 1 in December 2000 to protect visitors attending an event from exposure to lead-contaminated dust.
2. In January 2001, a complete survey of Hangar 1 was completed for lead contamination. The results from this survey indicated that lead contamination increases on horizontal surfaces from the floor to the ceiling with the greatest amount of lead being found in high catwalk areas. . In addition to the lead health hazard was communicated to all codes having activities within the hangar. Lead awareness training was initiated and blood lead level testing was offered to all workers within Hangar 1.
3. A lead abatement contractor cleaned the south end of hangar floor in February 2001. After the cleaning, the floor lead levels for the cleaned area (approximately 2/3 of the south end of the hangar) were at or below the Department of Health Services (DHS) limit of 50 micrograms of lead per square foot. The floor was sealed with a clear concrete sealer to protect the floor from further contamination and allow for ease of cleaning.
4. In 2001, the Navy Reserve transferred custody of a small battery operated wet sweeper to NASA for cleaning the hangar floor. The wet sweeper has been used since NASA received it to clean the hangar floor prior to events being held in Hangar 1.
5. In April 2001, the Assistant Inspector General for Inspections, Administrative Investigations, and Assessments wrote Ames a letter of inquiry concerning levels of lead in Hangar 1. Organization Code QH responded to this letter by describing actions that were already being utilized to address the identified hazard
6. A health and safety plan for Hangar 1 activities was drafted in 2001, which details the additional requirements for employees working in Hangar 1. This plan included asbestos and lead awareness training for personnel entering the hangar. Restrictions put in place requires workers who must access areas above the ground floor to wear personal protective equipment including: disposable coveralls, foot coverings, and respiratory protection if conducting activities other than inspection. Additional signage has been placed at each entrances to comply with regulatory requirements.
7. In late 2002, a Safety and Health Hazard Abatement Plan was issued to NASA headquarters restricting activities in certain areas and mandating certain actions take place prior to a public function. This plan also requested funding for the abatement of lead hazards from Hangar 1.
8. Public events held from August 2002 to present have required an additional measures of protection for employees and guests by placement of a protective barrier (such as astro-turf or equivalent) on top of the hangar floor and the availability of hand washing stations. These measures were initiated to address both the PCB and lead contamination, which have not been adequately controlled by wet sweeping.
9. Lead wipe samples were collected prior to the “Make a Wish” event in February 2003. The results of these samples ranged from 21,000 micrograms of lead at the quad wide trailers in Hangar 1 to levels less than 40 micrograms of lead per square foot elsewhere. These results are typical in of the hangar depending on frequency of cleaning and

proximity to an exit. In the area of Hangar 1, where the "Make a Wish" event was held, the results ranged from 50 to 300 micrograms of lead per square foot. The current regulatory limit is 40 micrograms of lead per square foot for a floor surface for publicly accessible areas.

10. The abatement method used until March 2003 required Quantam Services to clean the south end of Hangar 1 with the wet sweeper prior to each event to minimize contamination. This procedure has not historically kept the hangar floor clean from lead contamination.

Recent Actions/Mitigations

Following discovery of PCBs in the Hangar, the Hangar was closed to public events. An exception was made for the Make-A-Wish Foundation for which tickers had already been sold and a suitable alternate location could not be found. Immediately prior to holding that event, the Hangar floor was washed. Tenting was installed to protect cleaned surfaces from accumulation of particulates containing PCBs, lead and asbestos. In addition plastic was placed on the floor. Hangar users were provided with written notifications concerning the presence of these hazardous materials. Actions taken to date to minimize the presence of PCBs, asbestos and lead inside the Hangar have included washing the floor.

The EPA regulations prohibit the use of the Hangar for any public events due to the presence of PCBs inside the Hangar. Both EPA and TSCA prohibit any use of PCBs in other than a totally enclosed manner. The materials in Hangar 1 constitute an unauthorized use. EPA could issue a civil penalty for violation of TSCA at any time. In addition, EPA has notified Ames that any NASA official who enters the Hangar or allows anyone other than essential maintenance, abatement or cleanup personnel may be subject to criminal penalties for knowing violation of TSCA.

The Ames Development Office and Code JFP are working with the Moffett Historical Museum to move the museum's office supplies and museum exhibits to an alternate location outside Hangar 1. The Hangar will be closed to Museum staff and visitors.

Legal issues

The Toxic Substances Control Act (TSCA) states that "no person may …distribute in commerce or use any polychlorinated biphenyl in any manner other than in a totally enclosed manner" [15 USC Sec. 2605 (e) (2)(A)]. This prohibition is repeated in the regulations promulgated by the EPA under its TSCA authority [Code of Federal Regulations Title 40 Part 761.20(a) and (c)].

In its regulations EPA defines "totally enclosed manner" to mean "any manner that will ensure no exposure of human beings or the environment to any concentration of PCBs" [40 CFR 761.3]. Also in these regulations, EPA states that "*Distribute in commerce* and *Distribution in Commerce* when used to describe an action taken with respect to a chemical substance, mixture, or article containing a substance or mixture means to sell, or the sale of, the substance, mixture, or article in commerce; to introduce or deliver for introduction into commerce, or the introduction or delivery for introduction into commerce of the substance, mixture, or article; or

to hold or the holding of, the substance, mixture, or article after its introduction into commerce." The sale of real property is thus "Distribution in Commerce".

The presence of PCBs in Hangar 1 violates both Federal law and EPA regulations, since the PCBs in the building materials are not totally enclosed. The PCBs are being released into both the interior of the Hangar and to the environment outside the Hangar.

Mitigation Options

There are three options being evaluated for the mitigation of hazardous materials in for Hangar1:

- **Encapsulation of hazardous materials:** All hazardous materials covered by a double layer of coating material. This option would include an initial application of two layers of coating material on all interior and exterior surfaces containing PCBs. Regular sampling of the interior of the Hangar and the environment throughout the duration of NASA's use of the Hangar would be required to confirm that the coating is preventing releases of the hazardous materials. In the event that the Hangar is transferred or sold to any entity outside the federal government, NASA will be required to remove and dispose of all materials containing PCBs, and all materials that meet hazardous waste limits would have to be disposed as hazardous waste.
- **Removal and replacement of hazardous materials.** This option would include the removal of all materials in that Hangar that contain PCBs, including siding, roofing and putty. These materials would be replaced with non-PCB containing materials. All materials that meet hazardous waste limits would have to be disposed as hazardous waste.
- **Demolition and disposal.** For this option, the Hangar would be demolished and all materials that meet hazardous waste limits will be disposed as hazardous waste.

There are a number of issues associated with some or all of these options. Any of the 3 options will require coordination with the State Historic Preservation Officer, since the Hangar is a part of the Historic District. Any of the options will require that Ames perform an analysis of impacts, as required under the National Environmental Policy Act (NEPA). NEPA will require the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). Both EAs and EISs require public review and comment. There is interest in Hangar 1 from both an historic and cultural perspective. There is also likely to be public interest due to the presence of hazardous materials and exposure to the public and the environment.

Future liability will be an issue for the encapsulation option. Because it is illegal to distribute PCBs in commerce, EPA will require that NASA dispose of all PCB-containing materials as a condition of the transfer or sale of the Hangar to any non-Federal entity. Any materials that meet hazardous waste limits would have to be disposed as hazardous waste.

Code FEF is preparing a report that will include sampling data, a description of the three options and cost estimates for each option. This report should be completed in July 2003.

Regulatory Requirements

Asbestos Regulations

NASA ARC adheres to and enforces all applicable Federal, State, and local governing regulatory agency laws/guidelines pertaining to asbestos-containing materials and asbestos-related work as well as our own internal policies including:

1. U.S. Department of Labor, Occupational Safety & Health Administration (OSHA)
   - 29 CFR Part 1910.1001 (Asbestos Regulations)
   - 29 CFR Part 1910.134 (Respirator Regulations)
   - 29 CFR Part 1926.1101 (Construction Asbestos Regulations)
2. 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPS) - Subpart M - National Emission Standards for Asbestos
3. Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2 - Asbestos
4. Environnemental Protection Agency (EPA) Guidance Documents
   - Asbestos-Containing Materials in School Buildings, Parts 1 and 2
   - Guidance for Controlling Asbestos-Containing Materials in Buildings
   - Managing Asbestos in Place - A Building Owner's Guide for Operations and Maintenance Programs for Asbestos-Containing Materials
5. California Labor Code Sections 6501.5, 6501.7, 6501.8, and 6505.5
6. California Code of Regulations (CCR)
   - Title 8, Section 1529
   - Title 8, Sections 341.6-341.14, Registration - Asbestos Related Work
   - Title 26, Divisions 22 and 23
   - Title 22, Sections 22-12000 and 22-12901 (Proposition 65)
   - Title 22, sections 66260 through 66270 (hazardous waste)
   - Title 8, Section 5216 (Lead Regulations)
   - Title 8, Section 1532.1 (Construction Lead Regulations)
   - Title 8 Sections 5141 & 5144 (Respirator Regulations)
   - Title 17 Division 1, Chapter 8 (Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards)

Lead Regulations

Currently, NASA Ames adheres to and enforces and all applicable Federal, State, and local governing regulatory agency regulations/guidelines that pertain to lead-containing materials as well as our own internal policies including:

1. U.S. Department of Labor, Occupational Safety & Health Administration (OSHA)
   - 29 CFR Part 1910.1025 (Lead Regulations)
   - 29 CFR Part 1926.62 (Construction Lead Regulations)
   - 29 CFR Part 1910.134 (Respirator Regulations)
2. U.S Environmental Protection Agency
   - 40 CFR Parts 260-270 (Hazardous Waste)
   - 40 CFR Part 355 (Emergency Planning and Notification)

- 40 CFR Parts 370-372 (Community Right-to-Know)
- 40 CFR Parts 50 – 99 (Air Programs)

3. California Code of Regulations (CCR)
- Title 22 section 66270 through 66270 (hazardous waste)

4. Bay Area Air Quality Management District (BAAQMD) Hazardous Air Pollutant, Regulation 11, rule1

PCBs Regulations

Currently, NASA Ames adheres to and enforces and all applicable Federal, State, and local governing regulatory agency regulations/guidelines that pertain to PCB-containing materials as well as our own internal policies including:

1. Toxic Substances Control Act
2. U.S Environmental Protection Agency
- 40 CFR Part 355 (Emergency Planning and Notification)
- 40 CFR Parts 370-372 (Community Right-to-Know)
- 40 CFR Part 761 (PCBs)

3. California Code of Regulations (CCR)
- Title 22 section 66270 through 66270 (hazardous waste)

Figure 1. History of Aroclor 1268 Discovery

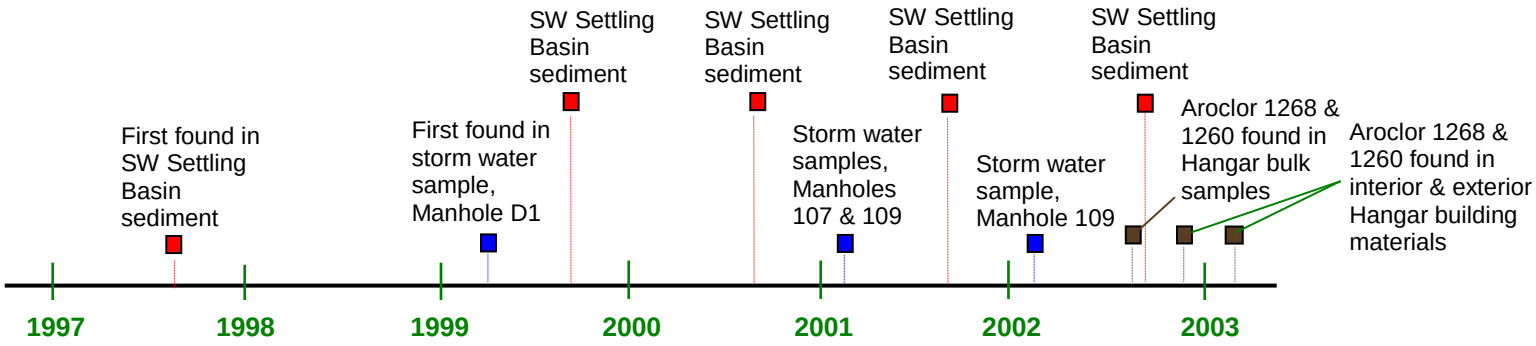

Table 1. Hangar 1 Exterior Sampling Results

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Date	Sample	Analyte(s)	Protocol	Result(s)	Regulatory Limit
Oct. 2002	Storm water, Manhole SD 107	PCBs ** (Aroclor 1268)	EPA	3 µg/L	EPA California Toxics Rule, PCBs: 0.00017 µg/L
Oct. 2002	Storm water, Settling basin effluent	PCBs ** (Aroclor 1268)	EPA	0.6 µg/L	EPA Water Quality Criteria, PCBs: 0.03 µg/L, salt water 0.014 µg/L, fresh water
Oct. 2002	Sediment, Storm water settling basin (influent)	PCBs ** (Aroclor 1268)	EPA	2900 µg/mg	EPA PRGs, PCBs: industrial soil: 1.0 ppm Moffett Field Site-Specific cleanup levels, PCBs: 0.470 ppm, ecological 1 ppm, residential
Oct. 2002	Air, environmental ambient air sampling; outside of Hangar; 4 screening stations,	PCBs Lead	EPA TO-10A EPA IO-2.3	Non-detect 0.013 µg/m^3 ***	EPA PRGs, PCBs: 0.0034 µg/m^3 (residential)
Nov. 2002	Air, environmental ambient air sampling	PCBs	EPA TO-10A	Non-detect	EPA museum ship consent agreement, PCBs: 1 µg/m^3 BAAQMD Hazardous Air Pollutant, Lead: 1.0µg/m^3 (24 hr average)
Jan. 2003	Hangar building materials:	PCBs **	EPA SW 846 Method 8082		
	Multi-ply asphalt roof membrane; 6 samples taken, 5 layers per sample	Aroclor 1260 Aroclor 1268		0.5 ppm *** 0.9 ppm ***	
	Roof sealant; 1 sample	Aroclor 1260 Aroclor 1268		4.4 ppm 5.7 ppm	EPA TSCA Limit, PCBs: 50 ppm
	Upper (black) coated corrugated steel panel siding; 8 samples taken	Aroclor 1260 Aroclor 1268		< 2 – 12 ppm < 5 – 119 ppm	Calif Hazardous waste limit:, PCBs ≥5 ppm (STLC) ≥50 ppm (TTLC)
	Lower(gray) coated corrugated composite panel siding; 10 samples taken	Aroclor 1260 Aroclor 1268		20 – 35,000 ppm 15 – 5,500 ppm	
	Putty, 8 samples taken	Aroclor 1260 Aroclor 1268		1.7 – 77 ppm 4 – 409 ppm	

Date	Sample	Analyte(s)	Protocol	Result(s)	Regulatory Limit
Jan. 2003	Paint from various exterior Hangar surfaces	Lead	HUD Guideline/ XRF	19 of 36 samples ≥ 1.0 mg/cm^2	HUD Guidelines: 1.0 mg/cm^2
Jan. 2003	Bulk paint chips; 2 samples taken	Lead	EPA 7000 Series	101,000 – 200,000 ppm	EPA & Calif Hazardous waste limit: ≥5 ppm (STLC) ≥350 ppm (TTLC)
Jan. 2003	Various materials from exterior roofing and surfacing materials; 40 samples taken	Asbestos	EPA/AHERA	18 samples with 0.7 – 18 % asbestos (as Chrysotile)	OSHA Limit 0.1% Calif. Hazardous waste limit: ≥1% asbestos
Mar. 2003	Rainwater from Hangar siding *	PCBs ** (Aroclor 1268)	EPA	3.09 µg/L and 6.7 µg/L	EPA California Toxics Rule: 0.00017 µg/L EPA Water Quality Criteria, PCBs: 0.03 µg/L, salt water 0.014 µg/L, fresh water
Mar. 2003	Rainwater from Hangar downspout *	PCBs ** (Aroclor 1268)	EPA	0.366 µg/L; and non-detect	
Mar. 2003	East side Hangar storm water drainage trench sediment *	PCBs ** (Aroclor 1268)	EPA	65.5 ppm and 72.4 ppm	EPA TSCA Limit: ≥50 ppm Calif. Hazardous waste limit: ≥5 ppm (STLC) ≥50 ppm (TTLC)

**Full suite of PCBs analyzed; only results above non-detect shown*
*** Split sample sent to 2 analytical labs.*
**** Maximum concentration of analyte(s)*

Table 2. Hangar 1 Interior Sampling Results

Date	Sample	Analyte(s)	Protocol	Result(s)	Regulatory Limit
Oct. 2002	Environmental ambient air monitoring; indoor sampling; 2 Lead, 2 PCB samples	PCBs Lead	EPA TO-10A EPA IO-2.3	0.09 – 0.11µg/m^3 0.002 – 0.013 µg/m^3	EPA PRG, PCBs 0.0034 µg/m^3 (residential) EPA museum ship consent agreement:, PCBs 1 µg/m^3 BAAQMD Hazardous Air Pollutant, Lead: 1.0µg/m^3 24 hr average
Nov. 2002	Environmental ambient air monitoring; indoor sampling	PCBs	EPA	0.03 – 0.04 µg/m^3	EPA PRG, PCBs 0.0034 µg/m^3 (residential) EPA museum ship consent agreement, PCBs: 1 µg/m^3
Dec. 2002	Personnel air monitoring; 9 samples taken	PCBs	OSHA	2.5µg /m^3	OSHA PEL 0.5 mg/ m^3 NIOSH REL 0.001 mg/ m^3
Dec. 2002	Concrete floor wipe samples; 83 samples taken on Hangar floor 15 samples taken in Moffett History Museum	PCBs	EPA	12 above EPA limit of 10 µg/100cm^2, with max of 16 µg/100cm^2 all less than 10 µg/m^3	EPA PCB Clean-up Level, Public access 10µg/100cm^2
Mar. 2003	Concrete floor wipe samples: - 3 weeks after floor cleaning - 3 days after floor cleaning	PCBs	EPA	21 µg/cm^2 5.61 µg/cm^2	EPA PCB Clean-up Level, Public access 10µg/100cm^2
Mar. 2003	Samples taken of dust on beams - Sample 1 - Sample 2	PCBs	EPA	 328 ppm Non-Detect	EPA TSCA Limit: ≥50 ppm Calif. Hazardous waste limit: ≥5 ppm (STLC) ≥50 ppm (TTLC)

Date	Sample	Analyte(s)	Protocol	Result(s)	Regulatory Limit
Mar. 2003	Interior surface sampling, lower (gray) wall; 7 samples taken	PCBs	EPA	37,000 to 186,400 ppm	EPA TSCA Limit: ≥50 ppm Calif. Hazardous waste limit: ≥5 ppm (STLC) ≥50 ppm (TTLC
Mar. 2003	Paint	PCBs	EPA	166 ppm	EPA TSCA Limit: ≥50 ppm Calif. Hazardous waste limit: ≥5 ppm (STLC) ≥50 ppm (TTLC

**Full suite of PCBs analyzed; only results above non-detect shown*
*** Split sample sent to 2 analytical labs.*
**** Maximum concentration of analyte(s)*

Glossary

BAAQMD	San Francisco Bay Area Air Quality Management District
DHS	California Department of Health Services
DTSC	California Department of Toxic Substances Control
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
HUD	U.S. Department of Housing and Urban Development
Kg	kilogram
L	liter
µg	microgram
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated biphenyls. A family of man-made chemicals that contain 209 individual compounds with varying levels of toxicity. PCBs are suspected human carcinogens. Aroclor products are identified by a four-digit numbering code in which the first two digits (12) indicate that the parent molecule is biphenyl and the last two digits indicate the percentage of chlorine content by weight. Thus, Aroclor 1260 is 60% chlorine by weight, while Aroclor 1268 is 68% chlorine by weight.
PEL	Permissible Exposure Limit.
ppm	Parts per million
ppb	Parts per billion
REL	Recommended Exposure Limit
SHPO	State Historic Preservation Officer
STEL	Short Term Exposure Limit
STLC	Soluble Threshold Limit Concentration; California limit at or above which a soluble waste is hazardous
TSCA	Toxic Substances Control Act
TTLC	Total Threshold Limit Concentration, California limit (weight-weight basis) at or above which a waste is hazardous
TWA	Time-weighted average

FACT SHEET

TIME-CRITICAL REMOVAL ACTION AT HANGAR 1

NASA AMES RESEARCH CENTER
MOFFETT FIELD, CALIFORNIA

PURPOSE

The purpose of this fact sheet is to document the need for a time-critical removal action at the storm water drainage trenches surrounding Hangar 1 at Moffett Field, California. Although Hangar 1 and the surrounding storm water drainage trenches are within the U.S. Navy's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site at Moffett Field, the NASA Ames Research Center (NASA-Ames) is proposing to undertake this action in order to protect the storm water sewer system for which it is responsible.

SITE DESCRIPTION

Hangar 1 was constructed in 1932 to house the airship U.S.S. Macon. The hangar is 345.3 meters (1133 feet) long, 93.9 m (308 ft) wide, and 60.4m (200 ft) high. After the loss of the Macon, the hangar continued to service both the Army and Navy for maintenance of aircraft, housing of training facilities, and office space for Navy patrol squadrons. In 1987, the Naval Air Station Moffett Field was listed on the National Priorities List (NPL) as a Superfund site. The hangar sits along the eastern portion of the Navy's Installation Restoration Program (IRP) Site 9. Hangar 1 became part of NASA-Ames in 1994 as part of the transfer of the former Naval Air Station Moffett Field to NASA-Ames under the Base Realignment and Closure (BRAC) program. Hangar 1 has been used by NASA-Ames for display space for air shows and open houses, Project Jason, the Moffett Historical Museum, and various commercial and public functions. It has been designated as a historic building in a historic district that is listed on the National Register.

The removal action site is the area surrounding the exterior of Hangar 1 including the storm water drainage trenches and paved concrete surfaces immediately adjoining the building. The site is bounded by Cummins Avenue to the west, Sayre Avenue to the east, Bushnell Street to the north and Cody Road and the south aircraft ramp to the south. The site is approximately 10 miles north of San Jose near the junction of Highways 101 and 85.

BACKGROUND

In 1992, NASA-Ames constructed a sediment settling basin for stormwater collected from the western side of the facility. The basin, along with new stormwater discharge pipes, was constructed to collect any possible contaminated sediment before discharge of the water to the stormwater retention pond (SWRP). Figure 1 shows the pipe lines and settling basin.

NASA-Ames began detecting Aroclor 1268, an uncommon form of polychlorinated biphenyls (PCBs), in the settling basin in 1997.

REMOVAL SITE EVALUATION

Recent investigations conducted by NASA-Ames found PCBs in the materials from which Hangar 1 is constructed. Two bulk samples taken in July 2002, one of the roofing material and one of the Galbestos siding, contained high concentrations of Aroclor 1268. Subsequent sampling in October and November 2002 and January 2003 has shown that PCBs as Aroclor 1260 and Aroclor 1268 are found in the Galbestos coating, roofing materials, window putty, and other interior and exterior building materials.

A rainwater sample taken from Manhole MH 107, located in the parking lot south of building N-248 near the corner of Bushnell and Cummins Roads, had a detectable level of Aroclor 1268. Samples taken in March 2003 found detectable concentrations of Aroclor 1268 in rainwater and in sediment taken from the storm water drainage trench running along the eastern side of the Hangar.

PROPOSED ACTION DESCRIPTION

NASA-Ames proposes to sample the sediment in the storm water drainage trenches surrounding Hangar 1 every 200 feet. A total of approximately 17 samples will be taken of the sediment. The samples of the sediment in the storm water drainage trenches will be analyzed for PCBs, including Aroclors 1268 and 1260, lead, zinc and asbestos.

All of the sediment will be removed and disposed offsite to a facility approved to accept this material. Any sediment that meets the hazardous waste toxicity characteristic for PCB, lead, zinc and/or asbestos will be disposed to a hazardous waste Treatment, Storage and Disposal Facility authorized to accept these materials.

The time-critical removal action would remove contaminants from the Hangar 1 storm water drainage trenches and on the paved surfaces immediately proximate to the Hangar. Removal of contaminants from these areas will abate the immediate threats to the storm water system, reducing threats to public health, welfare and the environment.

Sampling began the week of July 7, 2003. It is estimated that the removal action, including removal of contaminants from the Hangar 1 storm water drainage trenches and on the paved surfaces immediately proximate to the Hangar and disposal of any hazardous waste, will be complete by October 2003.

LONG TERM REMEDIAL ACTION

The US Environmental Protection Agency (EPA) has informed the Navy that the long term abatement of Hangar 1 will be added to the Navy's Federal Facility Agreement for the former Naval Air Station Moffett Field.

CONTACT INFORMATION

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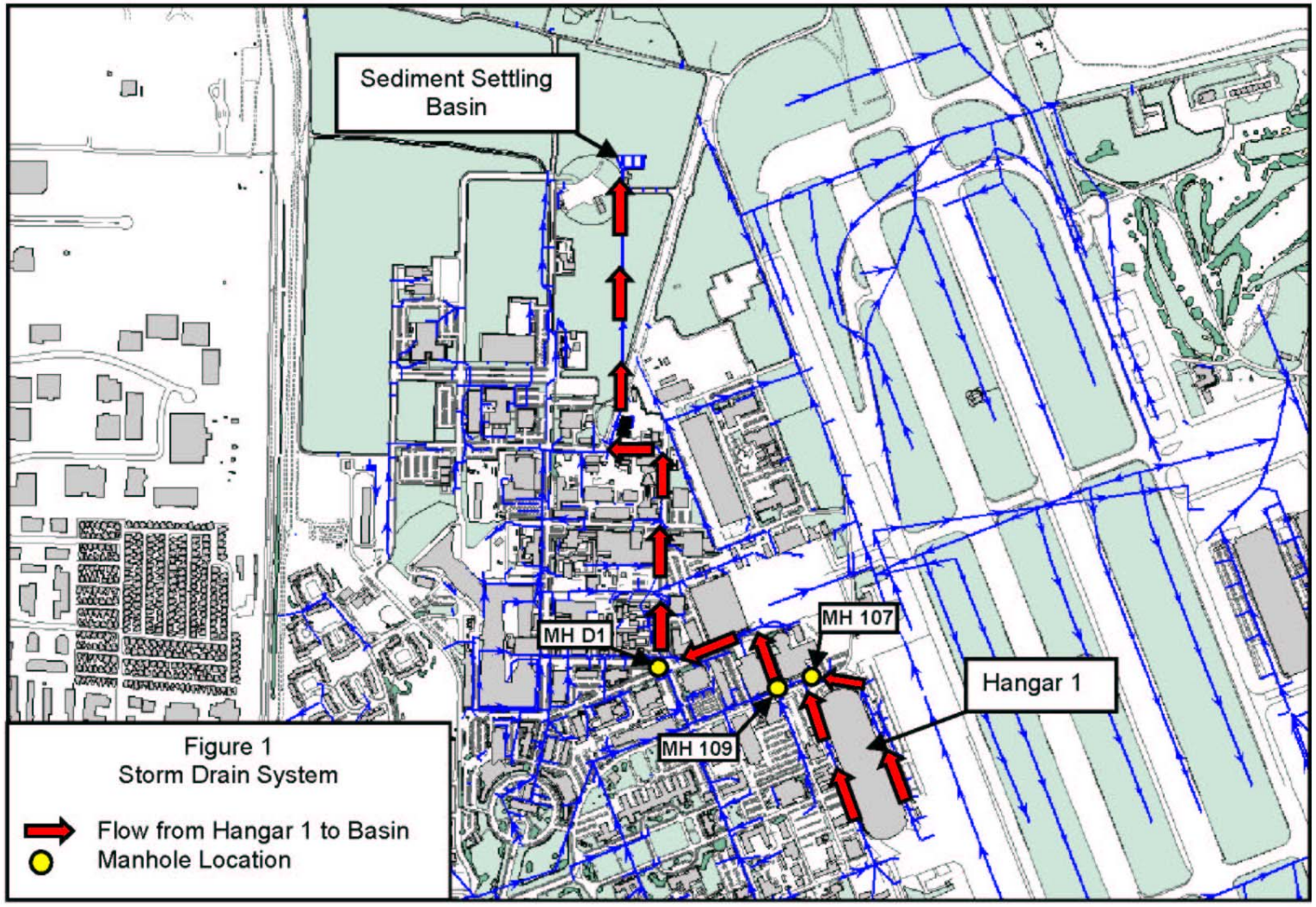
PUBLIC REVIEW

The Draft Action Memo is available at:

Mountain View Public Library
Reference Desk
585 Franklin Street
Mountain View, California 94041-1998
Monday-Thursday: 10 am - 9 pm
Friday-Saturday: 10 am - 6 pm
Sunday: 1 pm - 5 pm

Sunnyvale Public Library
Reference Desk
665 West Olive Avenue
Sunnyvale, California 94086-7655
Monday-Thursday: 10 am - 9 pm
Friday-Saturday: 10 am - 6 pm
Sunday: Noon - 8 pm

FIGURE 1: HANGAR 1 STORM DRAIN SYSTEM



NASA Ames Research Center Reportable and Non-reportable Spill Log

National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA

December 2024

Environmental Support Services Contract
80ARC020F0036
NASA Ames Research Center Reportable and Non-reportable Spill Log

Prepared for:
Environmental Management Division
NASA Ames Research Center
M/S 204-15
Building N204, Room 102B
Moffett Field, CA 94035-0001

December 2024

BB&E
CONSULTING ENGINEERS
& PROFESSIONALS

Executive Summary

CDRL 06-044, Reportable and Non-reportable Spill Log, presents a List of Significant Spills or Leaks for the five (5) year period of December 2019 through December 2024 and fulfills the Industrial General Permit requirement to maintain a spill log for a period of at least five (5) years.

NASA Ames Research Center
Table B — List of Significant Spills or Leaks

Date	Location	Quantity And Substance Released	Description	Actions taken to correct, control or mitigate incident	Recommendations to prevent recurrence	Followup Actions
12/7/19	CANG Flight Line	Apx 3 gallons of JP-8	During the refueling of an aircraft, an estimated 3 gallons of jet fuel was spilled onto flight line Spot #2 and Spot #3. Due to inclement weather, an undetermined amount of the fuel was washed into a storm drain that leads to the San Francisco Bay. The release to the drain was unrecoverable. The fuel that remained on the surface area was recovered by on-site personnel with the use of absorbents. No fires or injuries were reported.	CANG notified EPA and OES and deployed a floating boom at the outfall of the Marriage Road Ditch BMP, which did not remain in place. Absorbent was used to clean the ground surface at the location of the spill.	Properly maintain equipment to guard against unplanned releases, protect nearby storm drains when performing material transfers, educate personnel on the refueling instructions.	---
12/18/19	Moffett Runway	Apx 3 gallons of JP-8	An airplane maintenance crew noticed a fuel leak while working on a C130. The fuel was captured within secondary containment, there was no release to the environment. NASA Fire responded, but did not deploy spill materials.	NASA Fire responded, but did not deploy spill materials.	Properly maintain equipment to guard against unplanned releases.	---
5/20/20	Boyd Road between N229A and N227A	An unknown amount of hydraulic fluid	On Wednesday, 5/20/2020, Recology truck driver notified janitorial supervisor (Bill Reyes) at approximately 6:45am. that his truck had stalled at building N227A parking lot and one of the hydraulic line burst, leaking fluid on the ground. Janitorial supervisor notified NASA Dispatch, COR and left a voice message to code-Q	Recology Manager (John Zirelli), was informed of the issue and will be sending a mechanic to cap-off the damage hose, so that the truck can be towed from site and Great America Towing Recovering will be arriving to clean up the hydraulic oil spill.	Properly maintain equipment to guard against unplanned releases.	---
9/9/20	M020	apx 30,000 gallons of potable water	Water main break. A small potable water leak was found beneath M020. The flow was reduced to 2 gpm for about 10 days during the repair process.	Water leak was isolated, line was repaired and returned to service.	Properly maintain infrastructure to guard against line breaks.	---
9/17/20	Ellis gate entrance	2 gallons of diesel fuel	Two gallons of diesel fuel from an unknown vehicle was discovered on the pavement.	The Moffett Fire Department responded to the spill and deployed kitty litter to clean up the spill. The spill did not enter the storm drain.	Properly maintain equipment to guard against unplanned releases.	---
1/25/21	Westcoat Road and Stewart Drive	An unknown amount of sewer water	A sewer backup at the Westcoat Housing overflowed into the storm system.	Storm drains were blocked, and the blockage was removed from the sewer line. Settling Basin was sampled, results were within normal parameters.	Properly maintain infrastructure to guard against line breaks.	---
1/29/21	M566	apx 5,000 gallons of potable water	Water main break.	Water leak was isolated, line was repaired and returned to service.	Properly maintain infrastructure to guard against line breaks.	---
2/2/21	N144	apx 12,000 gallons of potable water	Water main break.	Jacobs responded and isolated the leak.	Properly maintain infrastructure to guard against line breaks.	---
6/4/21	N229	<5 gallons oily water	Earlier today at N229, there was an oil spill noticed by a technician performing routine equipment inspections. The oil was coming from an air compressor. Total amount is less than 5 gallons. The supervisor for that equipment will fill out the spill log and send it to me. Once I get, I will forward it to you. Dispatch was not contacted due to the small amount and short time needed to clean it up.	It is stopped, contained, and cleaned up. It took only a few minutes to contain and clean it.	Inspect and maintain equipment, use spill containers where appropriate.	---
9/11/21	M025	apx 10,000 gallons of potable water	Water main break.	Water leak was isolated, line was repaired and returned to service.	Properly maintain infrastructure to guard against line breaks.	---
9/11/21	N220	apx 12,000 gallons of potable water	Water main break.	Water leak was isolated, line was repaired and returned to service.	Properly maintain infrastructure to guard against line breaks.	---
9/30/21	N271	Unknown amount of Sodium Hydroxide 30%.	The flange after the tank had a hairline crack and was not leaking when found. There was less than 1 milliliter of caustic on the concrete foundation of the tank.	The area was wiped clean and a thick layer of RTV was added to the crack.	Inspect and maintain equipment, use spill containers where appropriate. Repair/replace broken elements in a Timely manner. Perform followup inspections to avoid reoccurrance.	This tank has been removed from service. The system was redesigned to use a 55 gallon drum located indoors. This eliminates the potential for future impacts to the storm water discharge system.

NASA Ames Research Center
Table B — List of Significant Spills or Leaks

Date	Location	Quantity And Substance Released	Description	Actions taken to correct, control or mitigate incident	Recommendations to prevent recurrence	Followup Actions
11/11/21	Hangar 1	2nd spot on west ramp	N724JJ wanted top off, at 21042 gal mark on meter fuel started to overflow over wings. Told pilot and called ups for help. Pilot stated aircraft fuel valve was inoperable as it showed it was flowing into left wing but kept on fueling out of right wing. Over flow valve did not work causing the spill.	Blocked off drain, brought spill containment cart over, used SW mat, pig mats, cat, to coman spill. NASA Fire department was there to assist. Fuel was in the 2 yellow bins and 1 hazmat bin in hazmat container.	Inspect and maintain fuel gauges.	---
11/16/21	N211 Northeast Corner	Small amount of AFFF	The AFFF storage system overflowed and leaked onto the ground.	Moffett Field Fire Department contained the leak and addressed the problem.	Inspect and maintain equipment per manufacturer's specifications.	---
1/12/22	N229 High Bay	Small amount of oil	Attempted to transport a pump with a forklift using extenders. During transport, the pump fell over causing a casing to break open and oil to spill around the pump in the middle of Boyd Road.	The spill was cleaned up and materials were disposed of through ARC's Hazardous Waste facility.	Use proper equipment and properly secure loads while transporting and trnasfering materials.	---
4/6/22	N240A	Apx 11,500 gallons of potable water	Water main break.	Water leak was isolated, line was repaired and returned to service.	Properly maintain infrastructure to guard against line breaks.	---
4/11/22	Fifth Avenue Gate	less than 5 gallons of raw sewage and biocides	Portable toilet staged near the Fifth Avenue Gate was blown over by the wind. A 3'x3' wet stain was found on the pavement near the toppled portable toilet.	The portable toilet rental company arrived on site to clean up the waste. The unit was left in repose to avoid a repeat spill during the wind storm.	Prepare for high-wind events by locating and securing the portable toilet and other equipment that can be damaged or toppled by the wind.	---
4/22/22	N239A	less than .5 pint of hydraulic fluid	Hydraulic fluid was found leaking from an unused hudraulic tank.	Jacobs responded to clean up the spill and recover any remaining oil in the tank.	Perform monthly and Annual inspections on aboveground storage tanks containing oil.	---
5/24/22	Near M545	600 gallons of liquid oxygen.	A gasket broke while filling a liquid oxygen tank. About 600 gallons vaporized and was released into the atmosphere. No liquid entered the storm distribution system.	Moffett Field Fire Department responded and decided the safest thing to do is let the tank “bleed” and the oxygen dissipate.	Inspect and maintain equipment per manufacturer's specifications.	---
5/31/22	N234 Cooling Tower	apx 3,000 gallons of potable water treated with CL49 and CL5642	Overflow from cooling tower system	The nearby storm drain was blocked and the cooling tower was shut off for maintenance. The settling basin was visually monitored for signes of contamination The travel path from the cooling tower to the storm drain was cleaned, after area dried debris was swept to remove debris and solids from the event.	Properly maintain sustems to guard against line breaks Install BMPs to protect nearby storm drains during maintenance activities.	---
9/3/22	King Rd and Cooper Loop	apx 15,000 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks.	---
11/1/22	M580	2-3 gallons of water and AFFF	Approximately 0835 a small amount of AFFF mixed with water leaked from an AFFF apparatus leaked onto the pavement outside of M580.	Absorbant was used to clean up the spill from the pavement.	Properly maintain equipment to guard against equipment leaks. Inspect equipment regularly.	---
12/14/22	Outside N207	Approx 30,000 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
2/11/23	Fire Station Garage	A few drops of engine oil	Engine oil from a fire truck leaked onto the floor of the firehouse garage.	Spill kit was deployed to clean up the leak and capture additionall drips until equipment could be serviced.	Place drip pans beneath equipment to capture leaks that develop.	---
2/13/23	Storm Water Settling Basin Parking Lot	< .25 gal hydrolic fluid	A hydraulic-powered lift assist on a roll-off dumpster broke, leaking hydraulic fluid to the pavement.	Hazwaste personnel was onsite observing the subcontractor delivering the roll-off bin. Spill kit materials were deployed to clean up the spill.	Equipment should be inspected by subcontractors before delivering on-site. Damaged equipment should not be accepted by personnel.	A new roll-off bin with working hydraulic lifts was delivered.
4/17/23	N271	10,000 gallons of poptable water and sodium hydroxide	A fill line was left open, overtopping a tank.	TSF personnel closed the valve to stop the overflow.	Fill lines should be monitored visually or tank must be equipped with automatic shut-off sensors.	Requested additional information from TSF. Recommend retaking SWPP Training course.

NASA Ames Research Center
Table B — List of Significant Spills or Leaks

Date	Location	Quantity And Substance Released	Description	Actions taken to correct, control or mitigate incident	Recommendations to prevent recurrence	Followup Actions
5/24/23	N238	Approx 5,000 gallons of cooling tower water	Approx 50 to 100 gallons of cooling tower water entered a storm drainage catch basin on Hunsaker outside N265.	Storm drains were blocked, and the leak was stopped. Settling Basin was sampled, results are expected within one week.	Inspect and maintain equipment per manufacturer's specifications.	Currently evaluating installation of an advanced BMP to prevent the release of process water during Arc Jet operations. Performed field visit to evaluate potential BMPs, recommended installing a SafeDrain and curbing. JQ's recommendations are currently under review.
5/25/23	N238	Approx 100 gallons of cooling tower water	A repeat event, storm drain was already blocked from the previous event.	Storm drains were immediately blocked, and the leak was stopped.	Inspect and maintain equipment per manufacturer's specifications.	Currently evaluating installation of an advanced BMP to prevent the release of process water during Arc Jet operations. Performed field visit to evaluate potential BMPs, recommended installing a SafeDrain and curbing. JQ's recommendations are currently under review.
6/14/23	N234A Near Cooling Tower	Approx 90 gallons of cooling tower water	The leak occurred when an underground water pipe broke and water bubbled up from the ground. The underground water pipe takes water from the Arc Jet hot well to the cooling towers for cooling and reinsertion into our condenser system. The leak was noticed when the SVS crew found water bubbling up from the ground during routine watch standing activities.	The broken section of pipe was isolated to stop flow and allow for repairs to the line.	Perform routine preventative maintenance on system components and piping.	Verify repairs to pipe and preventive maintenance plan is in place.
6/26/23	M076	Approx 720 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
9/8/23	N227D	Approx 720 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
9/12/23	Hunsaker Rd. and Mark Ave	Approx 2 gallons of Universal Tractor Fluid (UTF)	Container fell while being transported.	Absorbant was used to clean up the spill from the pavement. Traffic was diverted during spill cleanup efforts to prevent vehicles from tracking spilled UTF.	Properly secure containers before transfering.	Verified spill was properly cleaned up.
9/13/23	N229	Approx 2,400 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
9/19/23	N234A	Approx 200 gallons of cooling tower water	During start-up, hotwell level controller glitched out. It spilled over.	We enforced barricade around storm drain and swept standing water on the ground.	Perform routine preventative maintenance on system components and piping. Evaluate current BMPs and consider installing additional BMPs to control flow of potential future releases.	This is an ongoing issue, TSF is working with JQ to design the appropriate spill prevention barriers/equipment.

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Date	Location	Quantity And Substance Released	Description	Actions taken to correct, control or mitigate incident	Recommendations to prevent recurrence	Followup Actions
10/3/23	N234A	Approx 200 gallons of cooling tower water	Hotwell level controller failed spilling process water to ground.	Water was pumped to the wastewater system.	Perform routine preventative maintenance on system components and piping. Evaluate current BMPs and consider installing additional BMPs to control flow of potential future releases.	This is an ongoing issue, TSF is working with JQ to design the appropriate spill prevention barriers/equipment.. TSF has started pumping released process water into the industrial sewer system.
6/28/23	M076	Approx 720 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
11/7/23	M0146	Approx 1,800 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
11/20/23	M684-686	Approx 15,000 gallons of potable water	Water main break.	Jacobs responded, isolated the leak, and patched the water main.	Properly maintain infrastructure to guard against line breaks. JCE requested funding to address aging infrastructure.	---
2/28/24	N234A	Approx 8,000 gallons of cooling tower and steam condensate water	Hotwell level controller failed spilling process water to ground.	Flow was blocked from entering the storm drainage system. Spill was pumped to the sewer wastewater system. No water entered the storm drainage system.	Perform routine preventative maintenance on system components and piping. Evaluate current BMPs and consider installing additional BMPs to control flow of potential future releases.	This is an ongoing issue, TSF is working with JQ to design the appropriate spill prevention barriers/equipment..
8/8/24	N221 near entrance to the West Warehouse high-bay	Approximately .5 gal lead acid	An electrician was moving lead acid batteries from a sub-station using a forklift. When the forklift crossed the threshold the batteries tipped over.	The lead acid was contained and cleaned up immediately, materials were disposed of through the NFAC hazardous waste program.	Plan your route before transporting hazardous materials. Secure load to avoid tipping/falling/spills.	---
8/23/24	Golf Course	Unkown amount of sewage	A 10" sewer force main broke leaking sewage onto a vegetative area of the golf course.	The line was isolated to stop flow, repairs are in the planning stage.	Perform routine preventative maintenance on system components and piping. Evaluate current BMPs and consider installing additional BMPs to control flow of potential future releases.	---
8/27/24	N226 west side	Unknown amount of hydraulic oil	Hydraulic oil is slowly being released from bearings inside the abandoned Supersonic Wind Tunnel. Oil is accumulating beneath the tunnel.	Spill kit was deployed but has not been refreshed for some time. Plans to demolish the wind tunnel and investigate the subsurface are in development.	If equipment must be abandoned in place, enact safeguards to prevent spills to the environment. Funding for regular inspections, maintenance activities, and spill response must be included in the abandonment plan.	9/10/24-Inspected area, status remains the same. 10/24/24-Inspected area, status remains the same. 11/22/24-Inspected area, status remains the same. 12/19/24-Inspected area, status remains the same.

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Date	Location	Quantity And Substance Released	Description	Actions taken to correct, control or mitigate incident	Recommendations to prevent recurrence	Followup Actions
10/18/24	North of Building 018	Unkown amount of drinking water	A 10+ gpm leak from a valve under a fire hydrant.	The line was isolated to stop flow, repairs are in the planning stage.	Perform routine preventative maintenance on system components and piping. Evaluate current BMPs and consider installing additional BMPs to control flow of potential future releases.	---

Note: This list includes significant spills or leaks that discharged to, or had the potential to discharge to the storm water system at NASA Ames as described in section X.G.1.d.ii of the Industrial General Permit.

ERT CHAIN OF CUSTODY

REPORT TO: Marcia Christlieb
ERT/BB&E/NASA Ames
Bldg. T20G/ Room 142. M/ ST20G-4
Moffett Field, CA 94035-1000
(650) 604-5360 marcia.j.christlieb@nasa.gov

LAB: CLS
3249 Fitzgerald Rd.
Rancho Cordova, CA 95742
(916)638-7301

PROJECT NAME:
PROJECT NUMBER:
JOB DESCRIPTION

INVOICE TO: **BB&E, Inc.**
Accounts Payable
235 E. Main St, Suite 107
Northville, MI 48167

LAB ID #:

Field Conditions:
pH **/ Temp (** F)

SBE
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RTJO

DATE	TIME	SAMPLE ID	MATRIX	CONTAINER(S) No./TYPE	PRESER-VATIVE	625,Motor Oil, PCBs	JP5,JP8, Diesel	TSS, BOD	TP, N+N (4500-NO3-E), COD, TOC, NH3 (4500-NH3 B+C)	Hg (245.1), Cu, Pb, Zn (200.8)	Cr	Oil&Grease	624, TPH-gas, JP4	TURN AROUND TIME	SPECIAL INSTRUCTIONS
			Water	3 - Amber Liters	Cold	X								5 days	Analysis to include Aroclor 1268
			Water	1 - Amber 250 mL	Cold		X							5 days	
			Water	1 - Poly Liter	Cold			X						5 days	
			Water	1 - Poly 250 mL	H2SO4				X					5 days	
			Water	1 - Poly 250 mL	HNO3					X				5 days	
			Water	1 - Poly 250 mL	NH3/ NH4						X			5 days	**Include Cr VI**
			Water	1 - Amber Liter	HCl							X		5 days	
			Water	4 - Amber VOA	HCl								X	5 days	
															Please send results to marcia.j.christlieb@nasa.gov Brian.l.kawashima@nasa.gov **Request Linko EDD**

SAMPLER:	DATE/ TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE/ TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE/ TIME:	RECEIVED AT LAB BY: