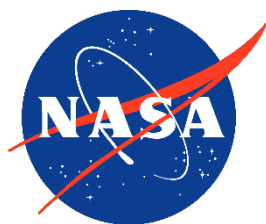


**PHASE II SOLID WASTE MANAGEMENT UNIT (SWMU)  
ASSESSMENT WORK PLAN  
CENTER WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)  
POTENTIAL RELEASE LOCATION (PRL) 237  
KENNEDY SPACE CENTER, FLORIDA**

**Prepared for:**



**Environmental Assurance Branch  
National Aeronautics and Space Administration  
Kennedy Space Center, Florida 32899**

**A-E Contract 80KSC019D0010  
Task Order 80KSC019F0289**

**March 2020  
Revision 0**

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**PHASE II SWMU  
ASSESSMENT WORK PLAN  
CENTER WIDE PFAS  
PRL 237  
KENNEDY SPACE CENTER, FLORIDA**

**March 2020**

**Revision 0**

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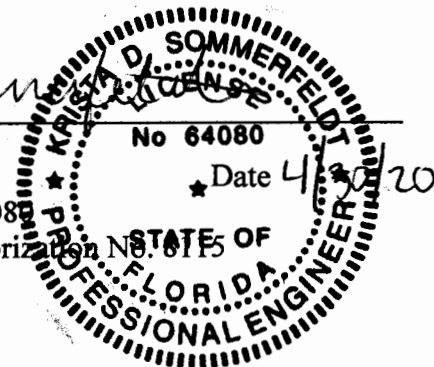
**407-843-6552**

In accordance with the provisions of Florida Statutes, Chapter 471, this Phase II Assessment Work Plan has been prepared under the direct supervision of a Professional Engineer registered in the State of Florida. This work was performed in accordance with generally accepted professional engineering practices pursuant to Chapter 471 of the Florida Statutes. The data, findings, recommendations, specifications, or professional opinions were prepared solely for the use of National Aeronautics and Space Administration and the Florida Department of Environmental Protection. AECOM Technical Services, Inc., makes no other warranty, either expressed or implied, and is not responsible for the interpretation by others of these data.

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**ABBREVIATIONS, ACRONYMS, AND SYMBOLS**

ADP	Advance Data Package
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film-forming foam
AST	aboveground storage tank
BLS	below land surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CS	Confirmatory Sampling
CSM	conceptual site model
DPT	direct push technology
ECHO	Enforcement and Compliance History Online
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FGDL	Florida Geographic Data Library
FRS	Facility Registry Service
ft	feet
GCTL	Groundwater Cleanup Target Level
GIS	geographic information system
KSC	Kennedy Space Center
KSCRT	KSC Remediation Team
LOC	Location of Concern
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
ng/L	nanograms per liter
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid

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**ABBREVIATIONS, ACRONYMS, AND SYMBOLS (CONTINUED)**

PFOS	perfluorooctanesulfonic acid
ppt	parts per trillion
PRISM	PRedictive Integrative Stratigraphic Modeling
PRL	Potential Release Location
RIS	Remediation Information System
RPM	Remediation Project Manager
SA	SWMU Assessment
SEMS	Superfund Environmental Management System
SSP	Space Shuttle Program
STP	sewage treatment plant
SWAPP	Source Water Assessment and Protection
SWMU	Solid Waste Management Unit
TEERM	Technology Evaluation for Environmental Risk Mitigation
Tetra Tech	Tetra Tech, Inc.
UCMR 3	Third Unregulated Contaminant Monitoring Rule
USEPA	United States Environmental Protection Agency
VAB	Vehicle Assembly Building
VSI	visual site inspection
WP	Work Plan



## **EXECUTIVE SUMMARY**

This document presents a description of solid waste management unit (SWMU) assessment activities that will be used to identify additional locations where per- and polyfluoroalkyl substances (PFAS) may have been used at the Kennedy Space Center (KSC). The activities described herein will also be used to identify potential off-Center sources of PFAS and potential background locations for PFAS within KSC.

The SWMU assessment (SA) activities will include a desktop review of resources that include:

- KSC data repositories, including the Remediation Information System (RIS), MSDSonline, and documents from the Technology Evaluation for Environmental Risk Mitigation (TEERM).
- Publicly available data sources, including:
  - Florida Department of Environmental Protection (FDEP) Map Direct, OCULUS, Contamination Locator Map, and PFAS Databases
  - Federal databases, including the Superfund Environmental Management System (SEMS), Enforcement and Compliance History Online (ECHO), and Facility Registry Service (FRS).
  - Aerial photography from collections managed by the Florida Department of Transportation (FDOT) and University of Florida.
  - Land use maps from the Florida Geographic Data Library (FGDL).

Staff interviews will be performed on current and former personnel with direct, reliable, credible knowledge of the use of PFAS-containing chemicals at KSC. Visual Site Inspections (VSIs) will be completed at the facility and at potential areas of interest to document physical evidence that supports data collected during the desktop review and staff interviews.

A brief summary of the results of the Phase I Solid Waste Management Unit Assessment and Confirmatory Sampling Report, Center-Wide Per- and Polyfluoroalkyl Substances (PFAS) Potential Release Location 237 is also included in this Work Plan.

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## **1.0 INTRODUCTION**

### **1.1 Overview**

This document is the Phase II Solid Waste Management Unit (SWMU) Assessment Work Plan (WP; Phase II SA WP), which describes Preliminary Assessment (PA) activities to be completed at National Aeronautics and Space Administration (NASA) Kennedy Space Center (KSC), Potential Release Location (PRL) 237 in Merritt Island, Brevard County, Florida (Figure 1-1). The PA activities will identify locations where per- and polyfluoroalkyl substances (PFAS) (e.g., metal plating, firefighting foams, sewage treatment, and water proofing) may have been used at KSC. In addition, other sites within a 4-mile radius of KSC (not under the control of KSC) that are potential sources of a PFAS release will also be identified. This WP focuses on the PA activities, and a companion WP, the PRedictive Integrative Stratigraphic Modeling (PRISM®) WP (PRISM WP), describes methods to be used to update the existing conceptual site model (CSM).

The Phase I SWMU Assessment and Confirmatory Sampling (CS) Report Center Wide PFAS PRL 237 (Phase I Report) (Geosyntec Consultants, 2019) presented PFAS sampling results for groundwater and surface water and included recommendations for further sampling. A forthcoming WP, the Phase II CS WP (Phase II CS WP) will be submitted later in 2020. The Phase II CS WP will describe sampling activities including locations/media identified in the Phase I Report, as well as additional locations/media selected based on information derived from this Phase II SA WP and the PRISM WP.

This document was prepared by AECOM Technical Services, Inc. (AECOM) on behalf of NASA under Prime Contract Number 80KSC019D0010, Task Order 80KSC019F0289.

### **1.2 Work Plan Objectives and Strategies**

The primary objective of this Phase II SA WP is to describe methods to be used to identify additional locations, beyond those assessed in the Phase I Report, where PFAS-containing materials/chemicals may be present at KSC. Supplemental objectives will be to identify other adjacent/surrounding businesses or operations, not under the control of KSC, that are potential sources of a PFAS release and to identify a potential background sampling location within KSC property. The primary strategies to be used during implementation of this Phase II SA WP are as follows:

- Perform a desktop review of existing information sources to identify potential PFAS use areas. The information sources will include data repositories specific to NASA, as well as online, publicly available information.
- Conduct personnel interviews with key NASA staff to identify known PFAS use areas. Visual site inspections (VSIs) will be performed to document physical evidence to supplement interview data.

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## **1.3 Work Plan Organization**

This WP is organized as follows:

**Section 1.0** Introduction - describes the purpose of the project, establishes the WP objectives and strategies, and presents this outline.

**Section 2.0** Phase I SWMU Assessment Overview - summarizes the assessment efforts, results, and recommendations from the Phase I Report.

**Section 3.0** Methods/Approach - describes the methods and resources to be used for data resource reviews, personnel interviews, and VSIs.

**Section 4.0** Reporting - describes the general content of the Phase II SWMU Assessment Report to be prepared for KSC.

**References** Provides a list of the references used to develop this document.

**Appendix A** Assessment Interview Questionnaires

**Appendix B** VSI Checklist

**Appendix C** Photographic Log

## 2.0 PHASE I REPORT OVERVIEW

The objective of the sampling activities described in the Phase I Report was to identify locations of concern (LOCs) associated with the storage, use, or release of materials containing PFAS at selected areas and to sample and analyze possible affected media. Potential source areas considered included aqueous film-forming foam (AFFF) storage and release areas such as fire training facilities and fire stations. Additional source areas evaluated included landfills, sewage treatment plants (STPs), sewage sludge disposal areas, and metal plating facilities.

Assessment activities described in the Phase I Report include: review of readily available information and reports related to the use, storage, and/or release of AFFF; identification of additional potential sources of PFAS; direct push technology (DPT) groundwater sampling; surface water sampling; and monitoring well sampling.

Between October 2018 and March 2019, 464 DPT groundwater samples were collected from 117 locations at depth intervals of 10, 25, 35, and 45 feet below land surface (ft BLS); 3 monitoring wells were sampled; and 37 surface water samples were collected at 36 locations. Samples collected were submitted for laboratory analysis of 14 PFAS constituents by United States Environmental Protection Agency (USEPA) Method 3535/537 Modified. The concentrations of perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and the summation of PFOA and PFOS (PFOA+PFOS) were evaluated against the provisional Groundwater Cleanup Target Level (GCTL) of 70 nanograms per liter (ng/L), equivalent to parts per trillion (ppt), as calculated by the University of Florida (Stuchal and Roberts, 2018) for FDEP. Overall, 33 LOCs were identified based on source area criteria. LOCs were grouped by geographical region (Northern, Central, and Southern), as shown on **Figure 2-1**.

- Northern Region - LOCs in and around the Vehicle Assembly Building (VAB) area and northern KSC (**Figure 2-2**);
- Central Region - LOCs south of the VAB area and north of the Industrial Area of KSC (**Figure 2-3**); and
- Southern Region - LOCs in and around the Industrial Area and southern KSC (**Figure 2-4**).

### 2.1 Phase I Report Results Summary

#### Northern Region Results

A total of 301 DPT groundwater samples from 37 locations, 27 surface water samples, and 3 monitoring well samples were collected. Provisional GCTL exceedances were observed in approximately 32 percent of samples collected. The groundwater and surface water samples with the highest PFOA+PFOS concentrations were collected at LOC 2 (Fire Station #2). The highest number of exceedances were observed in the 25 ft BLS samples, but the maximum detected concentration of PFOA+PFOS (73,910 ng/L) in the northern area was collected from 10 ft BLS. Generally, concentrations decreased with depth. Surface water results ranged from 12 to 2,180 ng/L PFOA+PFOS, with the highest concentration at LOC 2 (Fire Station #2).

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### **Central Region Results**

Approximately 231 DPT groundwater samples, 34 surface water samples, and 66 monitoring well samples were collected in the Central Region by Tetra Tech, Inc. (Tetra Tech) as of April 2019. Preliminary results and recommendations were presented at the April 2019 KSC Remediation Team (KSCRT) meeting and are summarized in the July 2019 Hydrocarbon Burn Facility, SWMU 007 PFAS CS Report (Tetra Tech, 2019). The highest concentration of PFOA+PFOS in groundwater samples (286,900 ng/L) was collected from 25-35 ft BLS downgradient of former large/small burn pans and former aboveground storage tanks (ASTs). One on-site surface water sample, three culvert samples, and two Banana River samples exceeded 70 ng/L; the highest surface water sample (28,895 ng/L) was collected along the southern portion of the Hydrocarbon Burn Facility.

### **Southern Region Results**

A total of 163 DPT groundwater samples were collected from 41 locations, and 10 surface water samples were collected from 9 locations in the Southern Region. Provisional GCTL exceedances were observed in approximately 34 percent of samples collected. The groundwater sample with the highest PFOA+PFOS concentration (245,100 ng/L) was collected from LOC 19 (Fire Station #1). Approximately 37 percent of the GCTL exceedances occurred in the 10 ft and 25 ft BLS samples, with a general decrease in concentration with depth. The highest surface water sample (979 ng/L) was collected in the Region I Stormwater Pond located in the eastern Industrial Area.

### **Center-Wide Results**

The results of the Phase I Report indicate PFAS impacts of groundwater and surface water at KSC, with 33 percent of groundwater samples collected in the combined Northern and Southern Regions exceeding provisional GCTLs for PFOA+PFOS. Generally, concentrations of PFOS and PFOA decreased with depth, with the fewest number of provisional GCTL exceedances observed in the 45 ft BLS interval. The highest concentrations in groundwater were associated with fire stations and known or likely releases of AFFF. Some STPs and sludge disposal area samples had concentrations that exceeded 10 times the provisional GCTL. PFOS was greater than PFOA in approximately 90 percent of samples collected, with PFOS up to 80 times the PFOA concentration. PFOS and PFOA were detected in every surface water sample.

## **2.2 Phase I Report Recommendations**

Continued SA and CS activities were recommended to further evaluate impacts at LOCs and to provide larger-scale delineation for PFAS. Recommended additional SA activities included the following:

- Investigating additional facilities that were not included under the Phase I Report or where limited information was reviewed;
- Conducting an on- and off-KSC well survey of potable, non-potable, and monitoring wells;
- Investigating the identified data gaps from the Phase I SA;

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- Identifying existing monitoring wells within the initial LOCs to sample for PFAS;
- Identifying a monitoring well network and installing staff gauges to assess regional and/or Center-wide groundwater flow and the interaction between groundwater and surface water;
- Resampling previous surface water sample locations to assess potential seasonal changes in concentrations; and
- Tracking drainage patterns to determine where surface water is coming from in different stormwater ponds, basins, and other water bodies.

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### 3.0 METHODS/APPROACH

The methods used to fulfill the objectives specified in Section 2.2 will include a desktop review of NASA-specific and publicly available data sources, and personnel interviews supplemented with VSIs.

#### 3.1 Desktop Review

The data review for KSC will include a comprehensive desktop review to obtain historical information relevant to past and current use and layout relevant to PFAS releases and archival search and data collection. The data review will focus on whether PFAS was stored, used, or spilled at the facility. The locations where PFAS entered the environment will be noted or the technical team will attempt to locate the most logical location on historical maps or photographs based on interviews or reports. In addition, historical information will be gathered that is related to other processes at the facility and businesses and/or operations adjacent to the KSC facility (not under the control of KSC) that use PFAS (i.e., metal plating and water proofing) and could potentially be the source of a PFAS release.

The desktop review will use data sources existing within NASA KSC, state, and federal resources to obtain historical information relevant to past and current use and relevant to PFAS releases. These sources include, but are not limited to, facility ownership and use, past assessments, water well inventory, tank storage records, landfills, biosolids, wastewater treatment plants, historical building uses, environmental investigations, records of firefighting events or training since 1960, historical record reviews, newspaper reports of firefighting, and historical photographs from 1960 to present relevant to AFFF or PFAS chemical use.

##### 3.1.1 NASA Data Sources

The following NASA data sources will be researched:

- **Remediation Information System (RIS).** The RIS database contains records related to the KSC Remediation Program, including reports, environmental media data, and meeting records. The RIS database will be searched for a variety of keywords (e.g., PFAS, AFFF, crash) to identify potential PFAS release locations. Additional keywords identified in other phases of this assessment (e.g., MSDS search) may also be included. The RIS database also contains a GIS element that contains an analytical query tool for current and historical sites. Common facility names for buildings (beyond those identified in the Phase I Report) that may have used PFAS compounds (e.g., hangars, refueling areas, emergency response site) will also be searched.
- **MSDSonline.** The NASA MSDSonline database will be searched to identify PFAS-containing chemicals that are used at KSC. The list of PFAS compounds will be derived from the USEPA PFAS Master List of PFAS Substances (USEPA, 2020). Identified materials will be incorporated into the interview questionnaires and a keyword search in RIS.

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- **Technology Evaluation for Environmental Risk Mitigation (TEERM).** The TEERM program was a part of NASA's Environmental Management Division, which sought to improve NASA's ability to adopt new environmental technologies. The TEERM team previously identified various components of the Space Shuttle Program (SSP) that used PFAS-containing materials (Meinhold, 2013). Although the TEERM program is now defunct, previous members will be interviewed to attempt to identify the specific components of the SSP that contained PFAS. This information will then be incorporated into the interview questionnaires and RIS keyword searches to identify locations at KSC in which these components were stored/handled.

### 3.1.2 Publicly Available Data Sources

The following publicly available data sources will be researched:

- **FDEP Map Direct Gallery.** The FDEP Map Direct Gallery will be used to identify potential sources of PFAS, not attributable to NASA, and possible receptors located within 4 miles of KSC. Information that will be obtained from the FDEP Map Direct Gallery includes:
  - **Contamination Locator Map** – contaminated sites that are currently under FDEP's cleanup oversight.
  - **Brownfields Map** – contaminated sites that have a current Brownfields Site Rehabilitation Agreement.
  - **Drycleaning Solvent Cleanup Program** – contaminated sites that are enrolled in the Drycleaning Solvent Cleanup Program. Drycleaning solvent sites have been identified as potential sources of PFAS in groundwater in Florida (Henry, Seguiti, and Watson [HSW] Engineering, Inc., 2019).
  - **Hazardous Waste Program Map** – contaminated sites that are currently enrolled in the Hazardous Waste Program.
  - **Institutional Controls Registry Map** – sites that have institutional control restrictions as defined by Florida Statutes 376.301 and 376.79. These sites can be petroleum cleanup, drycleaning solvent, Superfund, Resource Conservation and Recovery Act, Hazardous and Solid Waste Act, non-program sites (e.g., state enforcement or voluntary) and Brownfield areas.
  - **Solid Waste Disaster Debris Management Map** – sites that have been used to store debris created from natural disasters.
  - **Solid Waste Map** – sites that are solid waste management facilities or solid waste management test facilities.
  - **Storage Tank Regulation Map** – sites that are regulated under Storage Tank Compliance of the FDEP Permitting and Compliance Assistance Program. These sites have underground and above ground storage tanks.

- **Waste Cleanup Map** – sites that are currently enrolled in the FDEP Waste Cleanup Program.
- **2017 Map of Surface Water Plants and Drinking Water Map** – sites that provide treated water for public consumption.
- **Biosolids Sites** – sites in which residuals from wastewater treatment processes (i.e., biosolids) are applied.
- **Domestic Wastewater Facility Regulation and Wastewater Septic Systems** – sites that perform treatment of municipal wastewater.
- **Source Water Assessment and Protection (SWAPP) Map** – various sites, including drinking water supply wells and underground injection control wells.
- **Geologic Well and Borehole Data Map** – locations of groundwater wells.
- **Fire Training Facilities Assessment for PFOA and PFOS in the Environment** – locations of fire training facilities with known releases of PFOA and PFOS into the environment.
- **FDEP Databases.** The FDEP Contamination Locator Map and Electronic Document Management System (OCULUS) databases will be researched to identify potential non-KSC sources of PFAS. The Contamination Locator Map includes sites that are enrolled in various FDEP cleanup programs (e.g., Brownfield, Petroleum, Superfund). The OCULUS database is a repository of data and reports for each FDEP division. Sites identified with the Contamination Locator Map will be researched in OCULUS to determine which sites may be candidates for PFAS releases (e.g., fire training, electroplating, landfills).
- **FDEP PFAS Database.** The FDEP maintains a spreadsheet database of both confirmed and suspected sites with PFAS contamination (FDEP, 2019).
- **FGDL Metadata Explorer.** This database (FGDL, 2020) contains GIS information related to multiple data sources (e.g., Transportation Networks, Agriculture & Farming) that can be used to identify potential sources, or receptors, of PFAS.
- **Historical Aerial Photographs.** Online repositories of aerial photographs of KSC will be analyzed to provide additional information regarding the locations of PFAS releases. For example, the locations of historical polishing ponds (identified as data gaps in the Phase I Report) will be researched using historical images. Aerial photography sources will include the FDOT Aerial Photography Archive and the University of Florida Aerial Photography: Florida Collection.
- **Superfund Environmental Management System (SEMS).** The SEMS database contains information related to activities at hazardous waste sites managed under the USEPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
- **Enforcement and Compliance History Online (ECHO).** The ECHO database is used to search for information related to environmental compliance.

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- **Facility Registry Service (FRS).** The FRS is a USEPA database that can be queried by geographic location and North American Industry Classification System (NAICS) codes. Codes for potential PFAS source locations (e.g., airports, metal plating, sewage treatment) will be selected using methods described by Zhang and others (2016).

### **3.2 Interviews**

The interview process will begin with a coordination interview, held via telephone with the KSC Remediation Project Manager (RPM), and will include practical questions regarding data resources, various types of document repositories, and logistics, such as facility work schedule, restrictions on when interviews may occur, and access requirements. During this interview, the KSC RPM will assist in developing a list of employees with direct, reliable, credible knowledge of past or present conditions of the facility. Interviews of current and former personnel who were involved in operations at each facility will then be conducted.

A standard set of interview questions focused on AFFF use will be used and relevant information about each interviewee, their responses, and supplemental information provided by the interviewee will be recorded. Interview questions will also be focused on NASA KSC specific items derived from the desktop review phase. This will enable interview data to be combined for review and assessment. Correlation of the interview information may identify data gaps or conflicting data that require additional data gathering. The preliminary Interview Questionnaires are included in **Appendix A**. Specific questions will be altered based on results of the desktop review. Interview Questionnaires, including significant findings and opinions on the reliability of specific accounts, will be provided in the report.

### **3.3 Visual Site Inspections**

Visual Site Inspections (VSIs) will be completed at the facility and at potential areas of interest to document physical evidence that supports data collected during the historical records review and personnel interviews. The VSIs will include inspection from automobiles (windshield surveys) or walking surveys to help identify AFFF or other similar chemical storage, use, release, or disposal points. Personnel will use the VSI checklist in **Appendix B** to provide consistency and thoroughness at the KSC facilities and non-KSC facilities. Data to be collected include photographs of PFAS activities such as fire training, active fire, metal plating, and laundry facilities, as well as narrative descriptions. The AECOM team leader will also identify limitations, such as the restriction of photography, for security purposes and access issues. Photographs will be compiled into the photographic log in **Appendix C**.

### **3.4 Documentation of Nearby Off-Site PFAS Sources**

If the records research or interviews indicate that PFAS contamination may be emanating from a source off-site and/or adjacent to KSC, reconnaissance will be conducted in coordination with the current property owner of the potential off-site PFAS source, when possible. Decisions regarding off-site reconnaissance will be coordinated with the NASA RPM. Potential off-site PFAS

contamination sources will be evaluated using, but not limited to, the desktop review methods listed in Section 3.1.

### **3.5 Background Locations**

Background locations are defined as “...locations that are not influenced by the releases from a site...” (USEPA, 2002). It is noted that a background location on KSC may still potentially contain detectable PFAS, as these compounds are widespread in various environmental media (Vedagiri and others, 2018; USEPA, 2017). Potential background locations for PFAS derived from KSC sources will be identified using the desktop review methodology described in Section 3.1. In general, areas that have no evidence of previous industrial activity, no previous residences, no previous commercial activity, and are not hydraulically downgradient of these previous/current activities will be considered as potential background locations. Historical aerial photographs and database information from RIS will primarily be used to identify these areas. Results derived from the PRISM WP related to groundwater and surface water flow patterns will also be used to select potential background locations.

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#### **4.0 REPORTING**

A Phase II SWMU Assessment Report will be prepared to summarize the WP process and findings, and provide a conclusion on whether evidence suggests a release of PFAS at a determined LOC. The Phase II SWMU Assessment Report will include documentation from the data resource review, including findings from interviews and the VSI, identification of adjoining or adjacent assets likely to have PFAS releases, and analysis of compiled data. If a PFAS release source is identified during the process, the LOC will be included in the Phase II SWMU Assessment and Confirmatory Sampling Report.

Should evidence of a release be found that suggests off-site exposure to potential receptors, the AECOM Project Manager will immediately notify the KSC RPM.

Confirmatory sampling will be considered when written documentation that PFAS was stored, used, or accidentally released is discovered; information from employees or former employees with first-hand knowledge of a release or usage is obtained during interviews; and/or a weight-of-evidence case may be used that AFFF or other similar chemical materials were released to the environment.

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**PRL 237 PFAS Phase II SWMU Assessment Work Plan**

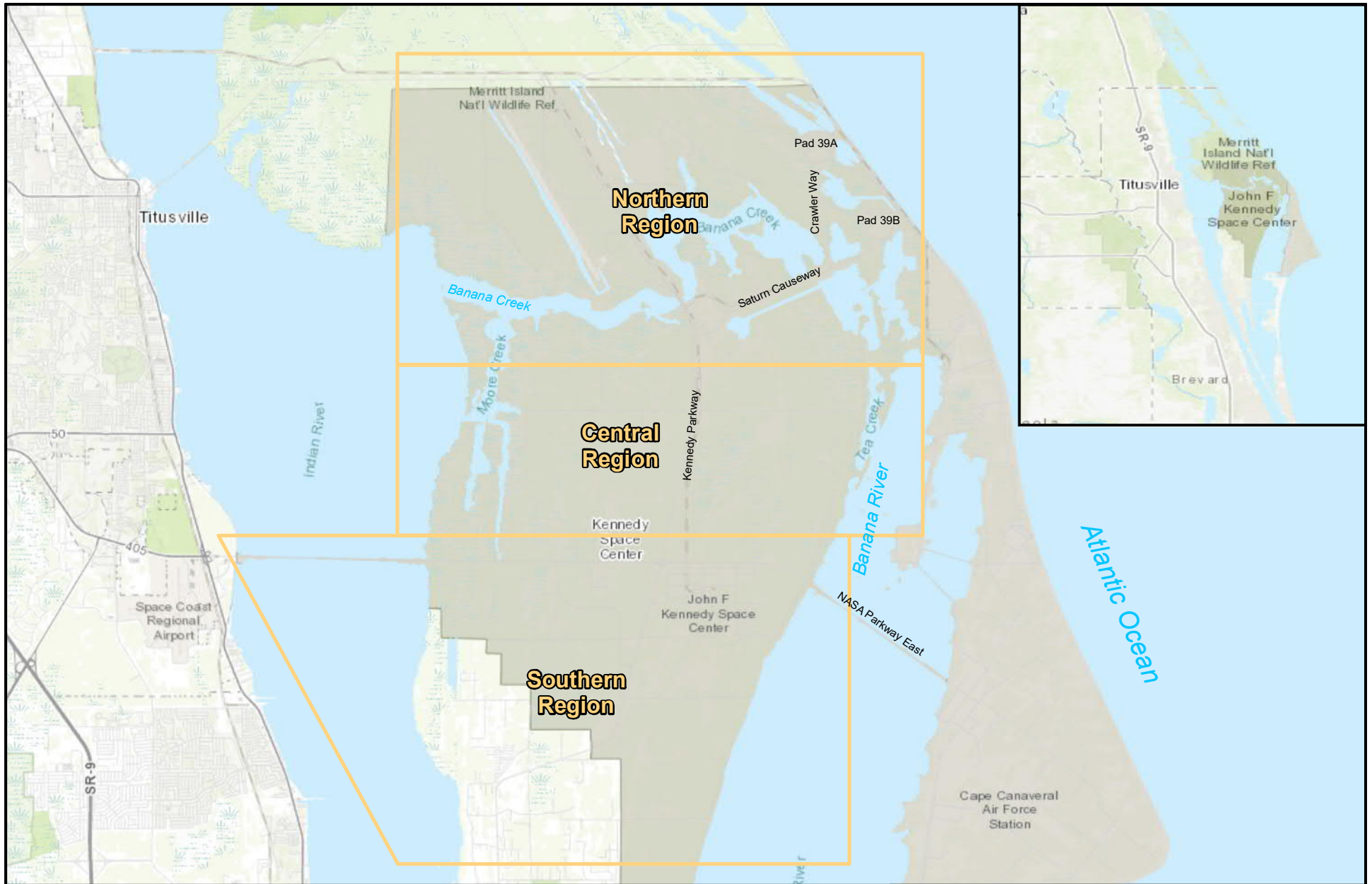
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**March 2020**

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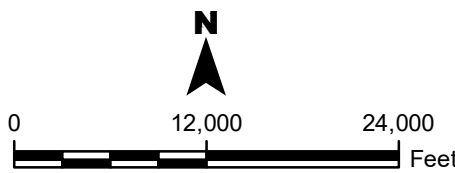
## **FIGURES**

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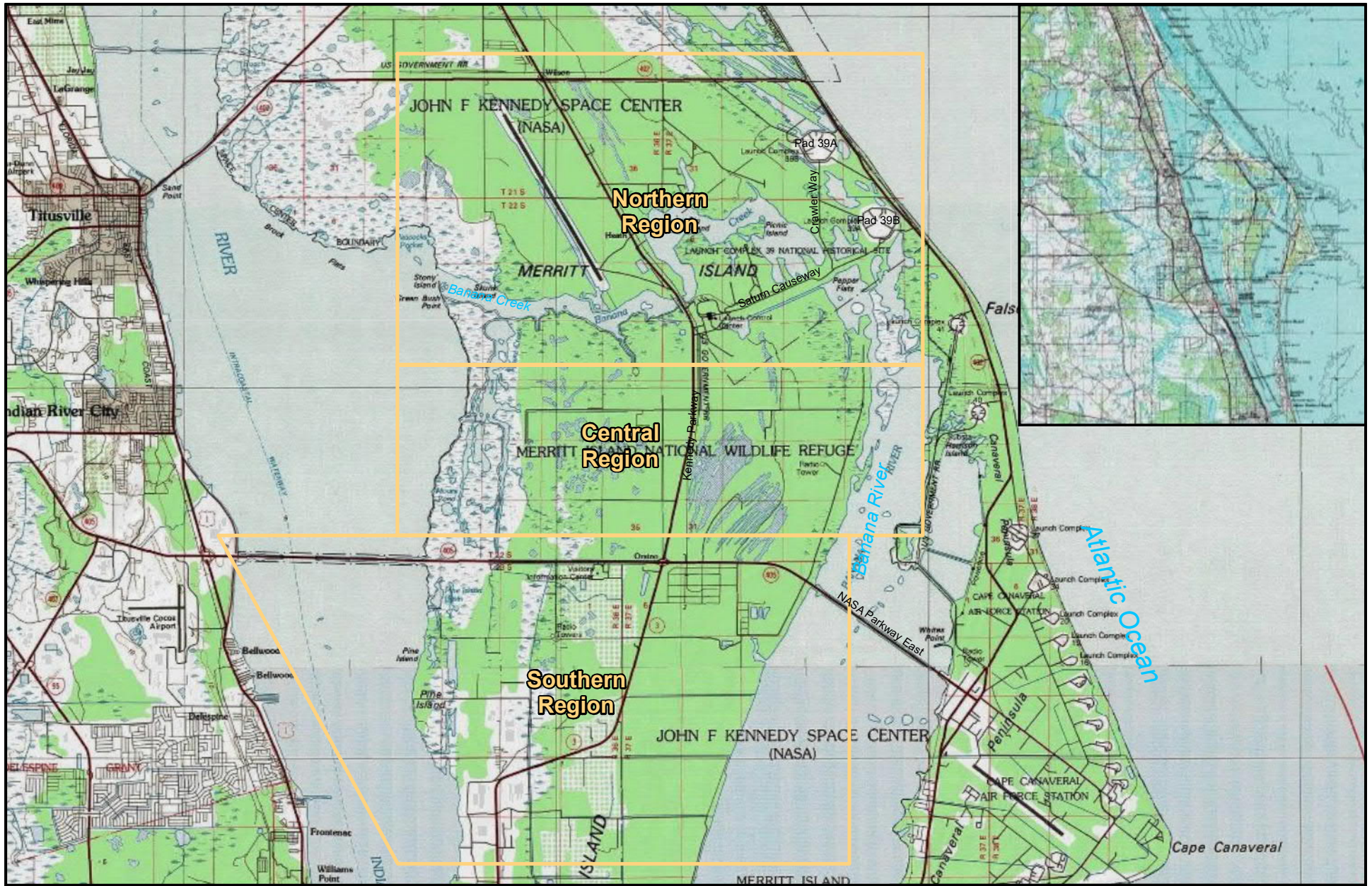
Notes:

- LOC = Location of Concern
- Region Delineation Derived From:  
*PHASE I SOLID WASTE MANAGEMENT UNIT ASSESSMENT AND CONFIRMATORY SAMPLING REPORT CENTER-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)*, Geosyntec Consultants dated September 2019

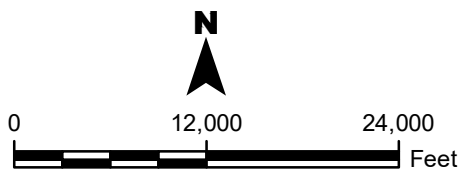


**FIGURE 1-1**  
**Kennedy Space Center Location Map**

NASA Kennedy Space Center, Florida



Notes:  
 • LOC = Location of Concern  
 • Region Delineation Derived From:  
 PHASE I SOLID WASTE MANAGEMENT UNIT ASSESSMENT AND  
 CONFIRMATORY SAMPLING REPORT  
 CENTER-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS),  
 Geosyntec Consultants dated September 2019



**FIGURE 2-1**  
**Kennedy Space Center Quadrangle Map**

NASA Kennedy Space Center, Florida

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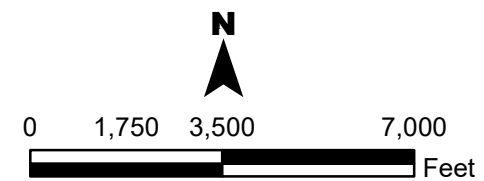
**Legend**

Regional Area

**Historical PFAS Sampling Area**  
**Proposed PFAS Sampling Area**

Notes:

- LOC = Location of Concern
- Historical and Proposed PFAS Sampling Areas derived from: PHASE I SOLID WASTE MANAGEMENT UNIT ASSESSMENT AND CONFIRMATORY SAMPLING REPORT CENTER-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), Geosyntec Consultants dated September 2019



**FIGURE 2-2**  
**Northern Region Locations of Concern**  
 NASA Kennedy Space Center, Florida

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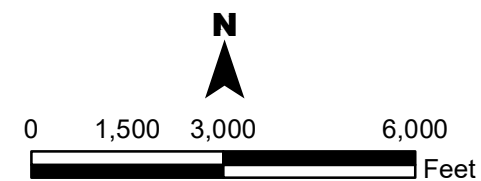


**Legend**

Regional Area

**Historical PFAS Sampling Area**  
**Proposed PFAS Sampling Area**

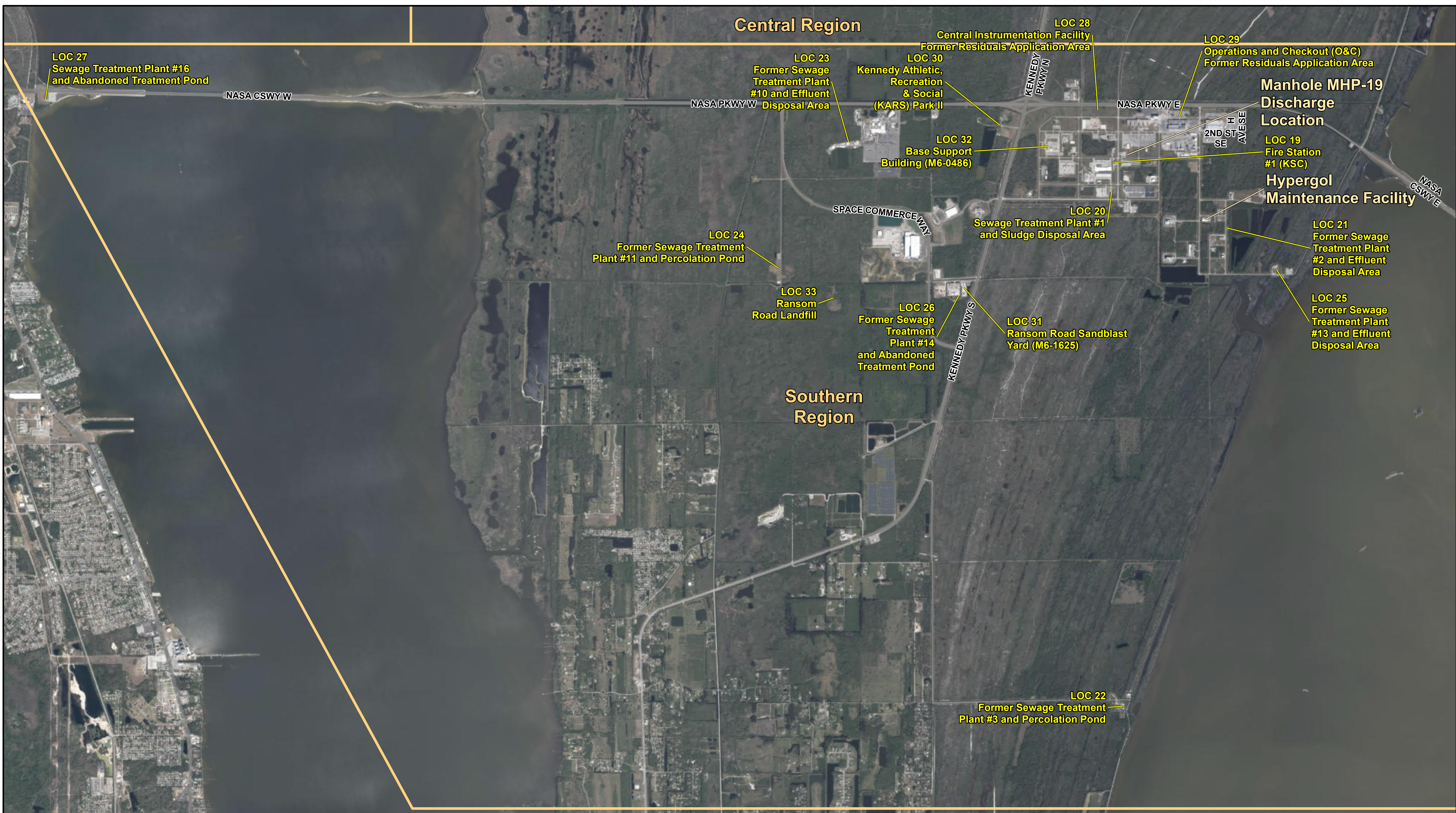
Notes:  
 • LOC = Location of Concern  
 • Historical and Proposed PFAS Sampling Areas derived from:  
 PHASE I SOLID WASTE MANAGEMENT UNIT ASSESSMENT AND CONFIRMATORY SAMPLING REPORT CENTER-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), Geosyntec Consultants dated September 2019



**FIGURE 2-3**  
**Central Region Locations of Concern**  
 NASA Kennedy Space Center, Florida



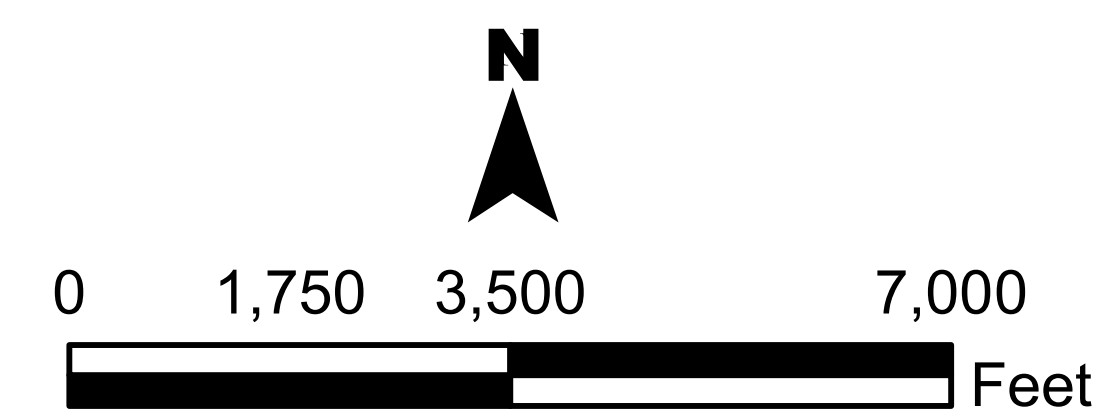
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**Legend**  
Regional Area

**Historical PFAS Sampling Area**  
Proposed PFAS Sampling Area

Notes:  
• LOC = Location of Concern  
• Region Delineation Derived From:  
*PHASE I SOLID WASTE MANAGEMENT UNIT ASSESSMENT AND CONFIRMATORY SAMPLING REPORT CENTER-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)*, Geosyntec Consultants dated September 2019



**FIGURE 2-4**  
**Southern Region Locations of Concern**  
NASA Kennedy Space Center, Florida

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**APPENDIX A**  
**ASSESSMENT INTERVIEW QUESTIONNAIRE**

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**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
*{Facility, Location}*

---

**Interviewee Name:** \_\_\_\_\_

**Interviewee Title:** \_\_\_\_\_

**Interviewee Email:** \_\_\_\_\_

**Interviewee Phone Number:** \_\_\_\_\_

**Date/Time of Interview:** \_\_\_\_\_

**Interviewer:** \_\_\_\_\_

➤ **Aerospace Industry**

---

1. Does the facility assemble, manufacture, use, repair, or store high-powered equipment associated with the aerospace industry such as aircraft, rockets, or space shuttle currently or in the past?
  - a. If so, what types of hydraulic fluids are/were used (i.e., fire resistant, water or oil-based) at this facility? Include manufacturer and brand names.
  - b. Where were they used/stored and how were they disposed of at the facility?
2. Were any space shuttle components manufactured, assembled, cleaned, or disposed of at the facility (e.g., external tank, rocket motors, orbiter, main engines, or solid rocket boosters)?
  - a. If so, please explain process and identify where these activities were completed.
  - b. Please indicate how long these activities were conducted (i.e., years).
3. Are/were flight crew equipment or space suits manufactured, assembled, cleaned, or disposed of at the facility? Are/were these materials treated with any materials to become fire-resistant or to repel stains/oil/water?
  - a. What type of fire/oil/stain/water-resistant materials were used? Please provide manufacturer/brand name.

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

- b. When (years) and where were these activities completed and materials stored?
  - c. How were used/waste materials disposed of at the facility.
4. Were/are specialty paints or coatings used at the facility? Specialty paints known to contain PFAS include antifouling, anti-graffiti, or anti-staining paints, and some latex paints. Were any flame-resistant paints used on equipment?
  - a. Please list types of specialty paints used at the facility and manufacturer brand names.
5. Please indicate when (timeframe) and where these paints were used and identify disposal processes for waste materials.
6. Are you aware of the use of any of the below mentioned products used at the facility:
  - a. Teflon aqueous fluoropolymer dispersion coating on Saint Gobain beta cloth (used in orbiter payload bay)
  - b. Echelon
  - c. Viton elastomers
  - d. Telomer products, such as Krytox or Braycote perfluoropolyether greases
7. Are you aware of the use of any other fluorinated compounds at the facility (look for “fluoro” in the SDS/MSDS chemical listing or product name, e.g., “fluorinated surfactant(s)” or “organic fluorosulfonate”)
  - a. If so, what are the names of the chemicals and amounts and concentrations used? Please provide the SDS/MSDS sheets for these chemicals and a description of where they are used in your process.

➤ **AFFF Use**

---

1. A. Was/is AFFF used at this facility?  
(If answer to this question is “yes,” then please answer questions 1B through 25 in this section. If answer is “no,” then please proceed to Other Non-AFFF PFAS Sources section.)
  - B. What type of AFFF was used at this facility (i.e. 3%, 6%, High Expansion Foam)?

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

2. What manufacturer's AFFF products have been used on this facility (i.e. 3M, Ansul, Chemguard)?
3. Where has AFFF solution been handled (mixed, contained, stored, transferred, etc.)?
4. Has AFFF been stockpiled as a reserve supply for the facility? If so, where at the facility and provide manufacture name and date on drum/containers.
5. Please list any buildings that have automated fire suppression systems that either currently or previously used AFFF. Please specify which are current and if known, the approximate year in which any systems were taken off line or retrofitted.
6. Please list any automated fire suppression systems that have been retrofitted for use of high expansion foam.
7. Are there records showing the amount of AFFF stored in your area, at the facility, or present in automated fire suppression systems? If so, where are they kept?
8. Please describe the procedure for how the suppression systems are recharged with AFFF.
9. Please describe the processes to contain and manage AFFF in the activation of fire suppressions systems? What is location of the discharge from the AFFF containment or hanger (building) floor drains? (storm water/surface water, WWTP or AFFF lagoon/pond)

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

10. Have there been accidental releases of AFFF from fire suppression systems? If so, the extent possible please describe:

- a. Building number/location.
- b. Was the release contained (either in the building, by a secondary containment system, etc.)?
- c. Year the accidental release occurred.
- d. Approximate quantity of AFFF released.
- e. How was it cleaned up?

11. How are AFFF releases handled (when the suppression system goes off)?

12. Who maintained the AFFF system? Are there maintenance records?

13. Provide a list of trucks and trailers, such as Aircraft Rescue Fire Fighting (ARFF) trucks, currently carrying AFFF. To the extent possible, please describe:

- a. Where are they parked/stored?
- b. How much AFFF (gallons) is carried or stored in the specified trucks and trailers?



**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

14. For both current and historical timeframes, please describe the process for testing/calibrating any mobile AFFF systems, including:

- a. How often are spray tests / calibration checks conducted?
  
  
- b. Where are the tests conducted?
  
  
- c. Given the location, are tests/calibration checks at the area released to the environment or contained in some way?

15. Please describe the procedure for how trucks and trailers are supplied with AFFF.

- a. Where does this resupply occur?
  
  
- b. Is there secondary containment in this area?
  
  
- c. What do you do with the empty concentrate containers?

16. Please describe the procedures for how these vehicles are cleaned/decontaminated.

- a. Where is the current vehicle cleaning/maintenance area?
  
  
- b. Are there previous areas where cleaning/maintenance was performed?

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

- c. Was AFFF contained during cleaning/maintenance or was it released to the environment?

17. Please describe current and previous AFFF equipment storage areas.

- a. Please describe procedures for how AFFF equipment is cleaned/decontaminated. Where has the equipment currently or formerly been maintained?

18. When AFFF was used during a fire training exercise, how was the AFFF cleaned up and disposed of?

19. Please provide location of any AFFF-related records, spill logs, or historical information.

20. Please describe, or provide records for, AFFF being used in response to:

- a. Fuel releases to prevent fires?
- b. Historical emergency response sites (i.e. crash sites and fires)?
- c. Emergency runway landings where foam might have been used as a precaution?
- d. How were the releases cleaned up?
- e. Were soils removed? If so, what happened to the soil?

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

21. If written records are unavailable or incomplete, please provide anecdotal or verbal information and location of spills or other emergency response incidents where AFFF was used.
22. What are the locations (other than Firefighting Training Areas) where:
- AFFF fire suppression systems are installed?
  - Where are these locations that currently contain or have contained AFFF (Building numbers)?
  - If converted from AFFF, when did they convert the system to high expansion foam?
23. Are there any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, bulk fuel tank farms, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste water treatment plants, and AFFF ponds/lagoons)?
24. Where are current and previous Firefighting Training Areas (FTA)? Please show their locations on a map.
- What are the years of operation for each FTA?
  - What types of fuels/flammable were used at the FTAs?
  - For inactive FTAs, when was the last time that fire training using AFFF was conducted at each one?

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

25. Are there any tenants that use AFFF?

➤ **Other Non-AFFF PFAS Sources**

Major non-AFFF PFAS sources include manufacturing facilities that utilized PFAS as a component of their products or operations. Potential secondary sources of PFAS from such operations include landfills and waste water treatment facilities. Manufacturing facilities known to have used PFAS-containing materials include textile and leather process facilities, paper mills, metal plating and etching facilities, wire manufactures as well as facilities that utilized surfactants, resins, molds, plastics, photography, and semiconductors. The Space Shuttle Orbiter and other shuttle components such as the external tank, rocket motors, main engines, solid rocket boosters, and flight crew equipment/space suits utilized PFAS-containing materials. Several spray coatings and greases associated with the aerospace industry are PFAS containing materials.

1. Is there anyone else or other facility organization personnel who might have information on non-AFFF PFAS sources? Please provide name, organization, position, phone number, email, etc.
  
2. Does the facility currently or previously operate a chrome-plating shop?
  - a. Identify location and timeframe of operation.
  
  - b. Were foams or wetting solutions ever used to suppress vapors in the process?
  
  - c. Were wastes from the plating shop disposed of onsite? If so, please list the landfill, if known.
  
3. Where does the facility water supply come from?

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

4. Are there irrigation, non-potable or potable water wells on-site? If yes, please explain water use practices (e.g., drinking, grass irrigation). Have wells been tested for PFAS compounds?
  
5. Please provide information regarding any spills or releases (either reported or unreported) of aircraft fuel, cleaners, or additives, and the names of these chemicals.
  
6. Are there on-facility waste water treatment plants (WWTPs)? What is the fate of the effluent, waste water treatment sludge, and biosolids from (e.g., land application, discharge to municipal water supply, irrigation, etc.)?
  
7. Are you aware of any diversionary flow valves for any pathways to the WWTP(s) that could prevent the WWTP treatment of wastewater or stormwater?
  
8. What is the fate of the effluent and sludge from facility oil/water separator (OWS)? Please specify the location of the OWS.
  
9. Are you aware of any current/former pesticide cleanout, storage, disposal, or maintenance areas?

➤ **LOCATIONS**

---

10. Please provide information on releases of any of the following list of substances in addition to AFFF and at which locations
  - a. **List of Materials**
    - i. Flame retardants
  
    - ii. Aviation hydraulic fluids
  
    - iii. Additional aircraft fluids (i.e., fuels, cleaners/detergents, regulated or unregulated additives)

**NASA PFAS Preliminary Assessment: Comprehensive Questionnaire**  
**{Facility, Location}**

---

- iv. Automotive fluids (i.e., fuels, cleaners/detergents, additives -regulated or unregulated)
- v. Foaming agents
- vi. Cleaning supplies
- vii. Fire-proof coatings (paints, enamels, varnishes, etc.)
- viii. Fire-proof materials (clothing, furniture, blankets, etc.)
- ix. Pesticides

- b. **If releases of above-listed materials have occurred**, please include known information regarding the fate of the release [i.e. did releases occur near drainage swales; were they washed to a pervious surface; did they occur on poorly maintained pervious surfaces (cracked concrete, porous asphalt, etc.); were they directed to a storm drain, trench drain, OWS, WWTP, etc.].

11. Please provide any other information regarding perfluorochemicals or substances of note not in above list. Products will have fluoro” in the SDS/MSDS chemical listing or product name. Please provide SDS/MSDS and how the chemical is used at the facility.

**PFAS Preliminary Assessment Questionnaire**  
**Emergency Response Personnel (Non-firefighter)**  
*{Facility, Location}*

---

Interviewee Name: \_\_\_\_\_

Interviewee Title: \_\_\_\_\_

Interviewee Email: \_\_\_\_\_

Interviewee Phone Number: \_\_\_\_\_

Date/Time of Interview: \_\_\_\_\_

Interviewer: \_\_\_\_\_

➤ **Facility Fire Department**

---

1. Does the facility have its own Fire Department? If not, is there a mutual aid agreement with the fire department that services the facility (e.g., local fire department or a DoD facility). Can you provide point of contact name and phone number for the fire department that services the facility?

➤ **AFFF Use, Storage, Handling, Spills**

---

1. Do you have recollection or records of AFFF being used at emergency response sites (such as plane, helicopter, or vehicle crash sites and fires), fuel releases to prevent fire, or emergency runway landings where foam might have been used as a precaution at the facility or at a location near the facility?

If so, please identify date and location(s).

2. Are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?
3. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

**PFAS Preliminary Assessment Questionnaire**  
**Emergency Response Personnel (Non-firefighter)**  
*{Facility, Location}*

---

4. Where is AFFF and AFFF equipment stored at the facility (currently and historically), and in what approximate quantities? (Please show locations on map provided.)
  - a. Please provide type of foam (i.e. 3%, 6%, High Expansion Foam) and manufacturer (i.e. 3M, Ansul, Chemguard)
  - b. Please describe procedures for how AFFF equipment is cleaned/decontaminated.
  - c. To the best of your knowledge, where has the equipment currently or formerly been maintained?

➤ **General Information**

---

1. Is there anyone else or other facility organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.
2. Are there other tenants at the facility that you service? If so, please provide name of tenant and point of contact (if available).
3. Are there any other tenants/tenant organizations that currently (or historically) use AFFF?



**PFAS Preliminary Assessment Questionnaire**  
**Fire Chief or Designee(s)**  
**{Facility, Location}**

---

Interviewee Name: \_\_\_\_\_

Interviewee Title: \_\_\_\_\_

Interviewee Email: \_\_\_\_\_

Interviewee Phone Number: \_\_\_\_\_

Date/Time of Interview: \_\_\_\_\_

Interviewer: \_\_\_\_\_

➤ **Facility Fire Department**

---

1. Does the facility have its own Fire Department? If not, is there a mutual aid agreement with the fire department that services the facility (e.g., local fire department or a DoD facility). Can you provide point of contact name and phone number for any other fire department(s) that services the facility?

➤ **AFFF Purchasing, Handling, and Storage**

---

1. Was perfluorinated AFFF historically or currently used on the facility? If so, provide any information regarding where and when.
2. Please provide type of foam (i.e. 3%, 6%, High Expansion Foam) and manufacturer (i.e. 3M, Ansul, Chemguard).
3. Where has the AFFF solution been handled (currently and historically) (such as mixed, contained, released for calibration, transferred)?
4. Where is AFFF and AFFF equipment stored at the facility (currently and historically), and in what approximate quantities? (Please show locations on map provided or describe locations).

## PFAS Preliminary Assessment Questionnaire

Fire Chief or Designee(s)

{*Facility, Location*}

- a. Please describe procedures for how AFFF equipment is cleaned/decontaminated.
  
- b. Where has the equipment currently or formerly been maintained?

### ➤ Firefighting Training Areas

---

1. Are any current or historical Firefighting Training Areas (FTAs) present on the facility? If yes, please show the location/s of the FTAs on the map provided.
  
2. To the best of your knowledge, what are/were the years of operation for each FTA you identified in your answer to Question #1 above?
  
3. How many FTAs are currently active? Inactive (historical in nature)? To the extent possible, please specify which are active versus historical.
  
4. Were fuels/flammables other than “typical” (such as JP-5, #2 Fuel Oil) used at the FTAs? If yes, what was used?
  
5. For inactive FTAs, to the best of your knowledge, when was the last time that fire training using AFFF was conducted at each one?
  
6. When AFFF was used during a fire training exercise, was the AFFF used contained and disposed, and if so, how was the AFFF cleaned up and disposed?

## PFAS Preliminary Assessment Questionnaire

Fire Chief or Designee(s)

{*Facility, Location*}

---

7. Are current and historical FTAs lined? If so, with anything other than concrete?

### ➤ Hangars and Buildings

---

1. To the best of your knowledge, which areas (such as hangars, buildings, fuel or hazardous waste storage areas) historically had or currently have automated and/or manually-activated AFFF fire suppression systems?
2. Please describe how the suppression systems are supplied with AFFF (that is, is system contained within the building, or are there separate buildings that serve to mix AFFF to supply one or more hangars with suppression systems).
3. Please describe the fire suppression system layout/activation process and if available, provide system plans or drawings.
4. When the fire suppression system engages/or engaged, what is the current, and if different, historical response process for cleaning up and removing released AFFF?
5. Have there been inadvertent releases of AFFF from hangar fire suppression systems (such as equipment failure)? If so, please provide additional details (such as when, in which hangars/buildings, could the release be quantified, was the release removed or cleaned up)?
6. Who was responsible for current or historical routine maintenance of the AFFF system/s? Were maintenance records kept, and if so where are they located?

## PFAS Preliminary Assessment Questionnaire

Fire Chief or Designee(s)

{*Facility, Location*}

---

7. For any historical activation (accidental, testing, or in response to an emergency) of AFFF systems within hangars and/or buildings, provide any information regarding the fate of the release (that is, did releases occur near drainage swales; were they washed to a pervious surface; did they occur on poorly maintained pervious surfaces [cracked concrete, porous asphalt]; were they directed to a storm drain, trench drain, oil/water separator [OWS], wastewater treatment plant).

### ➤ Trucks and Trailers

---

1. Provide a list of current and historical parking/storage areas for AFFF equipment.
2. Were the trucks currently and historically tested for spray patterns to make sure equipment is working properly? If so, how often and where are/were these spray tests performed?
3. What is the procedure on how trucks and trailers are/were supplied with AFFF?
  - a. Where does/did this resupply occur?
  - b. Is/was there secondary containment in this area?
  - c. What happens to the empty AFFF containers?

## PFAS Preliminary Assessment Questionnaire

Fire Chief or Designee(s)

{*Facility, Location*}

- 
4. What is the procedure for how these vehicles are/were cleaned, and where is/was vehicle cleaning performed (currently as well as historically)?

### ➤ **Records, Spill logs, and Historical Information**

---

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?
2. Do you have recollection or records of AFFF being used in response to the following:
  - a. Fuel releases to prevent fires
  - b. Emergency response sites (such as plane, helicopter, or vehicle crash sites and fires)
  - c. Emergency runway landings where foam might have been used as a precaution
  - d. Other
3. If yes to #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed?
4. In the potential absence of written records or incomplete written records, can you provide

**PFAS Preliminary Assessment Questionnaire**  
**Fire Chief or Designee(s)**  
**{Facility, Location}**

---

anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that haven't already been previously discussed?

5. What are the current and historical storage location(s) of the wreckage from emergency response incidents?

➤ **General Information**

---

1. Is there anyone else or other facility organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.
2. Are there other tenants at the facility that you service? If so, please provide name of tenant and point of contact (if available).
3. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?

**PFAS Preliminary Assessment Questionnaire**  
**GIS Personnel and Facility Historian/Librarian**  
{*Facility, Location*}

---

Interviewee Name: \_\_\_\_\_

Interviewee Title: \_\_\_\_\_

Interviewee Email: \_\_\_\_\_

Interviewee Phone Number: \_\_\_\_\_

Date/Time of Interview: \_\_\_\_\_

Interviewer: \_\_\_\_\_

➤ **Infrastructure Maps, Records, Spill logs, Historical Information**

---

1. Does the facility maintain current and historical GIS data/mapping (e.g., subsurface infrastructure).
2. Are there historical aerial photographs and other facility historical information (e.g., maps, photographs) in archive?
3. Are the following types of documents/records associated with AFFF available (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs or database, documentation of AFFF releases, photo interpretation)?
4. Can you provide anecdotal/verbal information and locations of fuel-related spills or emergency response incidents where AFFF was used ?

➤ **General Information**

---

1. Is there anyone else or other facility organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.

**PFAS Preliminary Assessment Questionnaire**  
**Hangar Managers, Fire Suppression System Managers, and Fire Protection Engineers**  
*{Facility, Location}*

---

Interviewee Name: \_\_\_\_\_

Interviewee Title: \_\_\_\_\_

Interviewee Email/phone number: \_\_\_\_\_

Interviewee Phone Number: \_\_\_\_\_

Date/Time of Interview: \_\_\_\_\_

Interviewer: \_\_\_\_\_

➤ **Hangars and Buildings**

---

1. Which areas (such as hangars, buildings, fuel or hazardous waste storage areas) historically had or currently have AFFF fire suppression systems?
2. To the best of your knowledge, please describe the procedure on how the suppression systems are supplied with AFFF (that is, is the system contained within the building, or are there separate buildings that serve to mix AFFF to supply one or more hangars with suppression systems).
3. Please describe the fire suppression system layout/activation process and if available, provide system plans or drawings.
4. When the fire suppression system engages/or was engaged, what is the current, and if different, historical response process for cleaning up or removing AFFF?
5. To the best of your knowledge, have there been inadvertent releases of AFFF from hangar fire suppression systems (such as equipment failure)? If so, please provide additional details (such as when, in which hangars/buildings, quantification of release, and how the release was removed or cleaned up).



**PFAS Preliminary Assessment Questionnaire**  
**Hangar Managers, Fire Suppression System Managers, and Fire Protection Engineers**  
**{Facility, Location}**

---

6. Who was responsible for current or historical routine maintenance of the AFFF system/s? Were maintenance records kept, and if so where are they located?
  
7. To the best of your knowledge, for any historical activation (accidental, testing, or in response to an emergency) of AFFF systems within hangars and/or buildings, provide any information regarding the fate of the release (that is, did releases occur near drainage swales; were they washed to a pervious surface; did they occur on poorly maintained pervious surfaces [such as cracked concrete, porous asphalt]; were they directed to a storm drain, trench drain, oil/water separator [OWS], or wastewater treatment plant)?

➤ **AFFF Purchasing, Handling, and Storage**

---

1. Was perfluorinated AFFF historically or currently used at the facility? If so, provide information regarding where and when.
  
2. Please provide type of foam (i.e. 3%, 6%, High Expansion Foam) and manufacturer (i.e. 3M, Ansul, Chemguard).
  
3. Where has the AFFF solution been handled (currently and historically) (such as mixed, contained, released for calibration, transferred)?
  
4. Where is AFFF and AFFF equipment stored at the facility (currently and historically), and in what approximate quantities? (Please show locations on map provided or describe locations).
  - a. Please describe procedures for how AFFF equipment is cleaned/decontaminated.

**PFAS Preliminary Assessment Questionnaire**  
**Hangar Managers, Fire Suppression System Managers, and Fire Protection Engineers**  
**{Facility, Location}**

---

- b. To the best of your knowledge, where has the equipment currently or formerly been maintained?

➤ **Hydraulic Fluids and Specialty Paints**

---

1. Does the facility assemble, manufacture, use, repair, or store high-powered equipment associated with the aerospace industry such as aircraft, rockets, or space shuttle currently or in the past?
  - a. If so, please describe activities and timeframes these activities were conducted.
  - b. What types of hydraulic fluids are/were used (i.e., fire resistant, water or oil-based) at this facility? Include manufacturer and brand names.
  - c. Where were they used/stored and how were they disposed of at the facility?
  - d. Please provide any other information regarding perfluorochemicals or substances of note. Products will have fluoro” in the SDS/MSDS chemical listing or product name. Please provide SDS/MSDS.
2. Were/are specialty paints or coatings used or stored at the facility? Specialty paints known to contain PFAS include antifouling, anti-graffiti, or anti-staining paints, and some latex paints. Were any flame-resistant paints used on aircraft/equipment or stored at the facility?
  - a. Please list types of specialty paints used/stored at the facility and manufacturer brand names.

➤ **Location Information**

---

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:
  - a. Stormwater conveyances/outfalls that drain runways, taxiways, and aprons

**PFAS Preliminary Assessment Questionnaire**  
**Hangar Managers, Fire Suppression System Managers, and Fire Protection Engineers**  
**{Facility, Location}**

---

- b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)
  
- c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)
  
- d. Water supply wells (such as potable, agricultural, industrial)
  
- e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)
  
- f. Other

➤ **General Information**

---

1. Is there anyone else or other facility organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.
  
2. Are there any other tenants/tenant organizations that currently (or historically) use AFFF?
  
3. Please provide any other information regarding perfluorochemicals or substances of note not in above list. Products will have fluoro” in the SDS/MSDS chemical listing or product name.

**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
*{Facility, Location}*

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Interviewee Name: \_\_\_\_\_

Interviewee Title: \_\_\_\_\_

Interviewee Email: \_\_\_\_\_

Interviewee Phone Number: \_\_\_\_\_

Date/Time of Interview: \_\_\_\_\_

Interviewer: \_\_\_\_\_

➤ **Facility Information**

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1. Is there a Teflon-coating shop at the facility? Historically? Provide location and timeframe of operation.
  
  
  
  
  
  
  
  
  
  
2. Is there a chrome-plating shop at the facility? Historically? Timeframe of operation?
  - a. Please describe process including the types of surfactants, wetting agents, fume suppressants used in the plating process. Was foam used to suppress vapors in the process?
  
  
  
  
  
  
  
  - b. Were any of the following demisters/defoamers/surfactant products used at the plating facility?
    - ANKOR Wetting Agent F (manufactured by Enthone)
    - Clepo Chrome Mist Control (manufactured by MacDermid Inc.)
    - Fumetrol 140 Mist Suppressant
    - Benchmark Benchbrite STX or Benchmark CFS
    - MacDermid Proquel B or Macuplex STR
    - Brite Guard AF-1 fume control

**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
**{Facility, Location}**

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3. Where are the current or former locations of auto hobby shops and car/truck washes?
  
4. Are there supply wells of any kind at the facility (such as, potable, irrigation, industrial) If yes, please explain water use practices. Have wells been tested for PFAS compounds?
  
5. Where are the current and historical landfills/disposal sites at the facility? What are the estimated years of use for each location? Confirm known landfills/disposal sites on map.

➤ **Aerospace Industrial Processes**

---

1. Does the facility assemble, manufacture, use, repair, or store high-powered equipment associated with the aerospace industry such as aircraft, rockets, or space shuttle currently or in the past?
  - a. If so, please describe activities and timeframes these activities were conducted.
  - b. What types of hydraulic fluids are/were used (i.e., fire resistant, water or oil-based) at this facility? Include manufacturer and brand names.
  - c. Where were they used/stored and how were they disposed of at the facility?
  - d. Please provide any other information regarding perfluorochemicals or substances of note. Products will have fluoro" in the SDS/MSDS chemical listing or product name. Please provide SDS/MSDS.
  
2. Were/are specialty paints or coatings used or stored at the facility? Specialty paints known to contain PFAS include antifouling, anti-graffiti, or anti-staining paints, and some latex paints. Were any flame-resistant paints used on aircraft/equipment or stored at the facility?
  - a. Please list types of specialty paints used/stored at the facility and manufacturer brand names.

**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
*{Facility, Location}*

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➤ **Industrial Wastewater Treatment Plant (IWTP) or Sanitary Wastewater Treatment Plant (WWTP)**

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1. Does the facility currently have (or has the facility historically had) an IWTP or WWTP? If yes, what are/were the timeframe of use and where is effluent from the IWTP and WWTP discharged to?
  
2. Which buildings and drainage features, including OWSs, discharge to the IWTP and/or WWTP?
  
3. Does the facility utilize oil water separators (OWSs) for the collection and separation of petroleum where AFFF might have been used for operations (such as, Fire Training Areas, Hangers, Maintenance Operations)? If so, to where did the OWSs discharge (such as WWTP, outfalls), and are there drawings available for the construction of these systems?
  
4. How are/have sludges, waste concentrates, and biosolids from the IWTP, WWTP, and OWS been disposed of?
  - a. If known, where are any current or historical drying beds/spray fields/sludge lagoons? Please identify the approximate location/s of such features on the facility map provided.
  
  - b. If known, has any sludge been land-applied at the facility for fertilizer or for use as landfill cover? If so, please identify the approximate location/s of such features on the facility map attached?
  
5. Are there any current or historical diversionary flow valves that would allow for waste to bypass the facility's treatment plant(s)?

**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
{*Facility, Location*}

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➤ **Paints and Pesticide Use/Storage/Release**

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1. Do you know if specialty paints containing PFAS were used in large quantities at the facility? These paints include antifouling, anti-staining, or some latex formulations. If so, please provide paint storage warehouse and disposal locations.
  
2. How are unused or waste paints managed?
  
3. Do you know if pesticides were stored, mixed or used in large quantities at the facility? If so, please provide pesticide storage warehouse and disposal locations.
  
4. How are unused or waste pesticides managed?

➤ **Records, Spill logs, Historical Information**

---

1. To the best of your knowledge, are there any current or historical data/documents/records associated with AFFF that we may review/copy (such as reports/work plans, historical or operational records, incident reports, crash data, inspection reports, AFFF spill logs, documentation of AFFF releases, photo interpretation)?
  
2. Do you have recollection or records of AFFF being used in response to the following:
  - a. Fuel releases to prevent fires

**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
**{Facility, Location}**

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- b. Emergency response sites (such as, plane, helicopter, or vehicle crash sites and fires)
  
  - c. Other
3. If yes to Question #2, please provide any information you have regarding how and if the releases were addressed and how any released material (including foam and contaminated soil) was disposed.
4. In the potential absence of written records or incomplete written records, can you provide anecdotal/verbal information and locations of spills or other emergency response incidents where AFFF was used that have not already been previously discussed?
5. What are the current and historical storage location(s) of the wreckage from emergency response incidents (if wreckage is stored outside)?

➤ **Location Information**

---

1. If not already covered in previous questions, please provide any information on releases of AFFF that may have been diverted to or could have impacted the following items/areas:
- a. Stormwater conveyances/outfalls that drain AFFF release areas
  
  - b. Stormwater management system (such as drainage swales, outfalls, retention/detention basins)



**PFAS Preliminary Assessment Questionnaire**  
**Public Works and Facility's O&M Personnel**  
**{Facility, Location}**

---

- c. Industrial or sanitary wastewater treatment system (such as storm drain, sanitary sewer, OWS, building and plumbing drains)
  
- d. Water supply wells (such as potable, agricultural, industrial)
  
- e. Large-scale disposal (such as landfilling, land application of WWTP sludge, washing, dumping)
  
- f. Other

➤ **General Information**

---

1. Is there anyone else or other facility organization personnel that you would recommend we interview? Name, organization, position, phone number, e-mail.
  
2. Are there any other tenants/tenant organizations that currently (or historically) use/used AFFF?
  
3. Are you aware of the use of any other fluorinated compounds at the facility (look for “fluoro” in the SDS/MSDS chemical listing or product name, e.g., “fluorinated surfactant(s)” or “organic fluorosulfonate”)
  - b. If so, what are the names of the chemicals and amounts and concentrations used? Please provide the SDS/MSDS sheets for these chemicals and a description of where they are used in your process.

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**APPENDIX B**  
**VSI CHECKLIST**

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# Visual Site Inspection Checklist

Names(s) of people performing VSI: \_\_\_\_\_

Recorded by: \_\_\_\_\_

Contact: \_\_\_\_\_

Date and Time: \_\_\_\_\_

Method of visit (walking, driving, adjacent): \_\_\_\_\_

## ***Source/Release Information***

**Site Name / Area Name / Unique ID:** \_\_\_\_\_

**Site / Area Acreage:** \_\_\_\_\_

**Historic Site Use (Brief Description):** \_\_\_\_\_

**Current Site Use (Brief Description):** \_\_\_\_\_

**Physical barriers or access restrictions:** \_\_\_\_\_

1. Was PFAS used (or spilled) at the site/area?  Y /  N

1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014): \_\_\_\_\_

2. Has usage been documented?  Y /  N

2a. If yes, keep a record (place electronic files on a disk): \_\_\_\_\_

3. What types of activities are located near the site? **Industrial / Commercial / Plating / Waterproofing / Residential**

3a. Indicate what activities are located near the site \_\_\_\_\_

4. Is this site located at an airport/flightline?  Y /  N

4a. If yes, provide a description of the airport/flightline tenants: \_\_\_\_\_

# Visual Survey Inspection Log

## Other Significant Site Features:

1. Does the facility have a fire suppression system?  Y /  N
- 1a. If yes, indicate which type of AFFF has been used:  
\_\_\_\_\_  
\_\_\_\_\_
- 1b. If yes, describe maintenance schedule/leaks:  
\_\_\_\_\_  
\_\_\_\_\_
- 1c. If yes, how often is the AFFF replaced:  
\_\_\_\_\_  
\_\_\_\_\_
- 1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?  
\_\_\_\_\_  
\_\_\_\_\_

## *Transport / Pathway Information*

### Migration Potential:

1. Does site/area drainage flow off installation?  Y /  N
- 1a. If so, note observation and location:  
\_\_\_\_\_
2. Is there channelized flow within the site/area?  Y /  N
- 2a. If so, please note observation and location:  
\_\_\_\_\_
3. Are monitoring or drinking water wells located near the site?  Y /  N
- 3a. If so, please note the location:  
\_\_\_\_\_
4. Are surface water intakes located near the site?  Y /  N
- 4a. If so, please note the location:  
\_\_\_\_\_
5. Does an adjacent non-KSC PFAS source exist?  Y /  N
- 5a. If so, please note the source and location.  
\_\_\_\_\_
- 5b. Will off-site reconnaissance be conducted?  Y /  N

## Visual Survey Inspection Log

### Significant Topographical Features:

1. Has the infrastructure changed at the site/area?  Y / N  
1a. If so, please describe change (ex. Structures no longer exist):  
\_\_\_\_\_
2. Is the site/area vegetated?  Y / N  
2a. If not vegetated, briefly describe the site/area composition:  
\_\_\_\_\_
3. Does the site or area exhibit evidence of erosion?  Y / N  
3a. If yes, describe the location and extent of the erosion:  
Unknown  
\_\_\_\_\_
4. Does the site/area exhibit any areas of ponding or standing water?  Y / N  
4a. If yes, describe the location and extent of the ponding:  
\_\_\_\_\_

### ***Receptor Information***

1. Is access to the site restricted?  Y / N  
1a. If so, please note to what extent:  
\_\_\_\_\_
2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**  
2a. Circle all that apply, note any not covered above:  
\_\_\_\_\_
3. Are residential areas located near the site?  Y / N  
3a. If so, please note the location/distance:  
\_\_\_\_\_
4. Are any schools/day care centers/sensitive receptors located near the site?  Y / N  
4a. If so, please note the location/distance/type:  
\_\_\_\_\_
5. Are any wetlands located near the site?  Y / N  
5a. If so, please note the location/distance/type:  
\_\_\_\_\_

## Visual Survey Inspection Log

*Additional Notes*

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**APPENDIX C**  
**PHOTOGRAPHIC LOG**

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## APPENDIX – Photographic Log

Kennedy Space Center, Florida	Location Name	City, State
<b>Photograph No. 1</b>		
<b>Description:</b>		
<b>Photo Date:</b> <b>Direction:</b>		
<b>Photograph No. 2</b>		
<b>Description:</b>		
<b>Photo Date:</b> <b>Direction:</b>		

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