



**STATEMENT OF BASIS
SUPPLY WAREHOUSE NO. 3, SWMU 88
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
KENNEDY SPACE CENTER**

PURPOSE OF STATEMENT OF BASIS

This Statement of Basis (SB) has been developed to inform and give the public an opportunity to comment on the proposed remedy to address contamination at Supply Warehouse No. 3 (SW3)¹. A Kennedy Space Center (KSC) Remediation Team consisting of National Aeronautics and Space Administration (NASA) and Florida Department of Environmental Protection (FDEP) personnel has determined that the proposed remedy is cost effective and protective of human health and the environment. However, before implementing the proposed remedy, the KSC Remediation Team would like to provide the public an opportunity to comment on the proposed remedy. At any time during the public comment period, the public may comment as explained in the “How Do You Participate” section of this SB. After the end of the public comment period, the KSC Remediation Team will review all comments and issues raised in the comments and determine if there is a need to modify the proposed remedy prior to implementation.

WHY IS A REMEDY NEEDED?

The results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report indicated that chlorinated

volatile organic compounds (CVOCs) listed in Table 1 are present in site groundwater which could potentially be harmful to human health.

HOW DO YOU PARTICIPATE?

The KSC Remediation Team solicits public review and comment on this SB before implementing the proposed remedy. The remedy for SW3 will eventually be incorporated into the Hazardous and Solid Waste Amendments (HSWA) Permit for KSC.

The public comment period for this SB and proposed remedy will begin on the date of publication for notice of availability of the SB in major local newspapers of general circulation, and end 45 days thereafter. If requested during the comment period, the KSC Remediation Team will hold a public meeting to respond to any oral comments or questions regarding the proposed remedy. To request a hearing or provide comments,

<p>The Cleanup Remedy</p> <p>The proposed cleanup remedy for SW3 includes the following components:</p> <ul style="list-style-type: none"> • Implementation of institutional controls to prohibit use of site groundwater. • Air sparging in the aggressive remediation zone. • Monitored natural attenuation in the low concentration plume.

¹ In accordance with RCRA §7004(b), this Statement of Basis summarizes the proposed remedy for the NASA SW3 site. For detailed information on the site, consult the SW3 administrative file, which is available for review by contacting the KSC Environmental Program Office at telephone number (321) 867-8411.

contact the following person in writing within the 45-day comment period:

Mr. John R. Armstrong, P.G.
FDEP - Bureau of Waste Cleanup
2600 Blair Stone Road, MS 4535
Tallahassee, FL 32399-2400

The HSWA Permit, SB, and associated administrative file, including the RFI Report, will be available to the public for viewing and copying at:

NASA Document Library
Merritt Island Public Library
1195 N. Courtenay Pkwy
Merritt Island, FL 32953
Telephone: (321) 455-1369

To request further information, you may contact one of the following people:

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FACILITY DESCRIPTION

NASA established KSC as the primary launch site for the space program. These operations have involved the use of toxic and

hazardous materials. Under the RCRA and applicable HSWA permit (Permit No. 0026028/HO/001) issued by FDEP and/or Environmental Protection Agency (EPA), KSC was required to perform an investigation to evaluate the presence or absence of contamination at Solid Waste Management Unit (SWMU) No. 88, SW3.

SITE DESCRIPTION AND HISTORY

SW3 is a NASA-operated facility that is located in the Industrial Area of KSC and encompasses approximately 12 acres, which includes one numbered building, SW3 (M6-891). SW3 was constructed in 1967 and, according to facility personnel, the building has reportedly been used for the same purpose since it was constructed, which is to store drywall, door frames and other building materials. The site location with inset showing the site layout is shown on Figure 1.

Investigations conducted at the site include:

- 2003: A SWMU Assessment (SA) was conducted to identify potential impacts to environmental media at the Communications, Maintenance, and Storage (CM&S) Facility, related to site operations. At the time, SW3 was considered part of the larger CM&S facility. The SA identified SW3 as a Location of Concern (LOC) which warranted further investigation in the RFI.
- 2004: RFI activities were conducted at the CM&S facility in a phased approach. The Phase I and II activities at CM&S indicated that there was a distinct source area at SW3. Therefore, SW3 was

identified as a separate SWMU and RFI activities were completed for SW3 independent of activities at CM&S.

- 2005: An RFI was conducted to characterize the nature and extent of contamination at SW3. Samples of soil and groundwater were collected to evaluate the presence or absence of contamination. CVOCs were detected in site groundwater above FDEP residential groundwater cleanup target levels (GCTLs). The footprint of the CVOC plume was in the southeastern portion of the site, extending from the water table (approximately 4 ft below land surface (BLS)) to 50 ft BLS.
- 2006: A Corrective Measures Study (CMS) was prepared to identify and evaluate potential technologies to efficiently and cost effectively obtain cleanup levels at SW3. CMS investigation activities were performed as part of the CMS, which focused on gathering supplemental data to support the final selection and design of the remedial alternative for SW3. The CVOC groundwater plume was further delineated, to include the southeastern section of the site and adjacent areas south and east of the facility. The contamination was separated into two remediation treatment zones, an aggressive remediation zone where trichloroethene (TCE) impacts were above Natural Attenuation Default Criteria (NADCs) and a low concentration plume, where CVOCs were detected above GCTLs, as shown on Figure 2.

SUMMARY OF SITE RISK

As part of the RFI activities a Preliminary Risk Evaluation (PRE) was completed in accordance with KSC's Remediation Team Risk Assessment Decision Process Document (DPD).

Human health chemicals of concern (COCs) in groundwater were identified by comparing the maximum detected concentration of each constituent against FDEP GCTLs. If the maximum concentration of a chemical exceeded the GCTL, it was retained as a COC.

The COCs identified for human health during the RFI were CVOCs in groundwater. For a complete list of COC concentrations in groundwater see Table 1. Due to the lack of ecological habitat present at SW3, no unacceptable ecological risk exists.

WHAT ARE THE REMEDY OBJECTIVES AND LEVELS?

The remedial action objectives (RAOs) are to limit the site to industrial uses, protect humans from exposure to groundwater by preventing its use as a drinking water source and restore groundwater quality for potential future use. Table 1 lists the COCs present in groundwater at SW3. The first column lists the chemical name, the second column lists the range of concentrations detected in groundwater at SW3 during the CM&S and SW3 RFIs and the SW3 CMS, and the last column presents the FDEP cleanup target levels to be achieved at the site.

Corrective Measures Objectives (CMOs) for this site are phased, with the Phase I goal to

reduce the aggressive remediation zone source area TCE concentrations to less than the NADC, and the Phase II goal is to achieve GCTLs for all CVOCs.

Table 1
**REMEDIAL ALTERNATIVES FOR
 SUPPLY WAREHOUSE NO. 3**

Site-Related Chemicals of Concern (COCs)	Range of Detections (µg/L)	Site-Specific Cleanup Level ¹ (µg/L)
trichloroethene (TCE)	3.11 to 42,700	300/3
cis-1,2-dichloroethene (cDCE)	73.8 to 21,200	700/70
trans-1,2-dichloroethene (tDCE)	122 to 614	1,000/100
1,1-dichloroethene (1,1-DCE)	7.74 to 4,100	70/7
vinyl chloride (VC)	1.2 to 2,360	100/1

¹Cleanup levels are NADC/GCTLs (FAC 62-777)(Phase II CMO).

The RFI performed for the SW3 facility identified that the CVOC plume footprint above GCTLs covered an area of 178,000 ft² and the TCE impacts above NADCs (aggressive remediation zone) were limited to a footprint of 20,500 ft² (less than ½ acre). Remedial alternatives are different combinations of plans or technologies to restrict access, and to contain or treat contamination to protect public health and the

environment. Since the low concentration plume concentrations are less than NADCs, monitored natural attenuation (MNA) has been selected as the presumptive remedy. The alternatives evaluated for the aggressive remediation zone follow.

Aggressive Remediation Zone Corrective Measures:

- Pump and Treat with MNA
- Air Sparging with MNA
- Enhanced Bioremediation with MNA

For all remedies, groundwater will be regularly sampled and analyzed to monitor and document the decrease in contaminant concentrations. In addition, institutional controls will be implemented for site groundwater. The institutional controls will maintain the site as an industrial area to avoid exposure of future residents. The institutional controls will also prevent the use of groundwater as a drinking water source. NASA, EPA, and FDEP have entered a Memorandum of Agreement (MOA), which outlines how institutional controls will be managed at NASA². The MOA requires periodic inspections, condition certification, and agency notification. The area of the site that will be under institutional control is shown on Figure 3.

² By separate MOA effective February 23, 2001, with the EPA and FDEP, KSC, on behalf of NASA, agreed to implement Center-wide, certain periodic site inspections, condition certification, and agency notification procedures designed to ensure the maintenance by Center personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Center's substantial good faith compliance with the procedures called for herein, reasonable assurances would be provided to EPA and FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by NASA KSC, EPA and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Center's substantial good faith compliance with the specific LUC maintenance commitments reflected herein. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

EVALUATION OF REMEDIES

The selected remedies were evaluated to determine if they will comply with EPA’s four threshold criteria and five balancing criteria for corrective measures. The four threshold criteria for corrective measures are:

- overall protection of human health and the environment;
- attain media cleanup standards;
- control the sources of releases; and
- comply with standards for management of wastes.

The five balancing criteria are:

- long-term reliability and effectiveness;
- short-term effectiveness;
- reduction in the toxicity, mobility, and volume of wastes;
- implementability; and
- cost.

Based on the detailed evaluation performed for the CMS Report, air sparging with MNA meets each of the threshold criteria and was determined by the KSC Remediation Team to be the best overall approach.

FINAL REMEDY

Air Sparging : The air sparging system will focus remediation efforts on the approximate ½-acre aggressive remediation zone. Once the air sparge system Phase I CMO is achieved (TCE less than 300 mg/L), MNA will continue at the site until GCTLs are achieved (Phase II CMO; see Table 1). Figure 4 presents the conceptual air sparge

treatment layout for SW3. Design specifications of the remediation system will be presented in the Corrective Measures Design (CMD) Report.

Monitored Natural Attenuation: MNA entails the use of natural processes (chemical, physical, and biological) to reduce CVOC concentrations. Chemical MNA processes include volatilization, sorption, and hydrolysis. Physical MNA processes include dilution due to infiltration, advection, and dispersion. Biological MNA processes include biological consumption due to electron acceptor reactions (reductive dechlorination), electron donor reactions, and cometabolism. All of these processes combine to reduce CVOC concentrations over time. The area surrounding the air sparge system will be remediated through MNA.

Institutional Controls: Institutional land use controls will be implemented to prohibit use of site groundwater. The area of the site that will be under institutional control for groundwater is shown on Figure 3.

WHAT IMPACTS WOULD THE REMEDY HAVE ON THE LOCAL COMMUNITY?

There would be no impacts to the local community because administrative actions to limit access to the site are consistent with current operating procedures, and the current and projected future land use of the SW3 is industrial in nature.

WHY DOES THE KSC REMEDIATION TEAM RECOMMEND THIS REMEDY?

The Team recommends the proposed remedy because:

- The chemical properties of the CVOCs and site conditions are well suited to the application of the selected technology.
- Air sparging is an aggressive remediation technology, which is expected to rapidly reduce TCE concentrations, immobilize the plume, and result in a reasonable remediation timeframe.
- Air sparging activities can be readily implemented without significant disruption to the site.
- The recommended alternative does not create potential exposure risks associated with bringing contaminated groundwater to the surface where human exposure and/or releases to the environment can occur.

- MNA of exceedances is a cost effective approach for monitoring CVOC dechlorination in the low concentration plume and for monitoring in the aggressive remediation zone once Phase I CMOs are achieved.
- Air sparging of the aggressive remediation zone is a cost-effective method for treatment of this relatively small area.

NEXT STEPS

The KSC Remediation Team will review all comments on this SB to determine if the proposed remedy needs modification prior to implementation and prior to incorporating the proposed remedy into KSC's HSWA permit. If the proposed remedy is determined to be appropriate for implementation, a Land Use Control Implementation Plan (LUCIP) will be developed to incorporate the institutional controls at this site and the air sparge system will be designed and implemented.

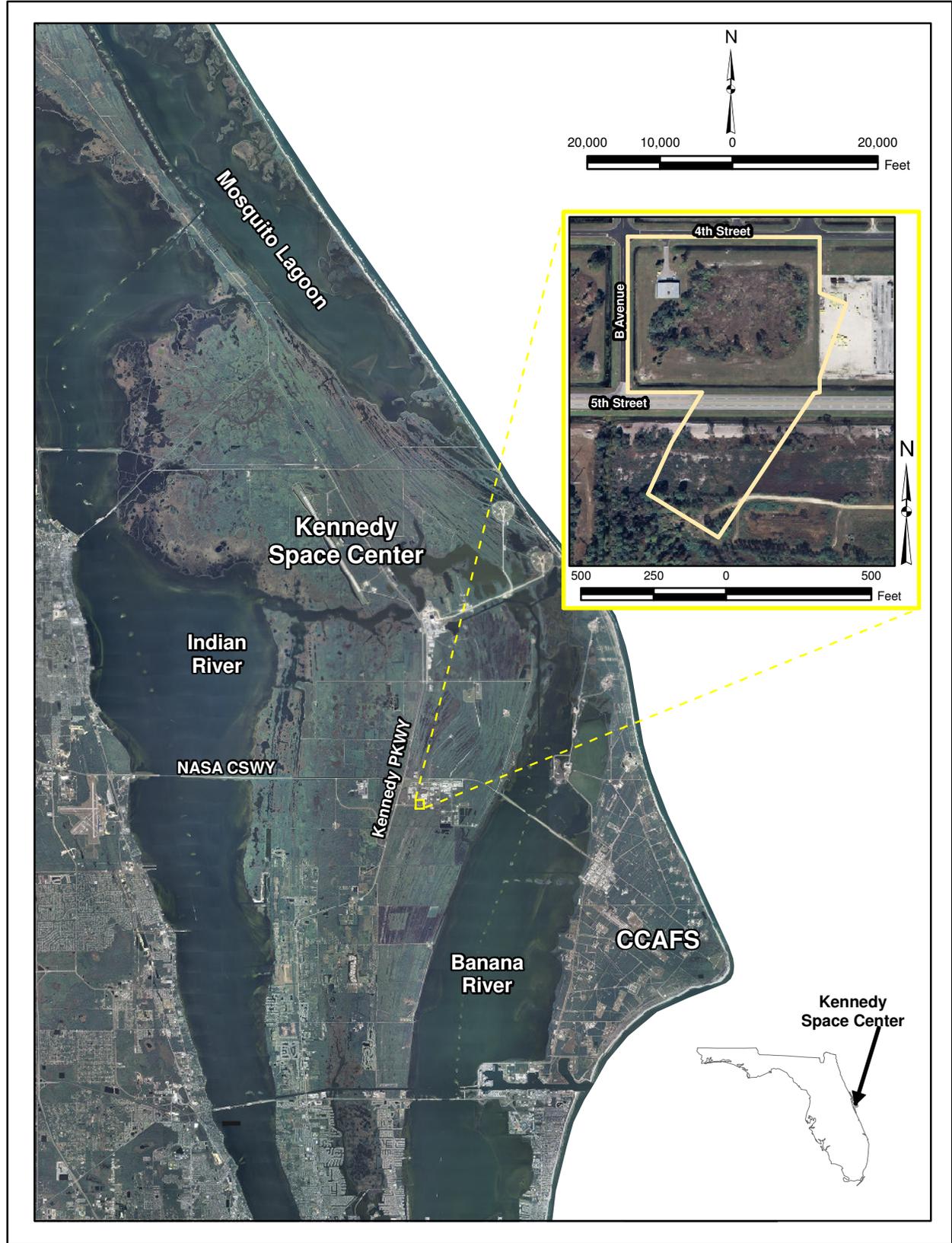


Figure 1
Site Location Map



Figure 2
Remediation Treatment Zones

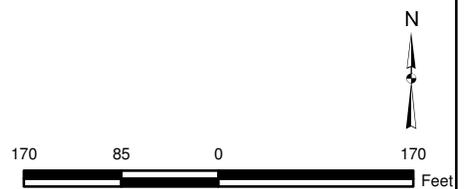
Legend

-  Shallow Monitoring Well Location showing screen interval (ft BLS)
-  Intermediate Monitoring Well Location showing screen interval (ft BLS)

 Aggressive Remediation Zone

 Total VOC GCTL Footprint (Low Concentration Plume)

Note:
ft BLS = feet below land surface.



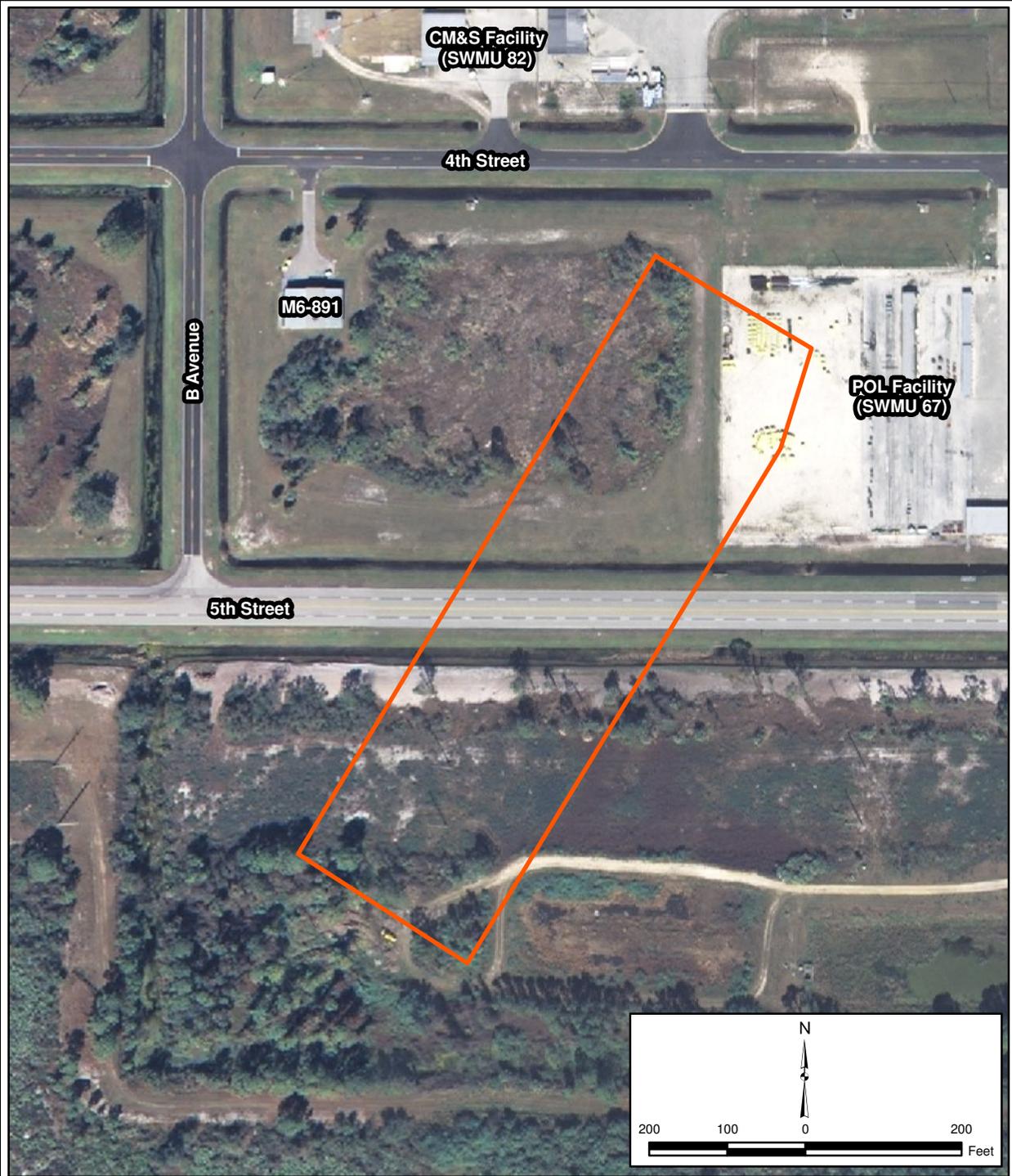


Figure 3
Groundwater Use Control Area

Legend

 Area Covered by Groundwater Use Control



Figure 4
Conceptual Air Sparge Treatment Layout

Legend

-  Shallow Monitoring Well Location showing screen interval (ft BLS)
-  Intermediate Monitoring Well Location showing screen interval (ft BLS)
-  Air Sparge Point with approximate radius of influence (15 ft)
-  Aggressive Remediation Zone

Note: ft BLS = feet below land surface.

