



STATEMENT OF BASIS

CITGO SERVICE STATION (PRL 129) NATIONAL AERONAUTICS AND SPACE ADMINISTRATION KENNEDY SPACE CENTER BREVARD COUNTY, FLORIDA

PURPOSE OF STATEMENT OF BASIS

This Statement of Basis (SB) has been developed to inform and give the public an opportunity to comment on a proposed remedy to address contamination at the CITGO Service Station (CGO; the Site). The Site is located in the Industrial Area of the Kennedy Space Center (KSC), south of the Headquarters Building (M6-0399) and is currently operated as a Mobil Service Station as shown on [Figure 1](#). The facility is located in Section 5, Township 23S, and Range 37E, in the Orsino Quadrangle. The KSC Remediation Team (KSCRT), 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, prior to implementation of the proposed remedy, the KSCRT would like to give an opportunity for the public 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 KSCRT 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 site assessment activities indicated that benzene, total xylenes, methyl tert-butyl ether (MTBE), and naphthalene (listed in Table 1) are present in groundwater above regulatory criteria, which could be potentially harmful to human health if this water is potentially used now or in the future.

HOW DO YOU PARTICIPATE?

The KSCRT solicits public review and comment on this SB before implementing the proposed remedy. The remedy for the CGO will be incorporated into the next update of the Hazardous and Solid Waste Amendments (HSWA) Permit for KSC.

<p>The Cleanup Remedy</p> <p>The proposed cleanup remedy for the CGO includes the following components:</p> <ul style="list-style-type: none"> • Attenuation of benzene, total xylenes, MTBE, and naphthalene in groundwater through naturally occurring processes. • Monitoring of groundwater to document natural attenuation of benzene, total xylenes, MTBE, and naphthalene. • Implementation of institutional controls to prohibit use of groundwater.
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The public comment period for the SB will coincide with the date of publication for notice of availability of the HSWA Permit in major local newspapers of general circulation and will end 45 days thereafter.

If requested during the comment period, the KSCRT will hold a public meeting to respond to any oral comments or questions regarding the proposed remedy.

To request a hearing or to provide comments, contact the following persons in writing within the 45-day comment period:

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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 Resource Conservation and Recovery Act (RCRA) and applicable HSWA permit (Permit No. 0026028-HO-005) issued by the FDEP, KSC was required to perform an investigation to determine the nature and extent of contamination from Potential Release Location (PRL) 129, the CGO.

SITE DESCRIPTION AND HISTORY

The CGO area is approximately 1.5 acres in size. The CGO was constructed in 1967 and formerly known as the NASA Union 76. In the mid-1990s the name changed to the NASA Exchange Council Service Station. In early 2000, the name was changed to the CITGO Service Station and became a Mobil Station in 2011. The station is used to dispense gasoline, diesel fuel, and ethanol and also used as a service station for automobile repairs. There is currently one compartmentalized 22,000-gallon underground storage tank (UST) at the Site that contains unleaded gasoline and diesel fuel. A 5,000-gallon ethanol above ground storage tank (AST) and ethanol dispenser is located on the northeast corner of the paved area east of M6-0596.

The area around the facility and fuel canopy are paved. Grassy areas are present to the north and east of the PRL. The Site is bordered by 3rd Street SE to the south and C Ave SE to the west as shown on [Figure 1](#).

The Site contains two structures, the main building (M6-0596) and the fuel canopy (M6-0596A) as shown on [Figure 2](#).

The following investigations have been conducted at the Site.

Closure Assessment Report (1991)

In 1991 a Closure Assessment Report was completed to support the replacement of four USTs. Groundwater and soil samples collected during these activities indicated that there were no environmental impacts and a No Further Action (NFA) status was requested for the Site.

Interim Measure (1993)

In 1993, an oil spill was documented. Soil samples were collected and confirmed the presence of total recoverable petroleum hydrocarbons (TRPH) in soil. The contaminated soil was removed to a depth of 10-inches below land surface. Confirmatory soil samples indicated that no additional impacts were present at the Site.

SWMU Assessment (2005)

A SWMU Assessment Report (SAR) was completed in 2005 to assess the potential for historical and current activities to have affected the environment. Five locations of concern (LOC) were identified:

- LOC 1: Electrical Transformer Locations
- LOC 2: Former Waste Oil Separator Unit
- LOC 3: Storage Shed Area
- LOC 4: Stormwater Inlets and Discharge Points
- LOC 5: Perimeter Surficial Groundwater

Confirmatory Sampling (2005-2006)

CS activities were conducted in 2005, and the results indicated that the soil at the CGO were impacted with copper, carbazole, MTBE and TRPH above applicable screening criteria. TRPH was detected above residential and industrial Soil Cleanup Target Levels (SCTLs). Carbazole was detected above the leachability to groundwater SCTL. Total xylenes exceeded the FDEP Groundwater Cleanup Target Level (GCTL). MTBE exceeded the FDEP GCTL and Natural Attenuation Default Concentration (NADC). Additional soil sampling was recommended for copper, carbazole, and TRPH. Additional groundwater sampling was recommended to

delineate petroleum constituents in groundwater.

Confirmatory Sampling Report Addendum (2006)

The additional soil sampling results did not confirm the copper, TRPH, and carbazole exceedances of screening criteria. TRPH in groundwater was confirmed and a complete delineation was recommended to be performed in accordance with the FDEP Petroleum Program Chapter 62-770, Florida Administrative Code (FAC).

Petroleum Site Assessment Report (2007)

Soil and groundwater samples were collected to complete the horizontal and vertical delineation of petroleum constituents. Thirteen monitoring wells were installed and sampled to support these activities. The soil sampling results indicated that carcinogenic polynuclear aromatic hydrocarbons (cPAHs) were detected above the FDEP residential direct-exposure SCTLs in one sample collected below the water table. The leachability criteria was not exceeded; therefore soil was recommended for NFA Groundwater cPAH concentrations were below the FDEP GCTLs. Benzene, ethylbenzene, total xylenes, MTBE, and naphthalene were detected in direct-push technology (DPT) groundwater samples at concentrations exceeding FDEP GCTLs. Groundwater samples collected from monitoring well indicated benzene, total xylenes, MTBE, and naphthalene exceeded FDEP GCTLs. Based on the groundwater sampling results, the Site was recommended for a Remedial Action Plan to address groundwater contamination.

Pilot Study Report and Remedial Alternatives Evaluation (2009)

Two pilot tests were conducted at the Site to assess the remedial technologies for treating petroleum affected groundwater. An in situ air sparge (IAS)/soil vapor extraction (SVE) pilot study was conducted in 2009. The pilot study data indicated that the lithology at the Site limited the effectiveness of the system and a full scale system was not recommended. The second pilot study was implemented to assess the effectiveness of in situ selected chemical oxidation to reduce the COCs present at the Site. The in situ selected chemical oxidant RegenOx™ was injected into the subsurface under pressure. A tracer was injected to assess the distribution and movement of the oxidant in the subsurface. The results of this pilot study also indicated that lithology limited oxidant distribution and the technology was not further evaluated as a remedial alternative. Based on the results of the pilot tests, long-term monitoring (LTM) was recommended and approved as the remedy for the Site.

UST Closure Report (2010)

Activities to support the removal of three USTs and associated piping, and dispensers were completed during the upgrade to one 22,000-gallon compartmentalized UST. The soil sampling and temporary monitoring well analytical results indicated all COCs were below applicable screening criteria in this vicinity and NFA was recommended for the UST, dispensers, and associated piping.

Annual Long-Term Monitoring Report (2011)

Activities included the collection of 26 depth to groundwater levels and groundwater samples from 26 monitoring wells during May and November 2010. The monitoring

wells screened in the 2 to 12 ft bls, 32.5 to 37.5 ft bls, and 42.5 to 47.5 ft bls depths were all below applicable screening criteria and were recommended for removal from the LTM program. In the 22.5 to 27.5 ft bls interval, one monitoring well exceeded the GCTL for naphthalene; two monitoring wells exceeded the FDEP GCTL for MTBE; and one monitoring well exceeded the FDEP GCTL for total xylenes. In addition, one monitoring well exceeded the FDEP GCTL and NADC for benzene.

WHAT ARE THE REMEDY OBJECTIVES AND LEVELS?

The remedial action objective (RAO) is to protect humans from exposure to groundwater that exceeds FDEP cleanup target levels by prohibiting use of site groundwater. Table 1 lists the COCs present in groundwater. The first column lists the chemical name, the second column lists the range of concentrations detected in monitoring wells, and the last column presents the site specific cleanup target level.

Table 1

Site-Related COC	Range of Detections (µg/L)	GCTL ¹ (µg/L)
Benzene	0.24 to 410	1
Naphthalene	0.054 to 22.9	14
MTBE	0.65 to 300	20
Total Xylenes	0.31 to 239	20

¹ Cleanup levels established by Chapter 62-777 FAC

REMEDIAL ALTERNATIVES FOR THE CGO

Remedial alternatives are different combinations of plans or technologies to restrict access, and to contain or treat contamination to protect human health and the environment.

Land Use Controls and Natural Attenuation with Long-Term Monitoring:

Because the heterogeneous soil located at the Site limited the effectiveness of remedial technologies, land use controls were selected as the Site remedy.

Under this alternative, material processes such as biological degradation, dispersion, advection, and adsorption will reduce COC concentrations to cleanup levels over time.

Groundwater will be regularly sampled and analyzed to monitor and document the decrease in COC concentrations. In the long-term this alternative will meet the RAO. Ongoing evaluation of the alternative will be conducted to determine whether the remedy is working and to provide an opportunity for change if necessary.

In addition, institutional controls will be implemented to prohibit the use of groundwater. NASA and the FDEP have entered into a Memorandum of Agreement (MOA) that outlines how institutional controls will be managed at NASA². Controls will include periodic inspection, condition

certification, and agency notification. The area of the Site that will be under institutional control is shown on [Figure 3](#).

EVALUATION OF REMEDY

The selected remedy was evaluated to determine if it will comply with the four threshold criteria and five balancing criteria established 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 following are the five balancing criteria considered for corrective measures:

- Long-term reliability and effectiveness;
- Short-term effectiveness;
- Reduction in the toxicity, mobility, and volume of wastes;
- Implementability; and
- Cost.

Land Use Controls and natural attenuation with LTM meet the threshold criteria and were determined to be the most appropriate

² By separate MOA effective February 23, 2001, with the FDEP and 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 the 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, 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.

approach with respect to consideration of the balancing criteria.

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 projected future land use of the CGO is industrial in nature.

WHY DOES THE KSCRT RECOMMEND THIS REMEDY?

The KSCRT recommends the proposed remedy because the naturally occurring processes observed at the Site are sufficient for the reduction of benzene, naphthalene, MTBE, and total xylenes concentrations in groundwater to RAOs. LTM will be used to monitor and document reduction in the COC concentrations to the cleanup target levels.

The institutional controls will also prevent exposure to contaminants prior to the cleanup levels being achieved. The proposed remedy meets the four threshold standards for corrective measures and was determined to be the best overall approach with respect to the balancing criteria.

NEXT STEPS

The KSCRT 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, then a LTM program will be initiated, and a Land Use Control Implementation Plan will be developed to incorporate the institutional controls at this Site.



Legend

 PRL Boundary

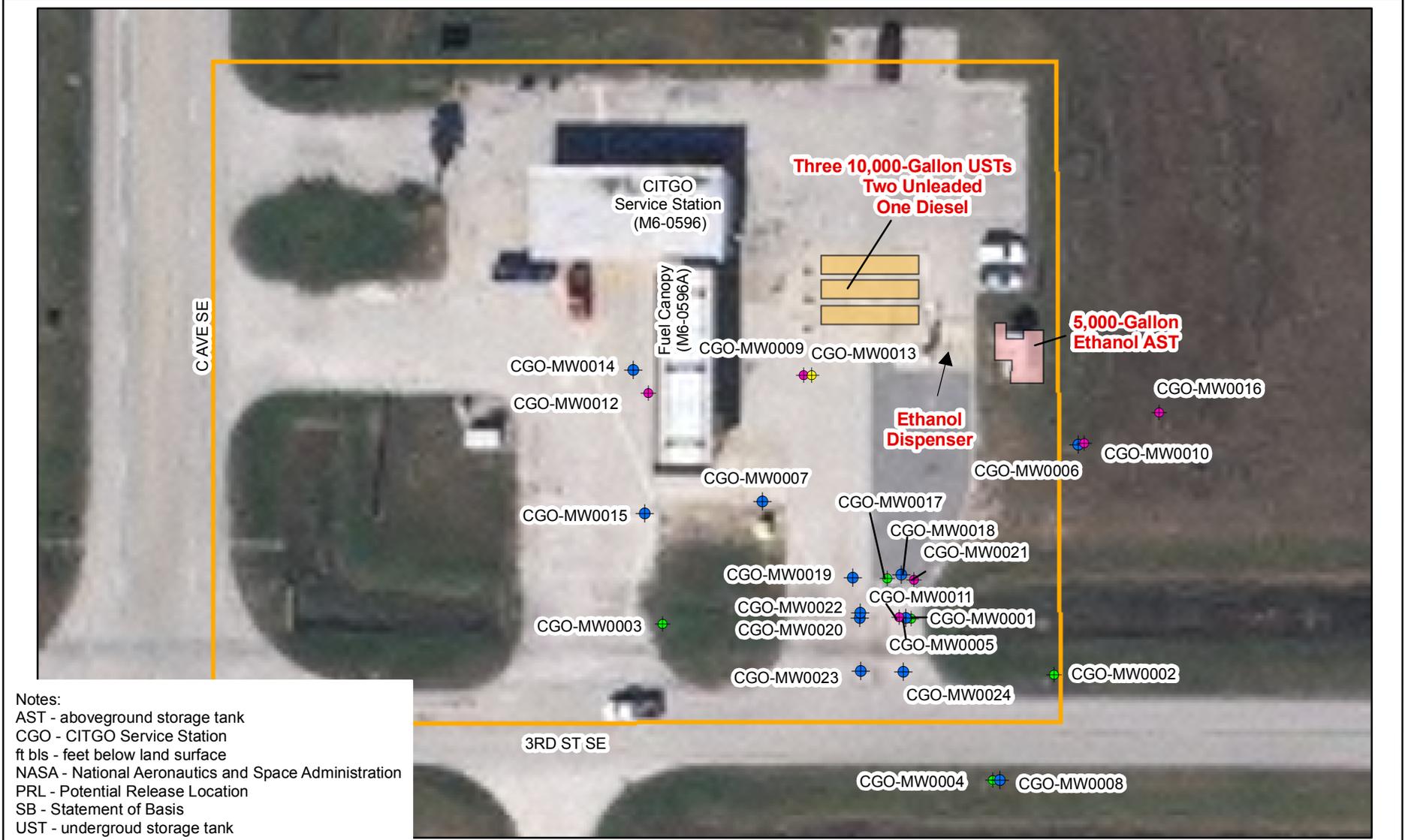
- Notes:
- CGO - CITGO Service Station
 - KSC - Kennedy Space Center
 - NASA - National Aeronautics and Space Administration
 - PRL - Potential Release Location
 - SB - Statement of Basis
 - VAB - Vehicle Assembly Building

**Site Location Map - PRL 129
Statement of Basis**

CITGO Service Station
NASA Kennedy Space Center, Florida

Project Number: TL014022.0000

Figure 1



Notes:
 AST - aboveground storage tank
 CGO - CITGO Service Station
 ft bls - feet below land surface
 NASA - National Aeronautics and Space Administration
 PRL - Potential Release Location
 SB - Statement of Basis
 UST - underground storage tank

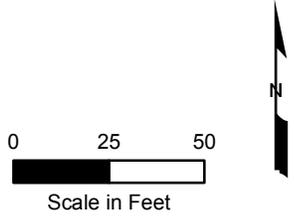
Legend

- ◆ Monitoring Well Screened 2 to 12 ft bls

 AST
- ◆ Monitoring Well Screened 20 to 30 ft bls

 UST
- ◆ Monitoring Well Screened 30 to 40 ft bls

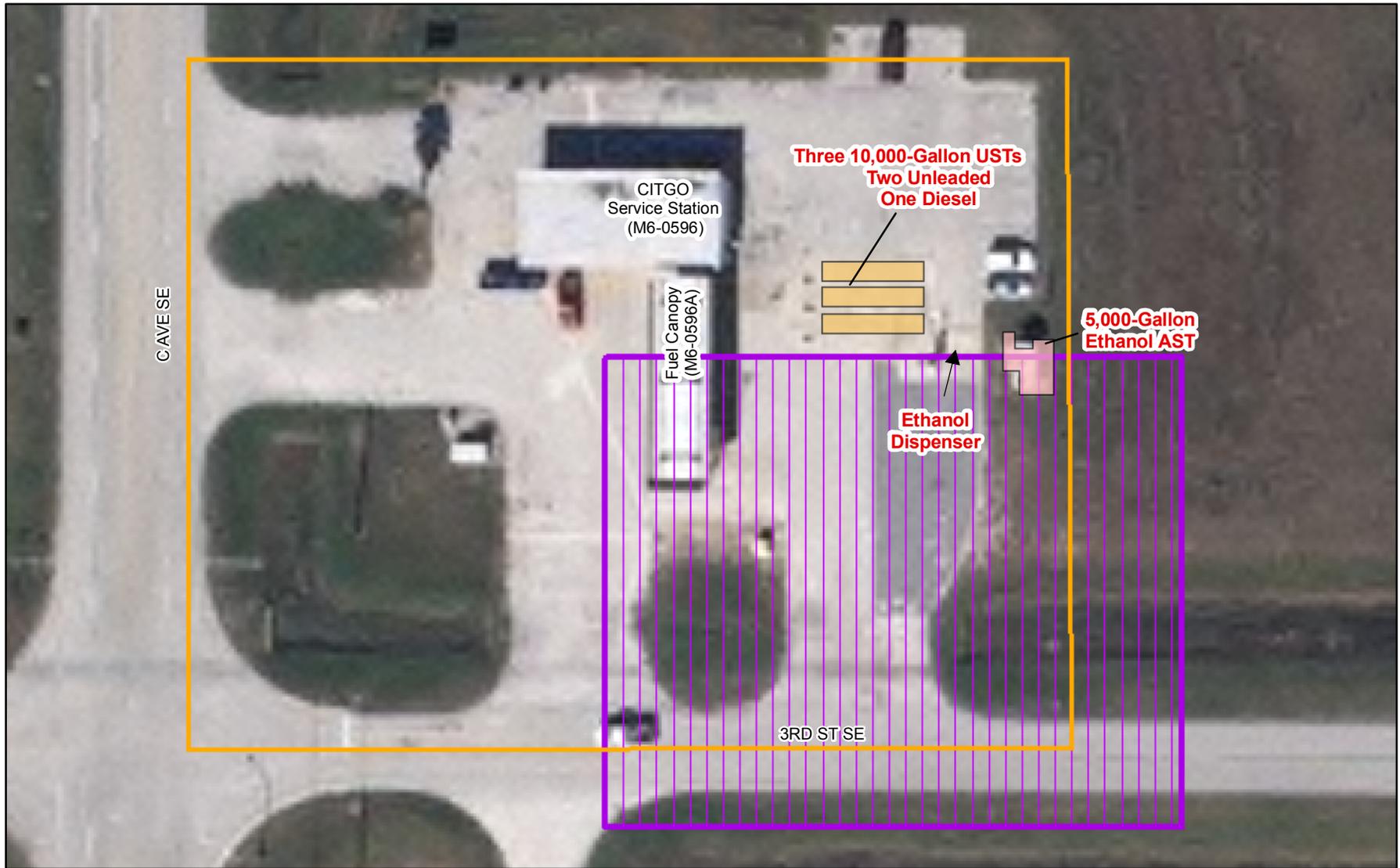
 PRL Boundary
- ◆ Monitoring Well Screened 40 to 50 ft bls



**Site Plan - PRL 129
Statement of Basis**

CITGO Service Station
NASA Kennedy Space Center, Florida

Project Number: TL014022.0000 **Figure 2**

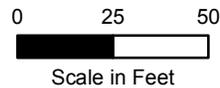


Legend

- AST
- UST
- PRL Boundary
- LUC Area

Notes:

- AST - aboveground storage tank
- CGO - CITGO Service Station
- LUC - Land Use Control
- NASA - National Aeronautics and Space Administration
- PRL - Potential Release Location
- SB - Statement of Basis
- UST - underground storage tank



**Area Under Institutional Controls - PRL 129
Statement of Basis**

CITGO Service Station
NASA Kennedy Space Center, Florida

Project Number: TL014022.0000

Figure 3