



STATEMENT OF BASIS

**C-5 ELECTRICAL SUBSTATION SWMU 66
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
KENNEDY SPACE CENTER
BREVARD COUNTY, FLORIDA**



PURPOSE OF STATEMENT OF BASIS

This Statement of Basis (SB) has been developed in order to inform and give the public an opportunity to comment on a proposed remedy to clean up contamination at the C-5 Electrical Substation. A Kennedy Space Center (KSC) Remediation Team consisting of National Aeronautics and Space Administration (NASA), United States Environmental Protection Agency (EPA), and Florida Department of Environmental Protection (FDEP) have 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 KSC Remediation Team 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 mentioned in the “How Do You Participate” section of this SB. Upon closure of the public comment period, the KSC Remediation Team will address 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 CLEANUP NEEDED?

The results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) indicated that several volatile organic compounds (VOCs) (listed in Table 1) are present in groundwater, which could be

potentially harmful to human health if this water was used for human consumption now or in the future.

HOW DO YOU PARTICIPATE?

The KSC Remediation Team solicits public review and comment on this SB prior to implementation of the proposed remedy as a final remedy. The final remedy for the C-5 Substation will eventually be incorporated into the Hazardous and Solid Waste Amendments (HSWA) Permit for Kennedy Space Center (KSC).

<p>The Cleanup Remedy</p> <p>The proposed cleanup remedy for C-5 includes the following components:</p> <ul style="list-style-type: none"> ▪ Natural attenuation of groundwater to remove contaminants through natural processes, primarily biodegradation. ▪ Monitoring of groundwater semi-annually to document water quality and contaminant levels. ▪ Implementation of institutional controls to restrict the use of groundwater as a potable water supply.
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The public comment period for this SB and proposed remedy will begin on the date of publication of 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

In accordance with RCRA §7004(b), this Statement of Basis summarizes the proposed remedy for NASA KSC C-5 Substation. For detailed information on the site, consult the C-5 Substation RFI Report, which is available for review at the information repository located at the NASA Document Library, North Brevard Library, 2121 South Hopkins Avenue, Titusville, FL 32780, telephone: (321) 264-5026.

any oral comments or questions regarding the proposed remedy. To request a hearing or provide comments, contact the following person in writing within the 45-day comment period:

Mr. Timothy J. Bahr, P.G.
FDEP - Bureau of Waste Cleanup
2600 Blair Stone Road, MS 4535
Tallahassee, FL 32399-2400

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

NASA Document Library
North Brevard Library
2121 South Hopkins Avenue
Titusville, FL 32780
Telephone: (321) 264-5026

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

Mr. Harold Williams
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FACILITY DESCRIPTION

NASA established the 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. FL6800014585) issued by the FDEP and/or EPA, KSC was required to perform an investigation to determine the nature and extent of contamination from Solid Waste Management Unit (SWMU) No. 66, the C-5 Electrical Substation.

SITE DESCRIPTION AND HISTORY

The C-5 Substation is a NASA-operated electrical power substation that includes banks of transformers, associated buildings, a Florida Power and Light (FP&L) Switching Station, parking lots, and dirt roads. Inside the fenced area, which houses the transformers and power structures, the ground is covered with 0.5 to 1 ft of crushed limerock. The C-5 Substation encompasses approximately 4.5 acres of land. Since the 1960s, the C-5 Substation has been used to provide power for the Apollo and space shuttle programs. During the 1970s, drums of waste polychlorinated biphenyl (PCB) oil were stored in the southwest corner of the fenced area. No data is available regarding the quantity of waste or length of time that PCB oil was stored at the C-5 Substation. Figures 1 and 2 present location maps. Investigations conducted at the site include:

- 1992-1993: Soil and groundwater sampling was conducted during construction activities supporting expansion of the C-5 Substation. PCBs, Total Recoverable Petroleum Hydrocarbons (TRPH), and toluene were present in soil samples above regulatory criteria.
- 1995: PCBs were identified in soils during construction excavations associated with facility upgrades and expansion. Interim Measure (IM) Work Plans were developed

and approximately 210 cubic yards (650 tons) of soil was removed and disposed of at the Chemical Waste Management Inc. facility in Emelle, Alabama.

- 1997-1999: A RCRA Facility Investigation was conducted. Samples of surface and subsurface soil, sediment, surface water, and groundwater were collected and analyzed. Results of these analyses were used to determine human health and ecological risks. The Preliminary Risk Evaluation (PRE) for human health indicated that groundwater containing VOCs, primarily vinyl chloride, trichloroethene (TCE), and dichloroethene (DCE), would result in an unacceptable human health risk if the groundwater was used as a source of drinking water. The ecological risk assessment (ERA) indicated that no unacceptable ecological risk is present at the site.

SUMMARY OF SITE RISK

As part of the RFI activities, a PRE was performed in accordance with EPA guidance (“Amended Guidance on Preliminary Risk Evaluations for the Purpose of Reaching a Finding of Suitability to Lease”, dated 1997) and NASA guidance (“Approach for the Use of Preliminary Risk Evaluation at NASA Sites”). The ecological risk assessment (ERA) was performed in accordance with the eight-step process described in the EPA’s “Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments”, dated 1997.

Chemicals of Concern (COCs) identified for human health during the RFI were:

- Groundwater: 1,1-Dichloroethane, 1,1-Dichloroethene, acetone, benzene, bromodichloromethane, bis (2-ethylhexyl) phthalate, chloroethene, cis-1,2-dichloroethene, chloroform, trans-1,2-dichloroethene, tetrachloroethene (PCE), TCE,

vinyl chloride, aluminum, chromium, iron, and manganese.

No COCs were identified for soil. No cancer risks or non-cancer hazards were estimated for current receptors to groundwater because of the lack of exposure pathways for any current use at the site.

The PRE showed that assuming future use of groundwater for drinking water, cancer and non-cancer risks would be unacceptable. The estimated excess lifetime cancer risk (ELCR) for the hypothetical future resident was determined to be 2 in 100, which is outside EPA’s acceptable range of 1 in a million to 1 in 10,000. The main contaminant contributing to this cancer risk was vinyl chloride. The non-cancer hazard index (HI) for the future hypothetical resident was estimated to be 5, which is above EPA’s acceptable threshold of 1.0. The main contaminant contributing to the HI was cis-1,2-dichloroethene.

The ERA did not identify any unacceptable ecological risks.

WHAT ARE THE CLEANUP OBJECTIVES AND LEVELS?

The remedial action objective (RAO) is to protect humans from exposure to groundwater by preventing its use as a drinking water source in the shallow aquifer where contaminant concentrations are higher than regulatory standards. Table 1 lists the COCs present at the C-5 site. The first column lists the chemical name, the second column lists the range of concentrations in groundwater present at C-5 during the RFI, and the last column presents the cleanup level to be achieved at the site.

Table 1

Site-Related Chemicals of Concern (COCs)	Range of Detections (µg/L)	Site-Specific Cleanup Level ¹ (µg/L)
1,1-Dichloroethene	0.79-17	7
1,1-Dichloroethane	1-130	70
cis-1,2-dichloroethene	1-220	70
trans-1,2-dichloroethene	0.77-30	100
Benzene	1-2	1
Bromodichloromethane	0.76-3	0.6
Chloroform	2.1-6	5.7
Chloroethane	5.9-118	12
Tetrachloroethane	2	3
Trichloroethane	1-16	3
Vinyl Chloride	1-360	1

¹ Cleanup level is from Florida Administrative Code 62-777 as approved in the Long-Term Monitoring Plan.

CLEANUP ALTERNATIVES FOR THE C-5 SUBSTATION

Cleanup alternatives are different combinations of plans to restrict access, to contain, to remove, or treat contamination in order to protect public health and the environment. Only two alternatives were considered because of the low levels of contamination present at the C-5 Substation. The cleanup alternatives considered for the C-5 Substation are summarized below.

No Action: Evaluation of the No-Action alternative is used as a basis for comparison with other alternatives. Under this alternative, no remedial action would be taken to reduce human health risks. No monitoring of COC concentrations in groundwater would be performed. It was determined this alternative would not attain the RAO.

Land Use Controls and Natural Attenuation with Long-Term Monitoring: Under this alternative, material processes such as biological degradation, dispersion, advection, and adsorption would reduce COC concentrations to cleanup levels over time. Groundwater would be regularly sampled and analyzed to monitor and document the decrease in contaminant

concentrations. Data collected during the RFI indicated that biodegradation will likely reduce contaminant concentrations below cleanup levels within five years. In the long term, this alternative will meet RAOs and will also allow re-evaluation to determine if the remedy is working and provide an opportunity for change if necessary. In addition, institutional controls would be implemented to limit the use of groundwater as a drinking water source. NASA, USEPA and FDEP have entered into a Memorandum of Agreement (MOA), which outlines how institutional controls will be managed at NASA. The MOA requires periodic inspections, condition certification and agency notification.

EVALUATION OF CLEANUP ALTERNATIVES

Each cleanup alternative was evaluated to determine how each potential remedy will comply with the four general standards for corrective measures. The four general standards 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 second alternative (Land Use Controls and Natural Attenuation with Long-Term Monitoring) meets each of the above criteria, while the no action alternative would not meet them.

WHAT IMPACTS WOULD THE CLEANUP HAVE ON THE LOCAL COMMUNITY?

There would be no impacts to the local community because groundwater is not used for potable water at KSC. The natural attenuation and long-term monitoring alternative includes administrative actions to limit the use of

groundwater until the cleanup levels have been reached.

WHY DOES THE KSC REMEDIATION TEAM RECOMMEND THIS REMEDY?

The team recommends the proposed remedy because the naturally-occurring biodegradation processes observed at the site (and predicted with a groundwater model) are sufficient for the removal of low concentrations of VOCs. The long-term monitoring will be used to monitor and document reduction in contamination concentrations to the cleanup goals. The institutional controls will also prevent exposure to contaminants prior to the cleanup levels being achieved. The proposed remedy meets the four general standards for corrective measures.

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, then a long term monitoring program will be initiated, and a Land Use Control Implementation Plan will be developed to incorporate the institutional controls at this site into the MOA.