

**NASA AMES Research Center  
Moffett Federal Airfield, CA  
Area of Investigation 4**

*Department of Toxic Substances Control  
Berkeley, California*

*Berkeley Office  
July 1998*

**I. INTRODUCTION**

NASA Ames Research Center (NASA Ames) has entered into a Voluntary Cleanup Agreement with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) to conduct investigations on releases of hazardous substances to the environment and to develop remedies for addressing these releases.

DTSC has prepared this fact sheet to provide information on the proposed cleanup activities for the NASA Ames Research Center, Area of Investigation (AOI) 4 located at Moffett Field, CA.

This fact sheet is the second in a series providing information about the NASA Ames Site (Site). Specifically it describes the final Removal Action Work plan (RAW) for AOI 4.

In addition, DTSC has prepared a Negative Declaration in accordance with the California Environmental Quality Act (CEQA). The Negative Declaration finds that implementing the draft RAW will have no adverse impacts.

The Final RAW and the Negative Declaration are available at locations listed on the back cover (See Information Repository).

This fact sheet provides background on soil and groundwater contamination at the Site, describes interim cleanup measures and provides information on the cleanup alternatives considered.

**II. SITE HISTORY AND BACKGROUND**

NASA Ames is a federal facility located at Moffett Field, California, comprising 440 acres of the approximately 1800-acre site (Map 1). Moffett Federal Airfield (formerly Naval Air Station Moffett Field) and Onizuka Air Station occupies the remainder of Moffett Field.

There are 102 buildings at NASA Ames, primarily located in the southern portion of the center. The main focus of the work at NASA Ames is information technology. The buildings consist of major technical facilities and laboratories used for information systems, and aeronautical, physical, space, earth system, and life sciences research. There are also general administrative support buildings and structures.

The northern part of NASA Ames is mainly undeveloped, consisting of non-tidal marshlands and grasslands. Some of this part of the property has been defined as wetlands. According to the NASA Ames Master Plan, no future development is planned for the wetland areas of NASA Ames.

Operations at NASA Ames have used various hazardous substances and previous investigations and reports indicated that some of these substances have been released in to the soil and/or groundwater in AOI 4.

### III. AOI 4 BACKGROUND

Records of spills and releases occurring since 1988 are well documented. Releases or potential releases occurring before 1988 were identified through the review of documents, including historical aerial photographs as well as interviews with long-time and previous employees.

Due to the size, the number of buildings, and the variety of activities that have occurred at NASA Ames, twelve Areas Of Investigation (AOIs) were identified at the facility to allow for a more focused investigation of each selected area. Five of these AOIs are under the oversight of DTSC. This fact sheet focuses on AOI 4.

AOI 4 is located on the west side of the Site (Map 1). AOI 4 includes the National Full-Scale Aerodynamics Complex (NFAC) and its vicinity. The NFAC is a large wind tunnel complex used to test the aerodynamic characteristics of large-scale craft models.

Sampling investigations were concentrated at four locations: Tank 1 and Tank 5 underground storage tanks and areas SB4-2 and SB4-6 (Map 2) where storage drums had been located.

#### **Tank 1**

Tank 1 is an 8,000-gallon, double-walled underground storage tank, which was installed in 1990 and is located on the south side of N221. The prior tank at this location was used to store jet fuel, a petroleum product. There is a pipeline conveying jet fuel to the wind tunnel. Contamination at this location is believed to have come from the old tank.

#### **Tank 5**

Tank 5 is a 15,000-gallon, double-walled underground storage tank, which was installed in 1994 and is located on the southwest side of N221B. Tank 5 was preceded by Tank 5A, a 15,000-gallon, single-walled underground storage tank, which was used to store jet fuel. In 1987, the pipeline for Tank 5A ruptured, releasing an unknown quantity of jet fuel.

#### **SB4-2 and SB4-6**

In 1994, soil borings SB4-2 and SB4-6 were drilled in areas where storage drums had been present or where dark stains were evident on the ground surface. SB4-2 is located west of N221 and SB4-6 is located south of N221B.

### IV. ENVIRONMENTAL SETTING

The groundwater flow direction beneath NASA Ames is generally to the north toward the San Francisco Bay. The uppermost aquifer present in AOI 4 occurs from approximately 5 to 25 feet below ground surface. This first water-bearing unit is locally referred to as the A/A1 aquifer.

### V. NATURE AND EXTENT OF CONTAMINATION

In the areas around Tank 1 and Tank 5, soils in contact with the groundwater are contaminated with petroleum hydrocarbons. Soils above the water table in this vicinity are not contaminated. This suggests that groundwater contaminated with petroleum hydrocarbons flows through the area and that the hydrocarbons adhere to the highly absorptive clay particles in the soil. The groundwater levels fluctuate with the seasons and this can cause the contaminants to be deposited across a wide band of soil.

Petroleum hydrocarbons have been found at Tank 1 as free product (floating on top of groundwater) and dissolved in the groundwater. Groundwater data indicates that vertical migration of dissolved hydrocarbons has not occurred. The free product hydrocarbons which sit on top of the groundwater are a source of future contamination due to lateral migration.

The groundwater at Tank 5 contains dissolved petroleum hydrocarbons. This contamination has migrated north beneath one of the wind tunnels in the NFAC. In addition, traces of trichloroethylene (TCE) were also detected in the groundwater here. The source of the TCE at this location is not known. NASA's TCE investigation in this area is currently in progress and is not addressed in the RAW. It will be addressed in a separate future action. TCE, a suspected carcinogen, is an industrial solvent used primarily for vapor degreasing and cold cleaning.

Soil in the vicinity of soil borings SB4-2 and SB4-6, contains detectable petroleum hydrocarbons (primarily diesel). These trace amounts do not constitute an environmental threat.

## VI. CLEAN UP ACTIVITIES

A final Removal Action Workplan (RAW) was prepared to evaluate several cleanup alternatives and to recommend a preferred cleanup approach.

The removal action objectives for the site are to minimize the risk to public health and the environment. Contaminants present at concentrations above selected remediation levels are considered to pose a risk (see Table 1). The goal of the removal action is to reduce the concentration of the contaminants to below the remediation levels shown in Table 1 below.

Product	Soil Remediation Level mg/kg	Groundwater Remediation Level µg/l
TPH-G	150	50
TPH-D	400	700
TPH-5	400	700
TCE	0.5	5

TPH-D = Total Petroleum Hydrocarbons as Diesel

TPH-G = Total Petroleum Hydrocarbons as Gasoline

TPH-5 = Total Petroleum Hydrocarbons as Jet Propulsion Fuel-5

TCE = Trichlorethylene

mg/kg = milligrams per kilogram

µg/l = micrograms per liter

Four alternatives have been assessed for cleanup of this Site.

### Alternative 1 - NO ACTION

This alternative is a baseline against which to evaluate other alternatives. No active means would be taken to stop the further migration of the contaminants, but natural degradation processes would occur.

### Alternative 2 - REMOVAL AND NATURAL ATTENUATION

- Install new monitoring well at Tank 1.
- Remove free product hydrocarbons at Tank 1.
- Monitor groundwater at Tanks 1 and 5.
- Natural degradation.

### Alternative 3 - REMOVAL AND EXCAVATION

- Install new monitoring well at Tank 1.
- Remove free product hydrocarbons at Tank 1.
- Excavate soil at SB4-6.
- Monitor groundwater at Tanks 1 and 5 and near SB4-2.

- Natural degradation.

### Alternative 4 - DUAL PHASE EXTRACTION

- Install a dual-pump dual phase extraction system at Tank 1.
- Install a groundwater extraction and treatment system at Tank 5.
- Excavation at SB4-2 and SB4-6.
- Monitor groundwater at Tanks 1 and 5.

Alternatives 2, 3, and 4 all include physical removal of contaminants (i.e., soil excavation and groundwater extraction) and long term groundwater monitoring. During and after removal of the contaminant sources there will be natural degradation of residual contaminants. Groundwater will be monitored, data analyzed, and reported on a routine basis. Groundwater plumes will be mapped.

Groundwater monitoring will continue for one year after remedial goals have been achieved. Upon completion of four quarters of monitoring, a projection of when the remediation goals will be met will be prepared.

Additional removal actions and installation of more wells will be implemented, if necessary. Groundwater monitoring will continue for one year after remedial goals have been achieved.

## VII. RECOMMENDED ALTERNATIVE

These alternatives were evaluated for effectiveness, implementability and cost. Alternative 3 (Removal of Free Product Hydrocarbons and Soil Excavation) is the recommended cleanup alternative because it is protective of public health and the environment, is readily implemented and is cost effective.

Alternative 3 involves installing two skimming pumps in a new groundwater well to remove floating hydrocarbons from the surface of the groundwater. This free product would be collected in a tank and periodically transported off site for recycling. Soil around SB4-6 would be excavated initially to a depth of 5 feet. Confirmation samples will then be taken and additional soil will be excavated until cleanup levels are attained. Clean soil will be used for backfill. Existing groundwater monitoring wells will be used to determine the remaining contamination. Monitoring will continue one year after remedial goals have been achieved.

**INFORMATION REPOSITORY**

NASA Ames Centerwide Sampling and Analysis Plan, EKI, March 1994; Removal Action Workplan for Tank 1, Tank 5 and SB-4-2 and SB-4-6 Area of Investigation 4 NASA Ames, Uribe & Associates, 1997; and all reports related to environmental investigations at NASA Ames are available for your review at the Sunnyvale and Mountain View Public Libraries. The full administrative record is available at DTSC's Berkeley office.

<b>Sunnyvale Public Library</b>	<b>Hours:</b>	
665 W. Olive Avenue	Mon.-Thurs.	10 a.m. - 9 p.m.
Sunnyvale, CA	Fri.-Sat.	10 a.m. - 6 p.m.
(408) 730-7300	Sunday	Noon - 8 p.m.

<b>City of Mountain View Library</b>	<b>Hours:</b>	
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(650) 903-6337	Sunday	1 p.m. - 5 p.m.

**PUBLIC PARTICIPATION**

DTSC encourages the exchange of information with interested members of the community. Your interest and involvement will help ensure a thorough review of the information gathered and the alternatives considered. If you have any questions on the NASA Ames Areas of Investigation 4, please contact any of the following.

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TO:

**INSIDE:**

**NASA Ames Research Center  
Program Fact Sheet 2  
Area of Investigation 4**

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