



2003 FACT SHEET
ADOT&PF PEGER ROAD OPERATIONS & MAINTENANCE FACILITY
FAIRBANKS, ALASKA

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What's New

This fact sheet summarizes the results from a continuing ground water assessment. The latest assessment period covers from mid-2002 to the end of 2003. Background information is presented first, followed by a synopsis of the tasks and results from the latest assessment. The fact sheet ends with an outline of planned future activities.

Background

The Alaska Department of Transportation and Public Facilities (ADOT&PF) Operations and Maintenance facility on Peger Road is the northern regional center for ADOT. It is a large complex of buildings and storage facilities (see Figure 1). The Peger Road facility is located within a section of Fairbanks that is a mixture of light industry, small businesses, and residences. Residences are located at varying distances to the west and northwest of the facility.

Environmental investigations began in the early 1990s, first under the direction of the ADOT, then continuing since 1998 under the direction of the Alaska Department of the Environmental Conservation (ADEC). The investigations are the result of compliance with Underground Storage Tank (UST) regulations and a federal Resource Conservation and Recovery Act (RCRA) compliance audit.

Releases of chlorinated solvents, specifically trichloroethylene (TCE), and of gasoline and diesel fuels (i.e., petroleum fuels) have contaminated portions of the soil within the facility. TCE-contaminated soil was found in the vicinity of the Materials Laboratory and the Cat House. Petroleum-contaminated soil was detected associated with UST releases at the Operations and Maintenance (O&M) building and the State Equipment Fleet Maintenance Shop building. The leaking tanks have either been removed, or were abandoned in place and are no longer in use. Portions of the contaminated soil were removed when the tanks were removed.

Some of the releases have also impacted the local ground water. The larger releases have created ground water contaminant plumes that extend off-site in the general direction of the regional ground water flow (i.e., from the southeast towards the northwest). Discontinuous permafrost exists sporadically throughout the general area and it may locally influence ground water flow in both horizontal and vertical directions. Contaminant plumes follow the ground water so the plumes' direction may also be affected.

The depths of the individual ground water plumes also differ because of the density differences between petroleum, TCE, and water. The densities of petroleum fuels are less than water. As a result, they typically impact the upper part of the aquifer close to the water table. On the other hand, the density of TCE is greater than water. TCE generally migrates below the water table to greater depths thus creating a “deeper” zone of ground water contamination.

Two TCE ground water plumes were identified: one originating at the Materials Laboratory, and the other originating in the vicinity of the Cat House. A petroleum ground water plume originates at the former location of the USTs at the O&M building. The TCE ground water plume associated with the Materials Laboratory is the longest off-site plume.

Prior investigations have focused on determining the amount of on-site contaminated soil and the lateral and vertical extent of both on- and off-site ground water contamination. Several nearby residential drinking water wells were tested in the late 1990s with no detected contamination.

Since 2002, the delineation of the off-site ground water plumes has continued along with an evaluation of the possible effects of the ground water plumes on nearby businesses and residences. A secondary focus has been the evaluation of potential cost-effective cleanup remedies for the contaminated soil and ground water.

Major 2002-2003 Activities

The overall ground water assessment had two major goals: first to complete the delineation of the off-site ground water plumes, and second to assess the natural attenuation capability of the local aquifer, specifically the biodegradation of TCE. The purpose of these activities is to answer the following questions:

1. What is the extent of the ground water plumes?
2. Are the plumes growing, stable, or declining in size and concentration?
3. Have or will the plumes impact any private drinking water wells; if so, at what concentration?
4. What are the potential impacts to human health and the environment from the on-site soil contamination and the on and off-site ground water plumes?
5. What is the existing natural attenuation capability of the local aquifer and can natural attenuation be enhanced in a cost-effective manner?

ADEC’s local environmental contractor accomplished a series of tasks to address these questions. Tasks included the installation and sampling of transects of temporary monitoring wells, the installation and sampling of permanent “clustered” monitoring wells (two separate wells co-located but each sampling a different depth of the aquifer), a statistical evaluation of cumulative ground water data, preliminary computer modeling, and an analysis of the potential contaminant pathways and their potential risks.

In addition, ADEC contracted with the United States Geological Survey’s (USGS) Toxic Substance Hydrology Laboratory to provide an independent assessment of the local aquifer’s natural attenuation capability. Natural attenuation encompasses the natural processes of dilution, dispersion, and biodegradation for a specific contaminant in ground water. Biodegradation is facilitated and mediated by microbes that normally reside in the aquifer.

USGS scientists Dr. Paul Bradley and Dr. Frank Chapelle, nationally recognized experts, visited Fairbanks in late summer 2003 to perform baseline measurements. Soil samples from the aquifer were provided to Dr. Bradley who is conducting long-term microcosm studies under simulated Fairbanks ground water conditions (i.e., temperatures reflective of the Subarctic).

The primary purpose of the studies is to determine if the existing natural biodegradation capability can be enhanced and in what manner. Since microcosm studies are long-term, Dr. Bradley will provide periodic reports during the study. The final conclusions from the study should also be applicable to other chlorinated solvent ground water plumes within the Fairbanks area, and will contribute to the general knowledge of contaminant degradation in cold environments.

Major Results

The major results are summarized for the Materials Laboratory, the O&M Building, and the Cat House area, in the order listed. All conclusions are tentative and should be viewed as working hypotheses. Plume locations that are depicted in the following figures are approximate. As more information becomes available, the uncertainty associated with the specific conclusions should diminish.

Materials Laboratory:

1. The deeper part of the TCE plume extends at least 1100 feet to the north-northwest at a depth of 45 feet below the ground surface (see Figure 2); preliminary computer modeling and statistical analysis suggest that the plume may extend an additional 600 feet at minimum for a total length of over 1700 feet.
2. The upper part of the TCE plumes also extends off-site to the north-northwest. However it is shorter in length.
3. There are no known private drinking water wells impacted by the plume.
4. The TCE concentrations from most monitoring wells located close to the source area and within the property boundaries are decreasing with time; the decreases are primarily attributable to dilution with possibly some contribution from natural biodegradation.
5. The TCE concentrations from monitoring wells located hydraulically down gradient have not decreased with time.
6. Additional monitoring wells are necessary to delineate the end of the plume and to evaluate potential risk to off site workers/residents.
7. Site workers, specifically at the Materials Laboratory, may be subjected to TCE exposure via ground water ingestion, dermal contact, and vapor intrusion if these completed pathways exist.

O&M Building:

Benzene, a common component of petroleum fuels and a known carcinogen, is typically used to approximate the extent of a petroleum-related ground water plume. Benzene is one of the most soluble components of gasoline and diesel and it is a known carcinogen.

1. There is a benzene plume associated with the former fuel dispensing system near the O&M building (see Figure 2).
2. The benzene plume extends beneath the O&M building.

3. The benzene plume extends off-site north of Davis road with a total length of about 600 feet.
4. There are no known private wells impacted by the plume.
5. Site workers at the O&M Building may be subjected to benzene exposure if a completed vapor intrusion pathway exists.
6. Overall, concentration levels in the monitoring wells are either stable or decreasing; additional sampling is necessary.
7. Benzene previously detected in temporary well WP02-1 (see Figure 2) is unlikely to be associated with the O&M Building benzene ground water plume.

Cat House Area:

1. There is a smaller TCE ground water plume associated with the Cat House floor drain leach field (see Figure 2).
2. TCE was detected above cleanup levels in temporary well WP03-A north of Davis Road; additional delineation is necessary to determine if this is related to the Cat House.
3. There are no known private wells impacted by the plume.

Planned Future Activities

Materials Laboratory Expansion:

ADOT intends to expand the Materials Laboratory by adding a fifty foot addition to the southern end of the building. ADEC is assisting ADOT with the environmental issues.

The soils in this area need to be excavated for engineering purposes. A limited number of soil samples in this area indicates that the soil is contaminated with TCE. Additional soil samples are being collected this winter. If the TCE soil concentrations exceed RCRA hazardous waste criterion, then the soil will have to be treated in place (i.e., in-situ) before excavation. This will delay the construction. If the TCE concentrations are below the criterion, the soils can be excavated and then treated. The ultimate treatment for the excavated soils will be determined based upon the soil sample analyses.

Materials Laboratory TCE plume:

Two well clusters will be installed in the vicinity of 20th Avenue to determine the extent of the plume. Ground water samples will be taken from these and other existing wells to monitor the nature and extent of the plume. The vapor intrusion pathway will be investigated.

O&M Building:

Additional ground water samples will be collected to monitor the nature and extent of the benzene plume. The vapor intrusion pathway will be investigated.

Cat House Area:

A limited number of additional monitoring wells will be installed to delineate the extent of the TCE plume.

If you have any questions or need additional information please contact the ADEC Project Manger, Mr. Douglas Bauer, at 907-451-2192 or at Doug_Bauer@dec.state.ak.us.