

- Uses low cost direct push well installation techniques.
- Uses common “off-the-shelf” components, contributing to low capital, operation, maintenance and lifecycle costs.
- Promotes shorter clean up times, typically taking less than a year to attain site closure goals.

## Limitations

The application of air sparging must be carefully evaluated for the following conditions:

- Typically, not effective for recovering light non-aqueous phase liquid (LNAPL) layers greater than 1-foot thick or recovering dense NAPL (DNAPL) free product.
- Soil vapor extraction wells may be needed to safeguard against toxic or explosive vapor buildup in nearby enclosed structures.
- Clay soils and highly stratified layers will limit the effectiveness of air sparging by inhibiting uniform air distribution.
- Air should not be injected into a confined aquifer due to possible off-site migration of the volatilized contaminants.

## Technology Application Team

NFESC’s Air Sparging Technology Application Team (TAT) is developing the guidance and technology transfer tools necessary for our customers to implement air sparging at sites throughout DOD.

## Available Services

Air sparging technology transfer tools currently being prepared to assist the DOD community and the public include:

- Application guidance documents
- Cost comparison and estimating tools
- Interactive screening matrix
- Technical consultations
- Construction and contracting support

## Past Collaborative Efforts

NFESC has partnered with the:

- Air Force
- Oregon Graduate Institute
- Arizona State University
- Battelle Columbus Operations

to demonstrate air sparging technology at the Naval Construction Battalion Center’s Hydrocarbon National Test Site in Port Hueneme, California.

### For further information about air sparging, contact:



NESC413  
(805) 982-4847, DSN: 551-4847



NFESC411  
(805) 982-1671, DSN: 551-1671



NAVFAC

# Air Sparging

## Application Guidance Tools



Air sparging demonstration, NCBC, Port Hueneme, CA



Naval Facilities Engineering Service Center  
1100 23rd Avenue  
Port Hueneme, CA 93043-4370

Visit our Web site at:  
<http://www.nfesc.navy.mil>

## What is Air Sparging?

Air sparging is an innovative treatment technology that uses injected air to remove volatile contaminants from the saturated or groundwater region. Air sparging can remove volatile contaminants such as, gasoline, selected solvents, and selected jet fuels.

The major components of a typical air sparging system consist of air injection or sparge wells, air compressors or blowers to supply injection air, and monitoring sensors and equipment. The sparge wells are normally vertical and screened below the contamination level. Air, injected into the saturated zone, strips the contaminants from the liquid phase to the vapor phase, and transports them to the vadose zone for removal.

With regulatory approval, the exiting air stream can be directly released into the atmosphere or, if need be, a soil vapor extraction system can be installed to collect and treat the air stream prior to atmospheric release (see Figure 1).

Air sparging provides oxygen for aerobic microbial degradation of contaminants, an effective mechanism in the later stages of remediation.

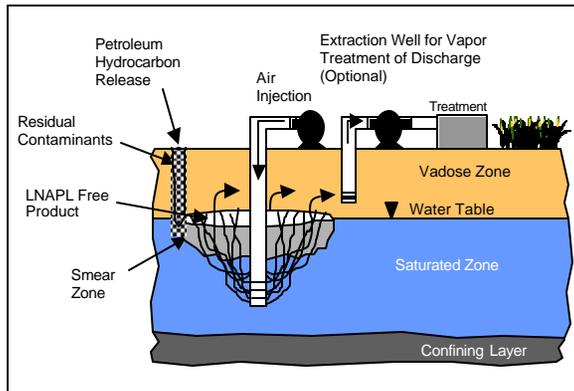


Figure 1. Air sparging/soil vapor extraction tandem.

## Applications

Air sparging can be used to remove residual source (smear zone) contamination (see Figure 1), clean up dissolved phase contamination (see Figure 2), or contain a migrating contaminant plume (see Figure 3).

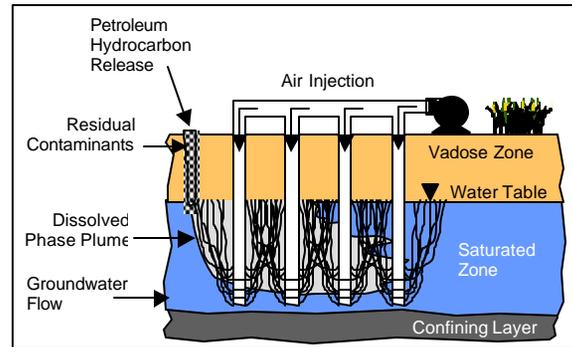


Figure 2. Removal of dissolved phase contaminants.

In situations where subsurface contamination is located under a building or runway, noninvasive horizontal or angled sparge wells may be used.

Air sparging is often used as part of a larger system of treatment processes at complicated remediation sites. For example, air sparging can be combined with bioslurping to create a system that recovers both residual and free product source contamination.

Pump and treat remediation systems can be more effective with the addition of air sparging, allowing for reduced clean up times and costs.

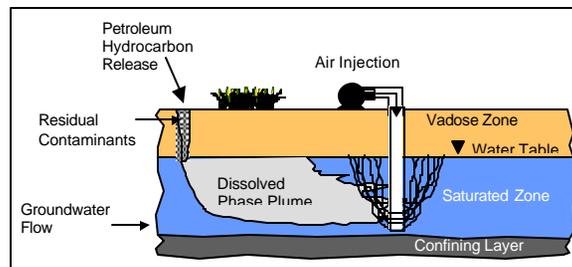


Figure 3. Containment of contaminant plume.

## New Developments

Through extensive research and analysis of previous air sparging sites and through the continued use in DOD and the private sector, this technology has emerged as a premiere remediation method for effectively cleaning contaminated groundwater sites.

The NFESC Air Sparging Technology Team is preparing application guidance to provide a user-friendly tool to help expedite the decision-making and evaluation process for implementing this technology at DOD sites.

## Will Air Sparging Work at My Site?

The success of air sparging depends on several parameters. First, the contamination must be evaluated for its ability to be readily volatilized. Site lithology must then be evaluated. If the contaminated region consists of relatively permeable soil, such as, sand, silty sand, or alluvial soil, there is an excellent chance for success.

## Advantages

Air sparging has many advantages over traditional remediation technologies.

- Effectively removes the volatile residual contaminant from the saturated source zone.
- Performed in situ, needing a nominal above ground footprint to house auxiliary equipment.
- Works in tandem with other technologies, such as bioslurping, soil vapor extraction, and pump and treat. Effective in significantly reducing deployment time for existing pump and treat sites.
- Produces relatively small volume waste streams, requiring minimal or no additional treatment.