

# TechBriefs

## Savannah River National Laboratory

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### At a glance

- > Easy and quick
- > Based on Microsoft Excel™
- > Guides clean-up decision making
- > Works with soil, soil vapor or groundwater samples

### Contact Information

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## NAPL Calculator: (Non-aqueous Phase Liquid)

An environmental engineer at the Savannah River Site has developed a software application that will determine if non-aqueous phase liquid (NAPL) contaminants are present in soil, groundwater, or soil vapor samples. The software will determine both the quantity and composition of NAPL chemicals in the samples based on the results of sample analysis. The software also computes important environmental engineering measures such as the residual saturation, mass of the NAPL in the sample, and mass balance and phase distribution of each chemical composing the NAPL.

### Contaminant characterization made easy

NAPL is an especially detrimental type of environmental contaminant. It exists in soil or groundwater as the same organic chemical(s) originally shipped from the manufacturer. Often NAPL comprises different chemicals like trichloroethylene (a solvent) or polychlorinated biphenols (a liquid electrical insulator). It is extremely difficult to detect in the environment; sometimes its presence must be determined by inferential evidence rather than by direct measurement.

Failure to recognize the presence of NAPL at a waste site will almost certainly result in failure of clean-up efforts. It is long lived, has low solubility, and is resistant to many conventional remedial technologies. Most importantly it will provide a reservoir of contamination for both soil and groundwater on a time scale of 10s to 100s of years. Therefore, it is absolutely essential that environmental engineers have a tool they can use to assess the nature and severity of NAPL contamination in order to apply and design the correct clean-up technology.

### Uses classic chemistry

The NAPL Calculator is an analytical model that is a self-executing Microsoft Excel workbook that requires qualitative/quantitative soil, groundwater, or soil vapor sample results and a few simple geotechnical parameters. A classic chemistry approach is used that is based on the work of Shiu, Feenstra, McKay and Cherry and is advocated by the U.S. Environmental Protection Agency.

The method is known to many academics and researchers but not to many practitioners in environmental clean-up. Even for those who know the method, the calculation can be laborious. The NAPL Calculator is designed to make this calculation method accessible, understandable and self-explanatory.

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### Technology transfer

The Savannah River National Laboratory (SRNL) is the U.S. Department of Energy's (DOE) applied research and development laboratory at the Savannah River Site (SRS).

With its wide spectrum and expertise in areas such as homeland security, hydrogen technology, materials, sensors, and environmental science, SRNL's cutting edge technology delivers high dividends to its customers.

The management and operating contractor for SRS and SRNL is Savannah River Nuclear Solutions, LLC. SRNS is responsible for transferring its technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

### Quickly provides useful data

The user selects the chemical(s) detected in the analyses from a pull-down menu, enters the concentrations for those chemicals, and provides some information about soil porosity. The software contains an imbedded database of physical chemical parameters that it uses to generate a robust body of information that can be used by environmental engineers to assess the level of contamination at a waste site.

Some of the information the software provides is:

- The existence of NAPL in the samples
- The total mass of NAPL in the samples
- The total mass of NAPL for each chemical composing the NAPL
- The volume of NAPL in the samples (called the residual saturation)
- The concentration and mass of each chemical
- The vapor pressure of the NAPL and of each chemical
- The solubility of the NAPL and of each chemical
- A mass balance and volumetric balance for each chemical
- The percent composition of each chemical
- Automatic graphing of some of the above information

### Partnering opportunities

SRNS invites interested companies with proven capabilities in this area of expertise to enter into a licensing agreement with SRNS to market this nuclear material detection system. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities, and milestones for commercializing this invention.

Qualifications should include past experience at bringing similar products to market, reasonable schedule for product launch, sufficient manufacturing capacity, established distribution networks, and evidence of sufficient financial resources for product development and launch.

SRNL-L9100-2009-00187



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