[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)

Technology Information	
Area	6 (Understanding groundwater flow)
Title	Tool for the Real-time Assessment of Subsurface Environments accessed by Directional-drilling (TRASED)
Submitted by	Rohit Salve

1. Overview of Technologies (features, specification, functions, owners, etc.)

Monitoring and remediation of contaminated vadose zone sites is currently achieved via vertical boreholes. In the case of contamination below structures, it often involves costly demolitions. For toxic sites vertical boreholes can be extremely dangerous for the remediation crew. Cost and safety issues are significantly improved with the use of horizontal access to contaminated zones. We propose here a tool that will allow safe and cheap access to contaminated zones while providing effective technologies for characterization and monitoring of contaminated sites.

The Tool for the Real-time Assessment of Subsurface Environments accessed by Directional-drilling (TRASED) is a multipurpose tool that has been conceived to assist groundwater characterization and remediation activities associated with contaminated sites. The technology in TRASED includes a borehole casing that is engineered to house a series of environmental sampling and monitoring devices that are configured for non-vertical boreholes. Details of this technology are included in the Appendix.

TRASED can be installed in non-vertical boreholes (with an internal diameter of 4" to 6") that are located in the vadose and saturated zone. There are four features about TRASED that makes it a novel and effective tool for characterizing the subsurface environment both for remediation and scientific research purposes.

1. The tool works in boreholes aligned in the non-vertical direction, which makes it possible to intercept flow and transport processes most effectively (i.e., perpendicular to the line of flow).

2. The well casing is engineered to (a) house an array of sensors (e.g., temperature, moisture content, pressure head, humidity etc.) and liquid/gas sampling devices, (b) allow for continuous sampling of liquids and gases, and (c) isolate sections of the borehole with

inflatable packers.

3. The tool is modular which makes it convenient to be deployed over varying lengths of borehole.

4. The cavity of the casing can be made accessible for periodic measurements (e.g., geophysics) and sampling of soil/rock.

2. Notes (Please provide following information if possible.)

- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)

The design of the tool is complete, and it can be fabricated in a period of months, largely depending on the extent of area that will be monitored and sampled. Preceding the deployment of the tool will the installation of horizontal boreholes. Because directional drilling in relatively shallow environments has become relatively easy, and cheap, it is anticipated that the use of deployment of TRASED will not be of significant concern.

- Challenges

The installation of the tool across large sections of the site will require some research and development activities to make it modular.

- Others (referential information on patent if any)

This tool has been designed by Rohit Salve, a scientist in the Earth Sciences Division at the Lawrence Berkeley Laboratory, where it is currently being reviewed for a patent application

【Areas of Technologies Requested】

(1) Accumulation of contaminated water (Storage Tanks, etc.)
(2) Treatment of contaminated water (Tritium, etc.)
(3) Removal of radioactive materials from the seawater in the harbor
(4) Management of contaminated water inside the buildings
(5) Management measures to block groundwater from flowing into the site
(6) Understanding the groundwater flow