Amargosa Desert Research Site (ADRS) – Use of Results

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USGS-Nevada Water Science Center & National Research Program

U.S. Department of the Interior
U.S. Geological Survey

ADRS Field Laboratory

- Arid “end member” of the USGS Toxics Program
- Long-term, benchmark data & knowledge on natural-hydrologic systems & contaminated systems
- Methods for characterizing & monitoring arid–semiarid sites

A few examples to illustrate the application of ADRS results & methods to other sites & studies ...

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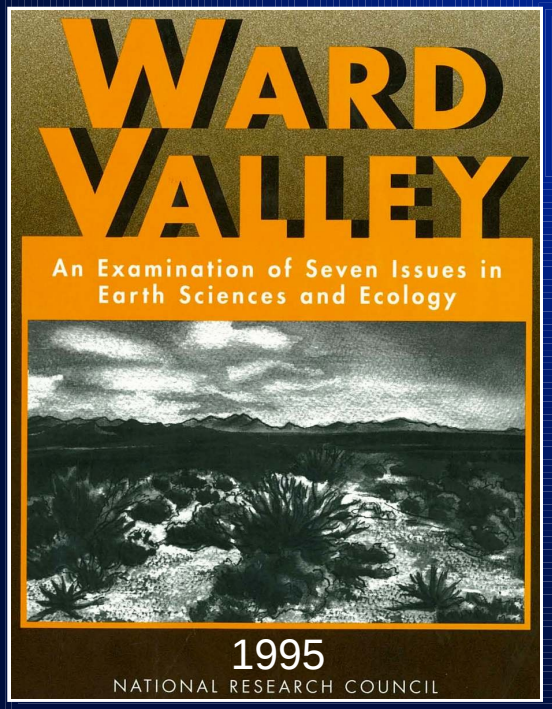
National Research Council's review of Ward Valley, CA

- National interest ... Ward Valley proposed to be Nation's next LLRW site but detailed data for the site were limited
- ADRS unsaturated-zone hydrology studies (1983-94) were used as an analog in the NRC's evaluation ... A GOOD THING!



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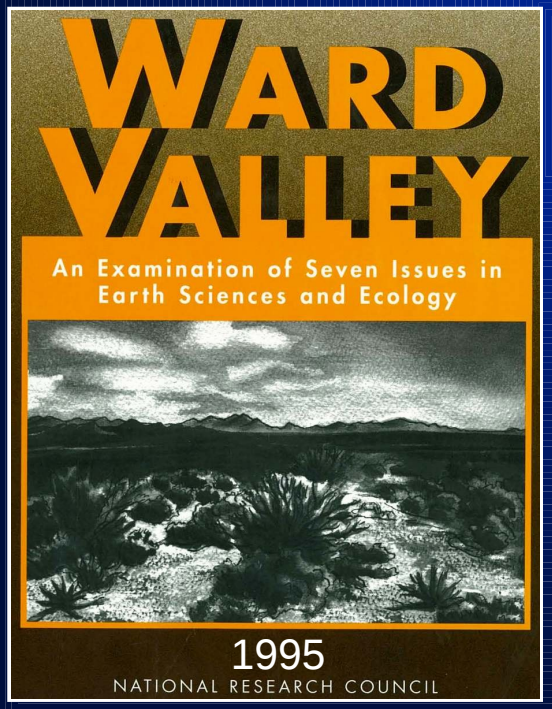
- **However ... release of the NRC report coincided with 1995 "discovery" of contaminants beneath the ADRS**



... & this led to an interesting period of time for many

"WHAT ... 1ST YOU SAY water has not moved down for thousands of years ... AND NOW YOU SAY contaminants are found at great depth !?!?" (J.Q. Public, 1995)

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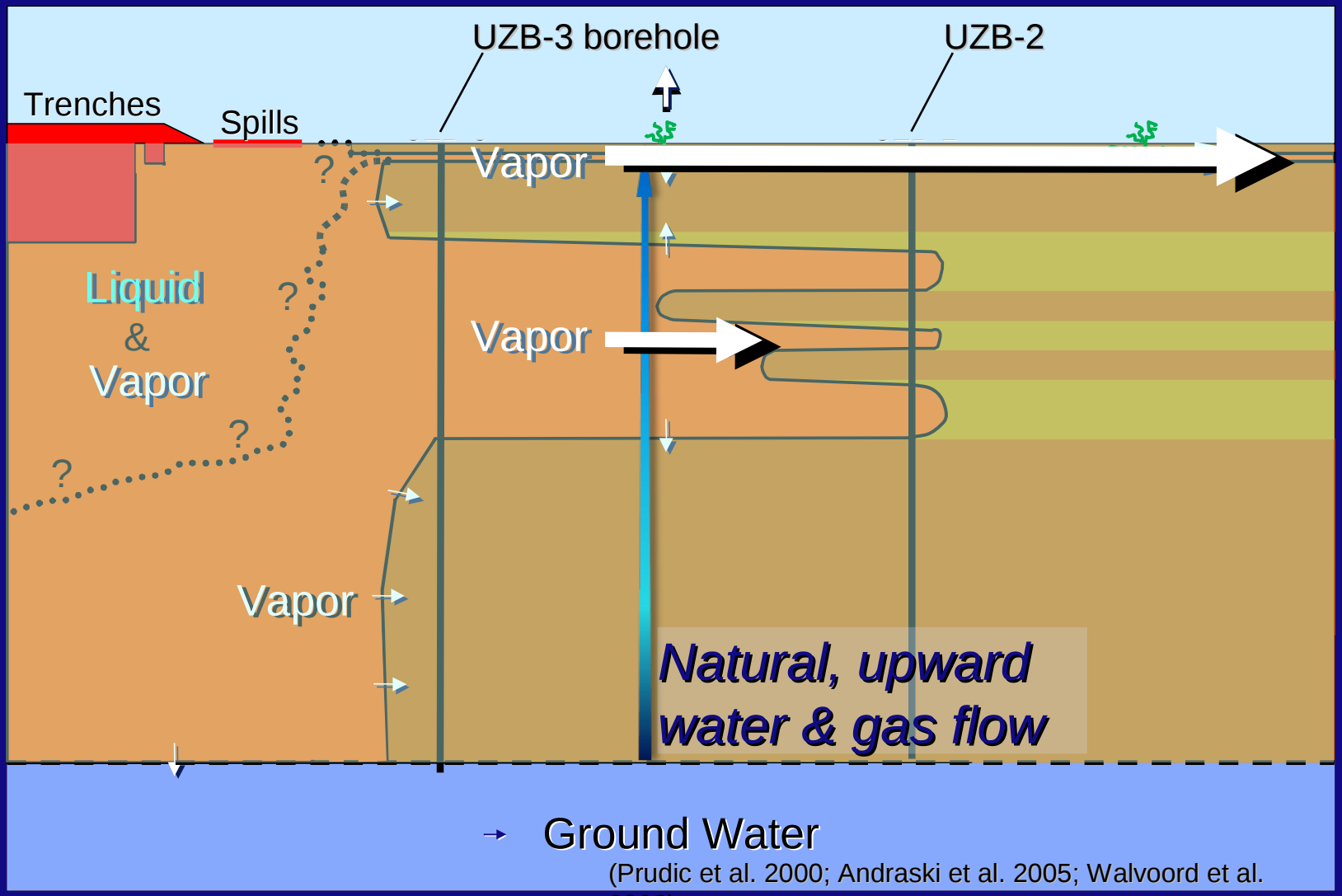
The answer was “yes” ... but further detailed study was needed to determine

- Predominant mode & direction of contaminant transport
- Contaminant movement is superimposed on natural, upward flow field



(Prudic et al. 2000; Andraski et al. 2005; Walvoord et al. 2008)

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“Had a meeting with Waste Management & other personnel yesterday … they firmly believe tritiated water could not be moving upward into the root zone.”

(R.H., 1996)

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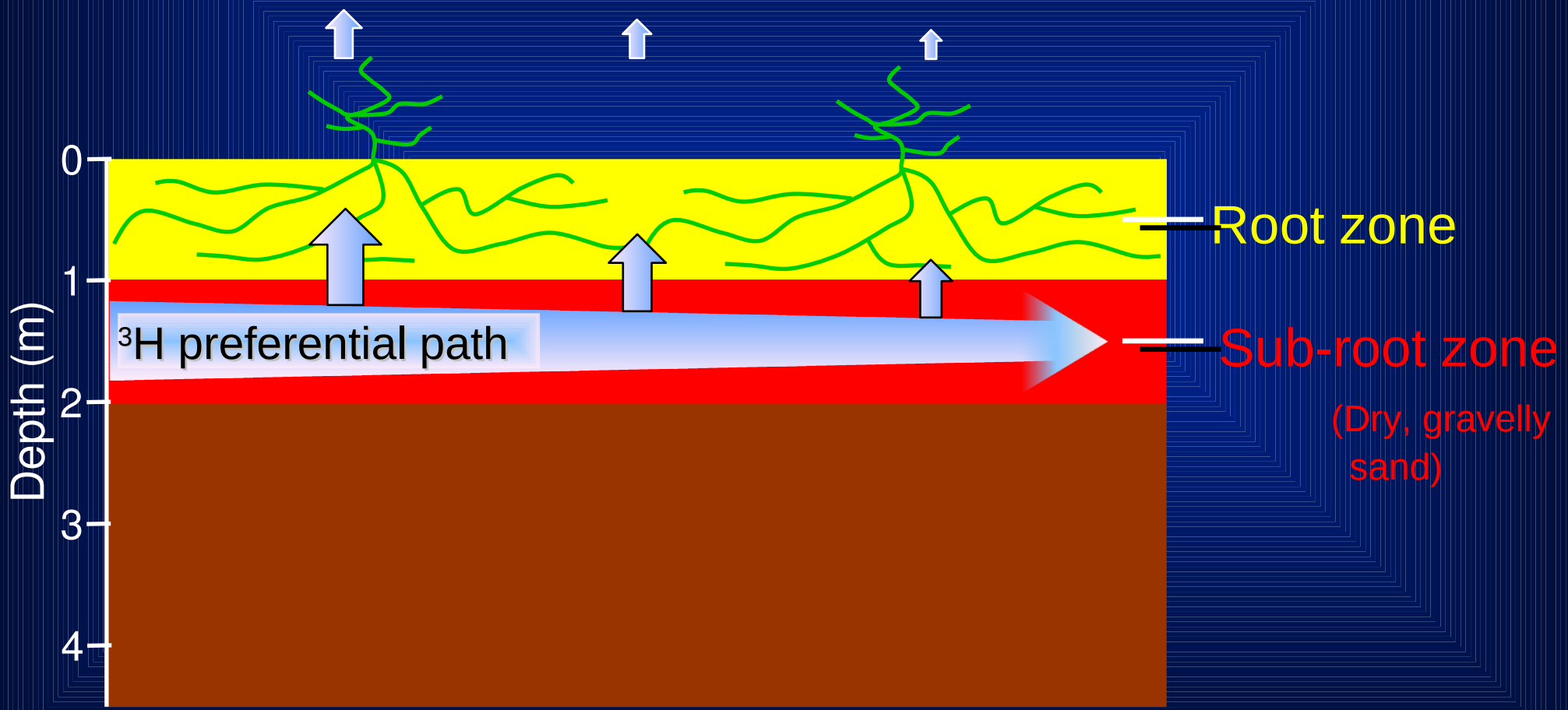
... here too, detailed characterization & study have determined that

- Desert plants can promote upward movement & release of waterborne contaminants from below the root zone



(Andraski et al. 2005; Garcia et al. *in press*)

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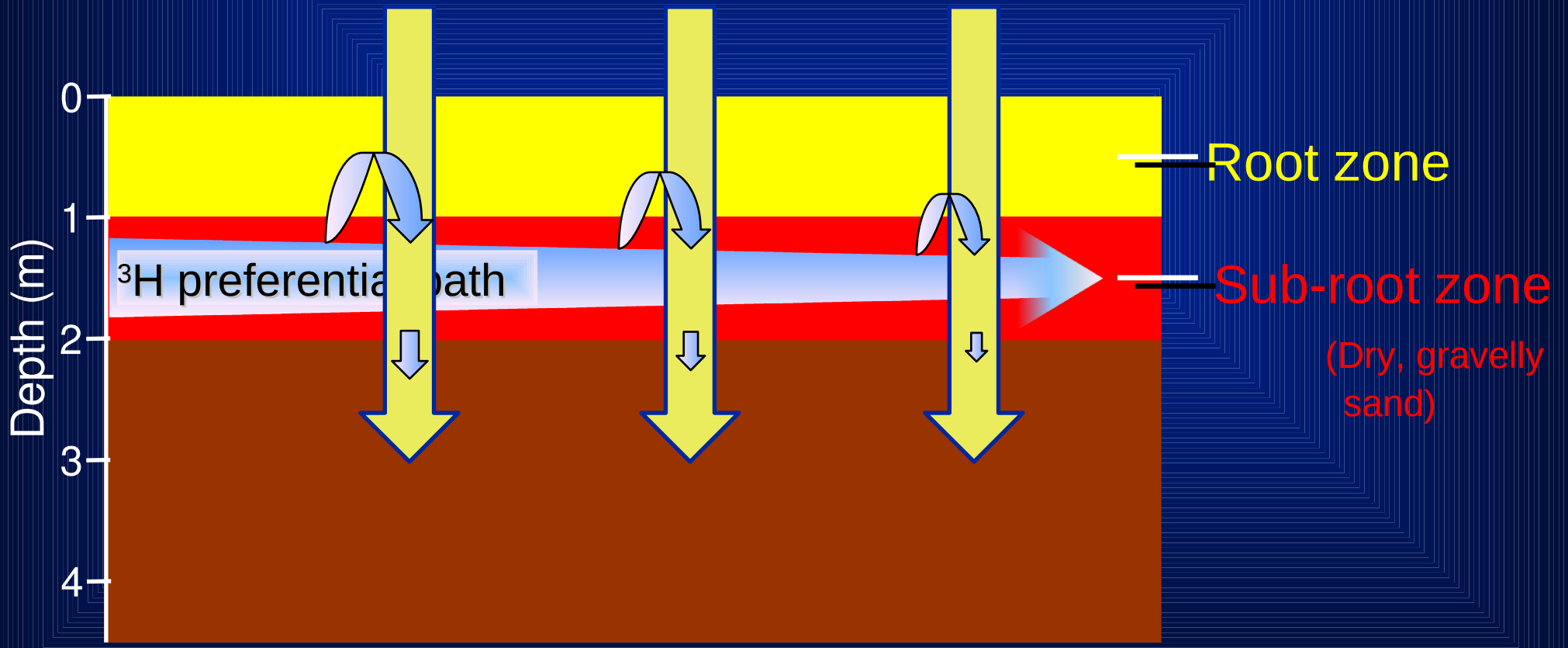
... here too, detailed characterization & study have determined that

- Desert plants can promote upward movement & release of waterborne contaminants from below the root zone
- If plants are removed ... precipitation/moisture accumulates & contaminants can be carried downward by percolating liquid



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(Andraski et al. 2005; Garcia et al. *in press*)

“... results will be of great help in identifying sites & developing guidelines for waste disposal in Namibia

... country with highly variable climate & large areas with limited precipitation, such as the Namib and Kalahari Deserts.”

(Sindila Mwiya, Geological Survey of Namibia, 2001)

ADRS research – natural soil-plant-water system & how the natural system is altered by burial-trench construction

“... studies provide valuable results that help establish regulatory guidance on design, numerical modeling, and performance monitoring of landfill caps.”

(T. Stepp, Montana Dept. of Environ. Quality, 2002)

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ADRS data have been used in methods-development & case studies by other Agencies

NUREG/CR–6346
PNL–10843

Hydrologic Evaluation Methodology for Estimating Water Movement Through the Unsaturated Zone at Commercial Low-Level Radioactive Waste Disposal Sites

Manuscript Completed: November 1995
Date Published: January 1996

Prepared by
P. D. Meyer, M. L. Rockhold, W. E. Nichols, G. W. Gee

Pacific Northwest Laboratory
Richland, WA 99352

T. J. Nicholson, NRC Project Manager

Prepared for
Division of Regulatory Applications
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001
NRC Job Code L2466

NUREG/CR-6948, Vol. 2

Integrated Ground-Water Monitoring Strategy for NRC-Licensed Facilities and Sites: Case Study Applications

Manuscript Completed: August 2007
Date Published: November 2007

Prepared by
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Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
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ADRS Methods Development & Technology Transfer

Fort Carson, CO (USACE, private industry)

- **UZ monitoring methods**
- **5-yr performance assessment of alternative landfill cover**
  - High level of interest ... **1st ET cover permitted & constructed as equivalent RCRA Subtitle C cover in Colorado**
    - McGuire et al. (*in press*) Journal of Geotechnical & Geoenvironmental Engineering

Yuma Proving Ground, AZ (USACE)

- Soil sampling & measurement methods
- Evaluation of approaches for detecting improvised explosives devices (IEDs) in desert soils

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One final pair of quotes ...

The White Mamba ... a “KILLER SNAKE”

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"... the paper is light on deep unsaturated-zone data ... Another deep borehole is needed to create a clear picture of the lateral migration of ..."

(anonymous reviewer, 2007)

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"WHAT ... IT COSTS HOW MUCH ... TO INSTALL ONE RESEARCH BOREHOLE !?!?"

("anonymous" Toxics Program Coordinator, January 1999)

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