

CNWRA Project 06002.01.051 (Igneous Activity KTI).
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Prior work with Dr. Woods focused on the dynamics of how the sudden decompression of gas-bearing and gas-free fluids like magmas into subsurface tunnels can accelerate and fragment the fluids. During FY2003, this work shifted from an evaluation of initial flow conditions to the conditions of potentially sustained flow through subsurface structures. Work during FY2004 will continue to develop analog experiments and numerical models to develop an understanding of the physical conditions associated with potentially sustained magma flow following initial intersection with a tunnel. The segregation of magmatic volatiles appears an important process in determining potential magma flow rates, and overturn or convection within the igneous magma system. Work in FY2004 will focus on the effects of volatiles on potential igneous flow conditions. These effects will be modeled to evaluate the potential for the disrupted system to entrain and disperse material, including possible effects on volcanic eruption processes.

Work will occur in FY2004 as these tasks:

- 1) Collaboration with University of Bristol and CNWRA staff in analyzing and reporting the results of FY2003 experiments of gas-poor analog fluids. This collaboration includes preparation of a report suitable for submission to a scientific journal.
- 2) Incorporation of FY2003 experimental results for gas-rich analog fluids into numerical models, including presentation of integrated results in a report suitable for submission to a scientific journal. This task includes collaboration with CNWRA staff and consultants at the University of Twente, Netherlands, and the University of Bristol.
- 3) Performance of experiments evaluating multiphase flow dynamics of bubbly fluids using the experimental apparatus in FY2003. In parallel with this experimental modeling, Dr. Woods will develop complimentary quantitative models and determine the different dimensionless parameters in the flow to understand how the results can be scaled to the geological repository system. This task includes collaboration with CNWRA staff and consultants at the University of Bristol.
- 4) Provide expert advice as required on volcanology in relation to potential magma-repository interactions, including support for NRC-DOE meetings.

The period of performance will be from July 15, 2003 to September 30, 2004. The budget for this statement of work will not exceed US\$, and will include:

Personnel:

Total Personnel Costs:

Direct Expenses:

To be billed at cost. Estimated expenses are currently:

One 3-day trip to San Antonio:

Roundtrip airfare London to San Antonio:

Car Rental:

Hotel