SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2009

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I. PROBLEM NUMBER

GHE-09-30

II. PROBLEM TITLE

Exposure to Naturally Occurring Hazardous Minerals During Construction Activity

III. RESEARCH PROBLEM STATEMENT

Oregon Department of Transportation (ODOT) excavation activities must avoid situations such as the one in which the Ash Grove Cement in Baker County currently finds itself; the belated and unexpected discovery that some of their limestone contains elevated levels of mercury. The Department of Environmental Quality (DEQ) has identified Ash Grove as one of the largest industrial emitters of mercury in the nation. A naturally occurring hazardous materials (NOHM) analysis of the site would have shown old hot springs deposits in close proximity to the mine site and would have flagged this area along I-84 as an area with potentially elevated levels of mercury.
Consequently, ODOT's rock source pits and private sources—used for state highway projects—could contain NOHM, as does rock moved from cuts to fills during construction activities. Many elements, minerals (non-fuel and industrial minerals), and rocks meet the NOHM criteria, particularly those that pose health hazards through their physical properties (e.g. size, shape, dissolution traits). Low levels of NOHM (known as "background") seem to be of little consequence, but when NOHM have been concentrated or exposed to the accessible environment, the exposure may cause or pose a substantial present or potential hazard.
Recently, the Federal Highway Administration warned ODOT Technical Services about a zeolite mineral, Erionite, associated with cut and fill work near Durkee, Oregon. This mineral is considered so hazardous that the EPA requires anyone who intends to manufacture, import or process any article containing Erionite to notify the EPA 90 days in advance. Erionite is just one NOHM in Oregon; there are many others, including asbestos. ODOT's biggest rock pit in southwestern Oregon is in serpentinized harzburgite/dunite—a source of asbestos minerals—and the rock has already been spread under most of I-5 near Grants Pass.
In response to NOHM threats, ODOT Hazmat personnel have raised several questions. First, what are the NOHM in Oregon that could pose environmental and health concerns related to ODOT's geologic investigations and environmental assessment of projects, and potential pollution liability? Second, where are NOHM located in the state and their relationship to state highway right-of-way including material sources, staging areas, disposal sites, and stockpile sites?

IV. RESEARCH OBJECTIVES

Objective 1: Identification and knowledge—Develop list of NOHM that may plausibly occur in Oregon , and tailor and query existing mineral and geologic databases to determine where such occurrences may intersect ODOT operations; setting priorities based on hazard assessment.
Objective 2: Detection—Develop tools such as digital maps that inform ODOT personnel of the potential location of NOHM using results of Objective 1 as a screening tool and build awareness of environmental and health impact.
Objective 3: Control and management—Develop and implement best management practices for identified NOHM determined in Objective 1and located in Objective 2.

V. WORK TASKS, COST ESTIMATE AND DURATION

Task 1: Research and Programmatic activities - $30,000

In concert with other organizations, research to identify and prioritize NOHM and understand health hazards. Based on result from NOHM inventory, and using a ranking system for various NOHM, create NOHM priority lists and incorporate these lists in Task 2 and Task 3. Establish through formal and informal meetings lines of

communication required to support the project and ensure the timely progress from project start-date through work period.

Task 2: Data Collection/Detection Protocol - $94,000

Update, enhance, and integrate existing DOGAMI databases into one NOHM hazard GIS layer—MILO which shows distribution of mineralized zones, aggregate sources, and industrial minerals; GILO which gives elemental geochemistry of volcanic rock; GTILO which shows distribution of hot springs, and by their nature, associated with elevated levels metals; and OGDC which shows spatial distribution of rock units that might be expected to be sources for NOHM—all to serve as screening tools. Synthesize and develop as needed various DOGAMI geochemical datasets not currently available, as well as external spatial datasets, including the USGS's geochemical landscape data. Summarize these data for detection protocols to be included in a NOHM-ArcGIS application, a GIS layer(s) of potential hazard zones, to identify and communicate information on NOHM.

Task 3: NOHM-ArcGIS Application/Assessment - $56,000

Develop a NOHM-GIS application for ODOT personnel to convey NOHM awareness information, metadata, and documentation.

Task 4: Research Administration - $9,000

Work Task Cost Estimate Duration	
1. Research and Programmatic Activities	$30,000 2 months
2. Collection of Data and Detection Protocols	$94,000 11 months
3. NOHM-ArcGIS Application/Assessment	$56,000 5 months
4. Research Administration	$9,000 18 months
Time & Budget: (18) months & $188,000 (FY09-$65,000, FY10-$124,000)	

VI. IMPLEMENTATION

Implementation of the research findings will occur at various ODOT levels (development, engineering, environmental) for NOHM associated with rock source pits and rock moved from cuts to fills. Using the NOHMGIS application, conduct surveys, inventories and map distribution, and monitor and perform hazard analysis at various spatial scales for ODOT's geologic investigations and environmental assessment of projects and flag potential pollution liability. Based on hazard assessment information, implementation of cost-effective best management practices (solutions) to avoid or minimize unnecessary exposure to ODOT employees, its contractors, and travelling public.

VII. POTENTIAL BENEFITS

Benefit 1: Proactive rather than reactive in actions to identify which rock source pits and rock moved from cuts to fills are likely to contain NOHM. Other agencies which would have particular interest in the results include DEQ, Department of State Lands (DSL), and Federal agencies, e.g. EPA.

Benefit 2: Reduces unnecessary health risk to ODOT employees, construction workers, and the traveling public.

Benefit 3: Reduces ODOT liability by not overlooking naturally occurring hazardous minerals in its geologic investigations and environmental assessment of projects and potential pollution liability.

Benefit 4: Provides education for resource managers and field-level personnel on the impact of NOHM control and the effects of various management and user practices.

VIII. SUBMITTED BY

Stage 1	**Stage 2**
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