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Nevada Risk Assessment/Management Program (NRAMP) – Phase 2: Quarterly Progress Report January 1, 2007 through March 31, 2007

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Nevada Risk Assessment/Management Program (NRAMP) – Phase 2

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Quarterly Progress Report

January 1, 2007 through March 31, 2007

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Quarterly Report (January 1, 2007 to March 31, 2007)

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1.0 Radiological Source Characterization and Radiological Source Release Terms (PI: E.J. Bentz, E.J. Bentz & Associates)

1.1 Progress – Summary

Work conducted in this second quarter consisted of continuing the detailed data and information acquisition; review of the received document contents, and interpretation of significance in light of previous DOE documents. This included telephone and in-person discussions with DOE NVO personnel at the March Waste Management Symposia in Tucson. As a result of these discussions and review of the supporting data and methodologies, a more specific listing of activities was developed, and DOE provided a confirmatory note to HRC in March.

Much of the review of the received information does indicate significant changes in data, methodologies, and baseline assumptions over the past four years since NRAMP 1. As identified below (Section 1.3.2), these reflect the changing conditions at the NTS RWMS and are significant for the conduct of the work plan.

1.2 Progress – Technical Work

Information Searches: Focusing on Subtasks 1 and 2, technical information searches (and analyses) were continued on each of the specific topics identified in the scope of work (e.g. MLLW; LLW; PA). These searches were significantly enhanced by the receipt of requested technical documents from NVO (courtesy of Gary Pyles). These searches consisted of:

- reviews of NTS data documentation (e.g. source term inventory; model development for the multiple PA addendums and updates since the original 1998 PA for Area 5, including the 2006 update);
- Goldsim model documentation; and,
- regulatory compliance documentation.

Visits & Discussions: Telephone and in-person discussions facilitated the acquisition and interpretation of the above data and information. In addition, multiple DOE papers presented at the WM'07 conference provided another source of up-to-date information, and the opportunity for discussions on interpretation and application to the NTS.

Follow-ups: Plans were established to conduct more detailed follow-up discussions during the forthcoming April 23 DOE Generator Workshop in Las Vegas. Examples for discussion include interpretation of the multiple data bases currently used complex-wide to forecast the source term for MLLW receipts, as well as the historical NTS data bases used in the current Goldsim Area 5 PA model (version 4.001, utilizing the Area 5 Inventory Version 2.021 Goldsim model as reported by DOE in March 2007, in the 2006 Annual Summary Report).

1.3 Findings

1.3.1 One key objective of the initial first phase effort was the development of the specific research activities in consultation with DOE, and consistent with their current priorities (*See*

EJB&A NRAMP II Scope, Areas of Research, last paragraph). This was accomplished, and discussed with DOE, and DOE provided a letter to HRC reflecting this on March 29, 2007.

1.3.2 Review and interpretation of PA and CA related data and documentation for Area 5

Closure reveals significant changes over the past 5 years. These include:

- significant changes in the **source term inventory** (with the addition of new radionuclides and rapidly growing radionuclide concentrations such as Rn 222 and Tc 99);
- changes in the **fate and transport models** within the Goldsim formulation (examples include the inclusion of additional exposure pathways reflecting radon gas release, and Tc99 uptake in plant systems; replacement of Rogers-Neilson calibrations for radon effective diffusivity in soil with laboratory-measures values);
- changes in **model assumptions** concerning regulatory compliance (examples include the addition of **additional** period of passive institutional control at the end of IC; and the increase of closure cover thickness from 2.4 to 4.0 meters); and,
- changes in **model methodology** (example - the inclusion of the decay of inventory during the operational period which is important for shorter-lived radionuclides that have decay daughters with dominant exposure pathways, such as Rn 222 to Pb210).

Analyses of these changes are critical to the work scope under Subtasks 1 and 2.

A reduced level-of-effort commensurate with the current annual budget authorization and the two-year base period of performance under the subcontract to UNLV continues.

2.0 Evaluation of Cap Subsidence due to Waste Package Degradation (PI: Moses Karakouzian, UNLV Department of Civil Engineering)

2.1 Subsidence Modeling Approach: Activities and Status

- Writing of the modeling approach report was initiated.
- Work continued on strategy for comprehensive modeling and uncertainty analysis of subsidence predictions.
- Met with NTS personnel; they will provide some details about their NTS subsidence model.

2.2 Probabilistic Subsidence Model: Activities and Status

- The research version of GoldSim software was purchased and received.
- Training on aspects of GoldSim modeling continued.

3.0 Radionuclide Behavior in Tank Waste (PI: Ken Czerwinski, UNLV Department of Chemistry)

3.1 Activities and Status

- The student originally assigned to this project moved to a different project leaving a personnel vacancy. Recruiting for an undergraduate student and/or postdoctoral researcher was initiated in case a graduate student does not become available in the summer.
- Contact was initiated with Pacific Northwest National Laboratory (Edgar Buck). PNNL is making TEM samples for UNLV to analyze, in particular, the morphology and behavior of older waste (real material). A graduate student with expertise and interest in this area is available if and when the sample arrives.

4.0 Environmental Behavior of Technetium and Evaluation of Stable Analogs for Actinide Elements in Tracer Experiments (PI: Ken Czerwinski, UNLV Department of Chemistry)

4.1 Activities and Status

- The current work plan for subtask 1 is to evaluate fundamental properties of Re and Tc using electrochemical methods. A Tc electrode has been made in the UNLV laboratory and the same technique may be applied to Re. Then the redox of Tc and Re under extremely precise conditions may be compared. The Eh and Ph diagrams for Tc are consistent, but Re appears to vary.
- The graduate student assigned to this task received permission to dedicate a Time of Flight (TOF) mass spectrometer to the project. This will allow research to commence work using Re while awaiting the long lead time for installation and training on the new ICPMS. The TOF unit is being serviced for proper operational condition.
- Recruiting for a second student or researcher was initiated, some prospects are hopeful for a summer term start date.
- The current work plan for subtask 2 on stable analogs for the actinides is to investigate vanadium as a homolog for uranium. The modeling has been done on this using Geochemist Workbench; however, an experimental method needs to be determined to measure low levels.

5.0 Evaluation of Radon Release and Transport from Actinide-Bearing Waste Forms (PI: Gary Cerefice, UNLV Harry Reid Center)

5.1 Activities and Status

- The received Th was verified to be in secular equilibrium so it can be used for experimental work without purchasing additional amounts. This research is synergistic work with the radiochemistry group trying to synthesizing ThN fuel. Synergistic because ThN was actually what was provided to UNLV, their report incorrectly called it Th Nitrate.
- A new graduate student was identified and is interested in working on this project, so activities are expected to significantly ramp up next quarter.

6.0 Review and Evaluation of Disposal Facility Performance Assessments (PI: Anthony Hechanova, UNLV Harry Reid Center)

6.1 Activities and Status

- The “Addendum 2 to the Performance Assessment for the Area 5 Radioactive Waste Management Site at the Nevada Test Site, Nye County, Nevada: Update of Performance Assessment Methods and Results,” dated June 2006 was received and is undergoing review.