NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE INDEPENDENT SCIENTIFIC INVESTIGATIONS PROGRAM ANNUAL REPORT MAY 1997 – APRIL 1998

Prepared by:

NYE COUNTY DEPARTMENT OF NATURAL RESOURCES AND FEDERAL FACILITIES

NUCLEAR WASTE REPOSITORY PROJECT OFFICE

GRANT DE-FG08-96NV12027

JULY 1998

DISCLAIMER

The investigations and research reported here have been conducted according to Nye County's Quality Assurance Program Plan manual, which is compliant with NQA-1 standards. However, the results reported here have not been thoroughly checked and compared against the sources of information. Some of the results are preliminary, and the quality assurance for some of the activities has not been completed as of the date of this printing. Therefore, some of the results presented in this report are subject to change and verification.

TABLE OF CONTENTS

LIST OF FIGURES AND PHOTOGRAPHS

LIST OF TABLES

CONVERSION FACTORS

Multiply	By	To obtain
acre-foot (acre-ft)	0.001233	cubic hectometer
acre-foot per year (acre-ft/yr.)	0.001233	cubic hectometer per year
cubic foot per second (ft^3/s)	.02832	cubic meter per second
foot (ft)	.3048	meter
inch (in.)	25.40	millimeter
mile (mi.)	1.609	kilometer
square mile	2.590	square kilometer

Temperature: Degrees Fahrenheit (F) may be converted to degrees Celsius (C) by using the formula $C = 0.5556 (F-32)$

CONTENTS OF THE ACCOMPANYING MEDIA

DATABASE

PRES_TEMP

Nycoun97.mdb	Pressure and temperature data collected at ONC#1 and NRG4 boreholes and atmospheric monitoring data collected in the ESF tunnel and the ECRB drift
Stor97.mdb	Pressure and temperature data collected at ONC#1 and NRG4 boreholes and atmospheric monitoring data collected in the ESF tunnel and the ECRB drift

SPRINGS PUMPAGE AND DISCHARGE (NQA)

Discharge.xls	Estimated evapotranspiration and spring discharge rates by discharge area
Pumpage.xls	Total pumpage rates per year for the Death Valley Regional Watershed
Springs.xls	Spring discharge rates for the Death Valley Regional Watershed

TUNNEL

tunldata.mdb	Atmospheric monitoring data collected in the ESF tunnel and the ECRB drift

WATERLEVEL (NQA)

modelUTM.mdb	Water Level data for monitoring and agricultural wells located in the Death Valley Regional Watershed

DOCUMENT

AnnualRpt97_98.doc	NWRPO Annual Report May 1997 – April 1998

FIGURES

FIGURES IN TEXT

RegionAllWells.ppt	Water level contour maps for all hydrographic areas combined
10yr_maps.ppt	Water level contour maps presented in 10-year intervals
AllYr_maps.ppt	Water level contour maps of the entire data collection period
Nrg4Text.ppt	NRG-4 graphs referenced in the text section of the Report
Onc1Text.ppt	ONC#1 graphs referenced in the text section of the Report
TextFiguresA.ppt	Additional figures located within the text section of the Report
TextFiguresB.ppt	Additional figures located within the text section of the Report

NRG4

Nrg4Press&Temp.ppt	Pressure and Temperature data collected at the NRG-4 borehole

ONC1

Onc1Press&Temp.ppt	Pressure and Temperature data collected at the ONC#1 borehole

GASSAMPLING

Onc1GasChem97.ppt	Gas Chemistry Results from ONC#1 - 1997
Onc1GasChem98.ppt	Gas Chemistry Results from ONC#1 - 1998

TUNNEL

ECRB

ecrbMay20_June25.ppt	Atmospheric monitoring data from the ECRB drift - 1998

ecrbJune98.ppt	Atmospheric monitoring data from the ECRB drift - 1998

ESF

ESFInstall.ppt	Atmospheric monitoring data from the one-time installation in the ESF tunnel
ESF_TBM.ppt	Atmospheric monitoring data from the TBM installation in the ESF tunnel

WATERUSAGE

TunnelWaterUse.ppt	Water usage data from the ESF tunnel and ECRB drift

TABLES AND GRAPHS

Cl36RockCuttings.xls	Chlorine-36 analyses of leachates from rock cuttings samples
Onc1GasChem.xls	Gas chemistry results in table form from ONC#1, 1997 and 1998
WaterLevelData.xls	Precipitation graphs, hydrographs and water level data for the Death Valley region
ecrb.xls	Site activity and water usage data from ECRB tunnel
esf.xls	Site activity and water usage data from ESF tunnel

EXECUTIVE SUMMARY

This annual summary report, prepared by the Nye County Nuclear Waste Repository Project Office (NWRPO), summarizes the activities that were performed during the period from May 1, 1997 to April 30, 1998. These activities were conducted in support of the Independent Scientific Investigation Program (ISIP) of Nye County at the Yucca Mountain Site (YMS).

The Nye County NWRPO is responsible for protecting the health and safety of the Nye County residents. NWRPO's on-site representative is responsible for designing and implementing the Independent Scientific Investigation Program (ISIP). Major objectives of the ISIP include:

- Investigating key issues related to conceptual design and performance of the repository that can have major impact on human health, safety, and the environment

- Identifying areas not being addressed adequately by the Department of Energy (DOE)

Nye County has identified several key scientific issues of concern that may affect repository design and performance which were not being adequately addressed by DOE. Nye County has been conducting its own independent study to evaluate the significance of these issues.

The reader is referred to previous reports (NWRPO, 1995; Multimedia Environmental Technology, Inc. (MET), 1995; 1996, and 1997) for a detailed explanation of these specific concerns.

This report summarizes the results of monitoring from two boreholes and the Exploratory Studies Facility (ESF) tunnel that have been instrumented by Nye County since March and April of 1995. The preliminary data and interpretations

presented in this report do not constitute and should not be considered as the official position of Nye County.

The ISIP presently includes borehole and tunnel instrumentation, monitoring, data analysis, and numerical modeling activities to address the concerns of Nye County.

Figure 1-1 shows the regional setting of the Yucca Mountain. Nye County has installed and is currently monitoring pressure and temperature instruments in boreholes UE-25 ONC#1 and USW NRG4 (Figure 1-2) to evaluate the long-term pneumatic conditions at strategic depths in the subsurface both in response to fluctuations in atmospheric conditions and in response to other possible disturbances resulting from site characterization activities such as the ESF tunnel construction. UE-25 ONC#1 was drilled by Nye County as part of its oversight program. Nye County has also installed instruments to measure temperature, pressure, humidity and wind speed within the ESF tunnel and the Enhanced Characterization of the Repository Block (ECRB) drift to characterize the air being used to ventilate the tunnel that could potentially impact the performance of the repository. Additionally, Nye County collected gas samples from the vadose zone in UE-25 ONC#1 at three different times to establish background conditions and to evaluate changes in the chemical composition of the gases. Changes in the chemical compositions of the gases in the vadose zone with time may be used to evaluate the impact of the ESF construction and obtain transport properties of the rock mass at the site. Finally, Nye County is conducting numerical simulations to evaluate factors (including tunnel ventilation) that might potentially affect both short-term and long-term pneumatic and moisture conditions in the repository host rock.

Nye County has also been evaluating new critical data and information as it becomes available from the DOE's Yucca Mountain Project studies. In the past year, Nye County has observed water usage in the tunnel and its potential impact on the repository horizon and the scientific investigation results. The

interpretation of the results of the ^{36}Cl and other environmental and geological isotope studies such as ^{14}C, ^{13}C, and ^{3}H have been the focus of many meetings attended by Nye County which has resulted in several letter reports to DOE during the past year. Some of these communications have resulted in DOE's more focused attention to some of the issues raised by Nye County. Specifically, these issues related to the need for more detailed studies in the ESF tunnel and ECRB drift, limiting the use of construction water, enhanced ventilation studies, and enhanced interpretation of the results of the isotope sampling.

Nye County evaluated procedures and methods used by DOE to conduct air-permeability tests in the unsaturated zone of YMS. As a result of several interactions between Nye County and DOE, satisfactory procedures were developed and used by DOE in more recent testing efforts. The results of these tests were analyzed and reported (Advance Resources International, 1995 and Multimedia Environmental Technology, Inc., 1995, 1996 and 1997).

Water resources of the county are one of its most important assets. Nye County has been conducting research as to the potential impact of the construction and operation of the Yucca Mountain Repository on its water resources. As part of this task, a regional model of the Death Valley Hydrologic Basin was developed and is undergoing refinement. Preliminary results have revealed inadequacies in current models of the Yucca Mountain hydrologic system. As a result of several meetings, DOE has developed plans to alleviate and address these concerns.

Nye County is planning to perform several investigations in the near future to clear some of the issues that were outlined above by installing new wells in both the saturated and unsaturated zones, testing and sampling these wells, and performing data analysis and modeling. These issues are related to the steep gradients in the saturated zone north and west of the site, the potential for dilution in the saturated zone as unsaturated zone moisture enters the saturated zone, the atmospheric and pneumatic boundaries in the Solitario Canyon that might impact the repository performance, and the large-scale transport properties of the

fractured formations in both saturated and unsaturated zones. Nye County has identified future monitoring well locations and plans to begin installation of these wells in late 1998.