



# United States Department of the Interior

U. S. GEOLOGICAL SURVEY  
Box 25046 M.S. 421  
Denver Federal Center  
Denver, Colorado 80225

IN REPLY REFER TO:

INFORMATION ONLY

November 13, 2003

Victor W. Trebules  
Director, Office of Project Control  
U.S. Department of Energy  
Office of Repository Development  
1551 Hillshire Drive  
Las Vegas, NV 89134-6321

SUBJECT: Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS)  
Progress Report, October, 2003

Attached is the USGS progress report in the required format for the month of October, 2003.

If you have any questions or need further information, please call Raye Ritchey Arnold at (303)236-5050, ext 296.

Sincerely,

Robert W. Craig  
Technical Project Officer  
Yucca Mountain Project Branch  
U.S. Geological Survey

Enclosure:

cc: J. Bresee, DOE/OCRWM-HQ/Forrestal  
S. Hanauer, DOE/Las Vegas  
W. J. Arthur III, DOE, Las Vegas  
R. Dyer, DOE, Las Vegas  
D. Barr, DOE, Las Vegas  
W. Boyle, DOE, Las Vegas  
D. Coleman, DOE, Las Vegas  
A. Gil, DOE, Las Vegas

T. Gunter, DOE, Las Vegas  
W. Kozai, DOE, Las Vegas  
S. Mellington, DOE, Las Vegas  
S. Petersen, DOE, Las Vegas  
E. Smistad, DOE, Las Vegas  
R. Spence, DOE, Las Vegas  
B. Terrell, DOE, Las Vegas  
M. Tynan, DOE, Las Vegas  
R. Latta, NRC, Las Vegas (2 copies)  
R. Andrews, M&O/BSC, Las Vegas  
G. Bodvarsson, M&O/LBNL, Las Vegas  
P. Dixon, M&O/LANL, Las Vegas  
A. Eddebarh, M&O/LANL, Las Vegas  
E. Hardin, M&O/BSC, Las Vegas  
R. Henning, M&O/BSC, Las Vegas  
J. Houseworth, M&O/LBNL, Las Vegas  
S. Kuzio, M&O/SNL, Albuquerque  
S. Pedersen, M&O/BSC, Las Vegas  
M. Peters, M&O/LANL, Las Vegas  
J. Wang, M&O/LBNL, Berkeley  
W. Alley, USGS, Reston  
D. Duncan, USGS, Reston  
R. Craig, USGS, Las Vegas  
R. Arnold, USGS, Denver  
M. Mustard, USGS, Denver  
T. Chaney, USGS, Denver  
M. Chornack, USGS, Denver  
W. Dudley, USGS, Denver  
D. Gillies, USGS, Denver  
C. Hunter, USGS, Denver  
Z. Peterman, USGS, Denver  
W. Scott, USGS, Las Vegas  
J. Stuckless, USGS, Denver  
D. Sinks, BSC, Denver

**U.S. GEOLOGICAL SURVEY**  
Executive Summary  
**YUCCA MOUNTAIN PROJECT BRANCH**

October 2003

## GEOLOGIC STUDIES

Geologic work by USGS staff in support of the Nye County early-warning drilling program (EWDP) continued. The data package entitled "Interpretation of the Lithostratigraphy in Deep Boreholes NC-EWDP-16P, NC-EWDP-27P, and NC-EWDP-28P, Nye County Early Warning Drilling Program, Phase IV A" continued in technical review. Those data represent the Yucca Mountain Project's initial examination and interpretation of subsurface lithostratigraphy near the southern part of Yucca Mountain. The data are intended for incorporation into cross sections and subsequent integration into hydrogeologic framework models. In further work with the Nye County boreholes, selected bit-cutting samples from boreholes NC-EWDP-24P and NC-EWDP-29P were examined.

Geologic mapping continued in support of determination of fracture and lithophysal characteristics of the repository host horizon (RHH). Lithophysal-panel mapping concluded in October, along with completion of the large-cavity lithophysal survey. The ECRB bulkhead at Station 17+60 was closed at the end of the month. The field portion of technical review of work conducted behind the bulkhead was completed this month to facilitate milestone completion.

Field mapping for review of the fault-related fracture array also was completed this month. All mapped faults exposed in the ECRB Cross Drift from the Solitario Canyon Fault to the intersection with the North Ramp were re-examined and evaluated to improve understanding of fracturing as it relates to faulting in the repository host horizon. Similar evaluation was completed for the South Ramp, Main Drift, and North Ramp of the ESF. The preliminary result of that exercise noted that fracturing appears asymmetrical in and around faults and fault zones. At the conclusion of field work, compilation of related data packages began.

Borehole fracture and lithophysal analysis continued as on-going investigations during the month, making use of video tape to improve definition of fracture and lithophysal distributions in the RHH. Creation and analysis of discrete [virtual] fracture networks through the use of length, spacing, and orientation data from detailed-line-survey (DLS) and full-periphery geologic mapping also continued. Such data were incorporated in the

writing and assembling of the SAR (Scientific Analysis Report) as they became available.

Preliminary evaluation of the borehole video for ThermK-015 (Thermal-K Test 4) was conducted to determine feature-specific locations of dm-sized (that is, 10-cm) lithophysae, clusters of cm-sized lithophysae and spots, and fractures. In that work supporting in situ testing to quantify lithophysal porosity, the resulting locations demonstrated good correlation when compared to preliminary neutron-log data. That information and correlation contributed to on-going development of specific procedures for thermal-test borehole logging.

## SATURATED-ZONE STUDIES

Reported work on modeling of the Death Valley regional flow system (DVRFS) focused on development of a base strategy for releasing (as a GIS coverage) the water-level data used in the transient model report. Staff also evaluated comments returned from a Chapter D, Transient Model, technical reviewer. Responses also were assembled to reviewer comments on Chapter F of that transient model report.

## UNSATURATED-ZONE STUDIES

The infiltration experiment in Alcove #8/Niche #3 continued, in on-going moisture monitoring. At weekly intervals, accumulated data were retrieved from the TCO, including weight data (reflecting amount of water applied to the large plot) from all 12 permeameters in Alcove #8. Barometric-pressure, temperature, and relative-humidity data were collected behind the bulkhead. Another station collected data from heat-dissipation probes (HDPs) surrounding the large plot. Additional data included measurement of background evaporation and signals from HDPs in the trench. Summarizing recent activity in the large-plot experiment, on August 28 water application was initiated (and continued, at this writing) in all twelve plots. Frequent equipment malfunctions typically have been caught early, but one malfunction resulted in a spill of some 2275 liters (600 gallons) of water—essentially an unplanned slug added to the left margin of the large plot over a two-day interval. The incident indicated that fractures and matrix around the large plot have the capacity to absorb a large amount of water quickly, and Niche #3 was wetter after the event. Observed behavior may represent fracture communication just below the surface of Alcove #8. Application rates remained at 60 to 70 liters per day, with application patterns in individual plots similar in many respects to previous experimental behavior.

Moisture monitoring in Alcove #7 also continued. Preliminary data for October were processed into spreadsheets; relative humidity remained near 100%. Monitoring equipment in Alcove #7 underwent various maintenance operations, plans were assembled for installation of an isolating transformer on the thermocouple data-logger battery chargers, and staff provided input to the UZ monitoring teleconference. Some

older probes are giving erroneous readings, probably due to condensation on the measurement grids. The newer-style probe, designed for condensing environments, continued to operate satisfactorily. In other moisture-monitoring work, plans were begun for extraction of monitoring equipment from the ESF.

Isotopic analysis by USGS labs continued in support of YMP investigations. Work to determine chemical and isotopic composition of pore water continued. The data package resulting from isotopic and chemical pore-water investigations reached final stages of preparation for submittal. In other work, additional samples from borehole ESF-HD-CHEMSAMP3 were requested from the SMF, in on-going isotopic support for thermal testing. In unscheduled work, USGS staff reviewed a revised Sandia National Laboratory procedure for "Borehole Water Sampling in the ESF." At the encouragement (and direction) of DOE, several staff members, including J. Stuckless, B. Marshall, K. Scofield, and K. Futa, and others, prepared separate presentations for the special session on the unsaturated zone held at the Geological Society of America annual meetings.

Laboratories of the USGS also provided isotopic and hydrochemical support to the Nye County early-warning drilling program (EWDP). Activity to collect water samples from Nye County and Inyo County (California) continued, and samples were collected from 25 different zones in Nye County EWDP wells during October. Major-ion and trace-metal analyses were completed on samples from six Nye County EWDP wells sampled during October.

In preparation for isotopic analysis in support of U-series delineation of UZ flow zones, samples collected in September from the transect across the Solitario Canyon Fault exposed in the ECRB Cross Drift were examined in the laboratory for signs of water/rock interaction. Samples within and adjacent to the fault show evidence of significant mineralogical alteration. The timing and degree of water/rock interaction responsible for those modifications will be addressed using  $^{234}\text{U}/^{238}\text{U}$  and  $^{230}\text{Th}/^{238}\text{U}$  isotope analyses in investigations over the next several months. In related developments, a necessary electrical transformer was ordered and will be installed in advance of the installation of the new Triton mass spectrometer itself (anticipated for November). Please note that the use of firm, trade, or brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey, the Department of Energy, or other element of the U.S. Government.

Analysis of microclimate records in fracture minerals also continued. Samples were examined for use as candidates for additional analyses by ion microprobe, micro-digestion, and XRF microanalysis. A technical procedure for use of the Kevex Omicron XRF microanalyzer was initiated. The instrument will be used to map the abundance and spatial distribution of secondary minerals within coatings from UZ fracture and lithophysal cavities.

Twinned calcite in breccias in some faults at Yucca Mountain has been attributed to elevated temperature and rapid deposition/crystallization, conclusions sharply at odds with existing data and published studies (by the USGS and elsewhere in peer-reviewed

journals) of secondary calcite in the UZ and simulations of the thermal history of the Yucca Mountain unsaturated zone. Additional detailed geochemical analyses (and supporting analyses) will be performed for comparison to fracture-hosted calcite and to refine existing models of thermal history. The analytical team awaited a list of potential sampling localities, slated to arrive from the Southwest Research Institute and Bucknell College.

#### WATER-RESOURCES MONITORING

Preparation of a quarterly report included review of data on ground-water levels and discharges collected and compiled for monitoring sites during July through September 2003. Staff prepared and delivered a letter report to the TPO and DOE on October 31, 2003, in completion of milestone **PAGSW266M4 [Prepare Monitoring Report 4th Qtr FY03]**, describing those monitoring observations. In related on-going work, ground-water levels were measured at 34 sites in routine monitoring, and ground-water discharge was measured at five springs and at one flowing well. Ground-water and spring-discharge monitoring data collected during October were checked and filed.

**USGS Milestone Report**  
**October 1, 2003 October 31, 2003**  
Sorted by Baseline Date

**Level: 4**

<b>Deliverable</b>	<b>Due Date</b>	<b>Expected Date</b>	<b>Completed Date</b>
<b>PAGSW266M4</b> Letter Report: 4th Qtr FY03	10/31/2003	10/31/2003	10/31/2003

**USGS Milestone Report**  
**October 1, 2003 October 31, 2003**  
Sorted by Baseline Date

**Level: 5**

<b>Deliverable</b>	<b>Due Date</b>	<b>Expected Date</b>	<b>Completed Date</b>
<b>PAGSM38EM5</b> Mtg Summary to TPO: Oct03	10/31/2003	10/31/2003	10/31/2003



YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey  
 Date Prepared 11/13/2003 11:11 AM

Fiscal Month/Year October 31, 2002  
Page 1 of 1

WBS ELEMENT	<u>CURRENT MONTH END</u>					<u>FISCAL YEAR</u>			
	ACTUAL COSTS	PARTICIPANT HOURS	SUBCONTRACT HOURS	PURCHASE COMMITMENTS	SUBCONTRACT COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMMULATIVE COSTS
1.5.01.01	182	1892	440	0	392	0	2813	0	182
1.5.01.05	41	406	305	0	175	0	444	0	41
1.5.01.06	30	300	350	0	163	0	291	0	30
1.5.01.07	29	301	0	0	0	0	579	0	29
1.5.01.09	139	1221	1668	0	734	0	2499	0	139
1.5.03.01	10	130	0	0	0	0	575	0	10
1.5.03.03	103	957	1152	0	443	0	1241	0	103
1.5.03.04	47	470	214	0	89	0	1230	0	47
1.5.03.07	77	1166	0	0	0	0	400	0	77
1.5.03.12	13	167	0	0	0	0	250	0	13
1.5.03.13	50	248	852	0	490	0	675	0	50
1.5.03.14	6	78	0	0	16	0	146	0	6
	727	7336	4981	0	2502	0	11143	0	727

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 2003 - October 31, 2002

11/13/2003 11:11:51 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
4568-9U001 Science Advisors	22.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.05
4568-9U010 Publications	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.10
4568-9U040 Tectonics	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.11
4568-9U041 Water Levels	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.00
4568-9U042 Geophysics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U060 Mapping Expertise (USBR)	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.54
4568-9U081 Geochemistry	67.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.72
819Y01 USGS Technical Advisory Capability	120.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.52
4568-9U002 Br Chief, Asst Br Chief, Deputy TPO, Tea	32.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.05
819Y11 USGS Branch Management	32.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.05
4568-9U003 Planning & Project Control	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.69
819Y21 USGS Planning & Project Control	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.69
1.5.01.01 Project Support - Project Manageme	182.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	182.25
4568-9U030 Regulatory Compliance Support	41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.03
819Y31 USGS Regulatory Compliance Support	41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.03
1.5.01.05 Project Support - Compliance Manag	41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.03
4568-9U024 Computer/Network Support	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.99
819Y15 USGS Commputer/Network Support	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.99
1.5.01.06 Project Support - Information Manag	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.99
4568-9U061 Water Resources Monitoring	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.30
819Y41 USGS Water Resources Monitoring	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.30
4568-9U062 Safety	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.08
819Y51 USGS Safety	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.08
1.5.01.07 Project Support - Environmental, Saf	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.38
4568-9U011 Reports Specialists	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.26
4568-9U012 Data Management	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.02
4568-9U013 Records Support	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.62

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 2003 - October 31, 2002

11/13/2003 11:11:51 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
4568-9U014 QAS Support	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.55
819Y12 USGS Data, Records & Reports	79.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.45
4568-9U021 Administrative Support & Personnel Servi	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.67
4568-9U022 Facilities Management	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U026 Facilities Other	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.63
819Y13 USGS Administration & Facilities	31.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.30
4568-9U023 Training	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.93
819Y14 USGS Training	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.93
4568-9U025 Property Management	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.89
819Y16 USGS Property Management	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.89
1.5.01.09 Project Support - General Project Ser	138.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	138.58
1.5.01	421.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	421.23
4568-9U017 Legacy Software Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
APAG01 USGS Legacy Software Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U008 LA Chapter Preparation	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.32
APAG03 USGS LA Chapter Preparation Support	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.32
4568-9U007 KTI Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
APAG04 USGS KTI Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
1.5.03.01 Integration	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.32
4568-9U063 Alcove 8/Niche 3 Infiltration	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.62
4568-9U064 Moisture Monitoring ESF/X-Drift Closeout	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.17
4568-9U065 Bulkhead Moisture Monitoring	34.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.48
4568-9U073 Alcove 7 Moisture Monitoring	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.16
AUZG01 USGS UZ Moisture Studies	62.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.44
4568-9U085 Geochemical Testing of UZ Flow	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.80
4568-9U087 Chemical & Isotopic Composition of Pore	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.74
4568-9U089 Mineral Records of UZ Flow	8.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.82

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 2003 - October 31, 2002

11/13/2003 11:11:51 AM

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
	EST	EST	EST	EST	EST	EST	EST	EST	EST	EST	EST	EST	
4568-9U094 Thermal History of Yucca Mountain	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.27
<b>AUZG02</b> USGS UZ Isotope Hydrology	36.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.63
4568-9U090 Isotope Support for Thermal Testing	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.04
<b>AUZG03</b> USGS Drift-Scale Test ESF	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.04
<b>1.5.03.03</b> Safety Analyses - Unsaturated Zone	103.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	103.11
4568-9U043 Hydrogeologic Data Integration	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U044 3D Hydrogeologic Model Development	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U045 Flow Model Calibration and Evaluation	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.16
4568-9U046 DVRFS Knowledge Exchange Protocol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U047 DVRFS Predictive Capability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
<b>819Y61</b> USGS Death Valley Regional Flow Mod	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.16
4568-9U049 Nye County EWDP Borehole Lithostratigr	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.03
<b>ASZG01</b> USGS SZ Investigations	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.03
4568-9U055 Site HFM - AMR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4568-9U092 Hydrochemistry/Support to Nye Co. EWD	33.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.39
<b>ASZG02</b> USGS SZ Isotope Hydrology	33.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.39
<b>1.5.03.04</b> Safety Analyses - Saturated Zone Flo	46.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.57
4568-9U069 Fracture & Lithophysal Characteristics of	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.00
<b>AEBG03</b> USBR Testing Activities in Support of D	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.00
<b>1.5.03.07</b> Safety Analyses - EBS Performance	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.00
4568-9U005 YMP Performance Confirmation	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.04
<b>APAG02</b> USGS Performance Confirmation Supp	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.04
<b>1.5.03.12</b> Performance Confirmation Support	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.04
4568-9U016 USGS Data Verification	49.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.69
<b>APAGD5</b> USGS Data Verification	49.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.69
<b>1.5.03.13</b> Safety Analyses - Technical Data Ma	49.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.69
4568-9U004 USGS Support to Site Description	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.20

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 2003 - October 31, 2002

11/13/2003 11:11:51 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
ANSG01 USGS Support to Site Description	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.20
1.5.03.14 Safety Analyses - Yucca Mountain SI	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.20
1.5.03	305.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	305.93
1.5	727.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	727.16
1.5 OPERATING	727.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	727.16
CAPITAL EQUIPMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	727.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	727.16
FTEs													
FEDERAL	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CONTRACT	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TOTAL	72.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	