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

January 13, 2002

Victor W. Trebules
Director, Office of Project Control
Office of Civilian Radioactive Waste Management
Office of Repository Development
P.O. Box 364629
North Las Vegas, Nevada 89036-8629

SUBJECT: Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS) Progress Report, December, 2002

Attached is the USGS progress report in the required format for the month of December, 2002.

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

Sincerely,

Raye Ritchey Arnold
for Robert W. Craig
Technical Project Officer
Yucca Mountain Project Branch
U.S. Geological Survey

Enclosure:
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U.S. GEOLOGICAL SURVEY
YUCCA MOUNTAIN PROJECT, EXECUTIVE SUMMARY

December 2002

GEOLOGY

In geologic work supporting development of borehole lithostratigraphy for the Nye County early-warning drilling program (EWDP), samples from two recently drilled Nye County boreholes remained in processing by the SMF. Examination of those samples awaited completion of sample processing. In related progress, responses to review comments were being prepared for the Phase III lithostratigraphic data package. The Phase II cross-section data package was submitted for technical review.

Attributions currently are being compiled for the completed geologic map of the potential southern expansion area of the proposed repository so that the Publications group can work with the map using their software. When the attributing is completed, the Publications group can review the map for USGS director's approval. Anticipated dates for USGS Director's approval of that map are in middle to late February.

Comment resolution from technical reviews of the report describing deterministic seismic hazards analysis is underway. Required revisions have taken longer than anticipated but are nearly complete.

Several efforts continued in relation to underground mapping and rock testing. Data from shear-strength testing has been compiled into a draft package and is expected in technical review in early January. In preparation for static-fatigue testing, LVDT (Linear Variable Differential Transformers) electromechanical transducers were received from Bechtel/Nevada calibration. Before actual testing can begin, however, additional "chain" lateral-extensiometer LVDTs must be received from Sandia (Albuquerque). The arrays of electromechanical transducers convert rectilinear motion into corresponding electrical signals. Testing can begin within a few days of receipt of the transducers.

Collection of data in Slot Test #3 (located in the invert of the Cross Drift at Station 21+25) to quantify lithophysal porosity with *in situ* tests continued. Data on the size, shape, and distribution of lithophysal cavities, rims, and spots were gathered in two slot maps, a central borehole map, and a "panel map" of the invert. Configuration of the video recordings in the two vertical slots differed from previous recording set-ups, so a new video "slot grid test" was performed, and the overlay for the VCR monitor (used in mapping from the images) was revised. In related lithophysal work, Phase I and Phase II lithophysal data packages have been combined into a single package. That package has been compiled and en route to the TDMS.

SATURATED-ZONE STUDIES

Preparations for cross-hole hydraulic and tracer testing at the Alluvial Test Complex (ATC) continued during December. The Westbay transducers for instrumentation of well NC-EWDP-19IM1 for background monitoring, which had been sent to Westbay, Inc. for calibration, were delivered early in December. On December 19, those transducers were lowered by wireline and positioned in appropriate locations within the Westbay PVC casing already in the well. That installation completed the instrumentation process in NC-EWDP-IM1. Actual monitoring for barometric response is expected to begin around January 2003 by activation of the Westbay data logger to collect background pressures and temperatures from transducers installed in borehole –19IM1. Those background pressures will be used to calculate barometric efficiency.

In deferred work during December on cross-hole hydraulic and tracer testing at the ATC, compilation continued of Software Management Reports (SMRs) for the programs INJECTION-PUMPBACK.VI, MOENCH-PEST.VI, and STRELTSOVA-ADAMS.VI. Those SMRs are expected to be submitted to Software Configuration Management by the end of January. Also expected to be completed at that time are SMRs for additional software packages DERIVATIVE.VI, COOPER-JACOB.VI, and HANTUSH.VI. The SMRs for programs entitled RECIRC.VI and ELLIPSE.VI are expected to be completed by late February. [Please note that any use herein of private firm or brand names is for identification and explanatory purposes only and does not constitute endorsement by the United States Geological Survey or other agency of the U.S. government.]

Modeling of ground-water flow and compilation of related data continued in work on the Death Valley regional flow system (DVRFS). A variety of software and hardware improvements were put in place for management of the complex DVRFS data bases, including replacement of ARCVIEWER, v. 3.2, with ARCMAP for implementation of flow-model post-processing. Other efforts improved capabilities using reVision, Inc., Rockworks, and Visio software packages. Improvements and maintenance also continued on the DVRFS-project web site in support of knowledge-exchange and DVRFS modeling-meeting information. Available data were scrutinized to determine if those data indicate decreasing hydraulic conductivity with depth in the Death Valley region, and plots for measured hydraulic conductivity versus depth were prepared for various hydrogeologic units. Differences between hydrogeologic units and trends in data were evaluated.

Three-dimensional hydrogeologic model (HFM) development continued, with emphasis on updates to lithologic unit descriptors in several areas, based on updates to the UGTA (Underground Test Area of the NTS) description. Inconsistencies between cross sections were corrected. Examination of the depth decay of hydraulic conductivity for various hydrogeologic units for the flow model and development of zonation arrays (composite zonations for all of the volcanic rocks, volcanic aquifers, and volcanic confining units) contributed to enhancement of the hydrogeologic model. A progress report was prepared

and submitted to the TPO describing mid-year progress in discretization of the hydrogeologic framework model and updates based on hydrogeologic data incorporated from newly constructed geologic maps and cross section(s), in completion on December 19 of milestones **PAGSM32EM5 [Mid-Year Progress Report—HFM Discretization]** and **PAGSM32GM5 [Progress Report—Updates Based on Hydrogeologic Data]**.

Efforts also continued for calibration and evaluation of the flow model. Incorporation of new boundary conditions was a particular focus of work in December, including work on boundary-flux simulations and re-parameterization of the Lower Carbonate Aquifer (LCA) to account for new fluxes across boundaries. Improvements were developed to transient-model post-processors to aid flow modeling. General head boundary (GHB) input files were updated. Model design and strategy for adding constant-head boundary conditions to the current flow model were evaluated. MODFLOW2000 input files were constructed to test those alternative boundary conditions, and modifications were made to post-processor and zone-budget source code to enable post-processing of new boundary conditions. The new borehole data base for the DVRFS flow model was incorporated into the post-processor, and strategy for dynamic linking was examined. Adjustments also were made to accommodate changes in MODFLOW2000 code. Planning efforts began for the documentation and publication of supporting digital data for the current DVRFS flow model. A range of updates were made where improved data became available, including reflagging needed after recent water-level changes at Pahute Mesa and after ground-water withdrawals from DVRFS. Progress in flow-model calibration included incorporation of a new HFM into the flow model, which corrected inconsistencies with input cross sections. A new version of the GHB (head boundary) package was created to reflect changes in the new framework model. Fluxes at discharge areas did not change but cells in which springs are simulated as discharge may have changed due to the new spatial distribution of the LCA. An updated set of wells was included as steady-state head observations. New and corrected water-level measurements, corrected borehole locations, and related improvements were incorporated into that data set.

Several milestones were completed. A memorandum was prepared for the TPO describing elements of the Knowledge Exchange Meeting held on December 13, including examination of depth-decay of hydraulic conductivity, boundary conditions, and updates to the hydrogeologic framework model; water-use information; and improvements to the flow model. That memorandum completed milestone **PAGSM37GM5 [Meeting Summary to TPO—Knowledge Exchange]** on December 20. In related work, milestone **PAGSW373M5 [Annotated Outline for Death Valley Regional Flow Model Report]** was completed on December 12 with submittal of a detailed annotated outline to the TPO. That report carries the tentative title *Evaluation of the Death Valley Regional Ground-water Flow System (DVRFS), Nevada and California.* A further memorandum was prepared for the TPO, reporting submittal of introductory report sections to the editor and completion of milestones **PAGSM30AM5 [Hydrogeologic Data Integration]**, **PAGSM32CM5 [3-D Hydrogeologic Model Development]**, and **PAGSM34CM5 [Flow Model Calibration and Evaluation]** on December 20 with submittal of report sections to the report editor.

Work in Site-scale hydrochemistry continued. The open-file report describing the hydrochemical data base is being revised in response to review comments. (The working data base has been released and is available to Project participants.) Design of discrete-zone sampling (in WT and H Wells) progressed as far as possible until the final decision on which wells will be sampled and what configuration of packers and tubing will be used. Those decisions await M&O input that was expected in November.

Activities to evaluate hydrochronology of the Yucca Mountain flow system were delayed by problems discovered in the sample-plan QC review, with unacceptable results from some testing of standards. Investigation of discrepancies is under way. The related data package is complete except for resolution of issues raised by review of the sample plan.

UNSATURATED-ZONE STUDIES

In on-going deferred work in Alcove Moisture Monitoring, data packages for Alcoves #3 and #4 and the separately compiled Alcove #7 are through technical and checker review. The packages have been returned to the PI for minor updates and additional documentation concerning instrument calibration and data reduction. Corrections were made regarding a missing calibration document and a problem in a data-reduction example. Responses to review concerns are being assembled, with the packages expected to be ready for submittal in January 2003.

Close-out of the surface-based deep UZ borehole instrumentation program also continued. Final records-package review was completed for data packages for UZ boreholes UE-25 UZ-4/UZ-5 and for USW NRG-7a. The completed data package was submitted to TDMS/RPC on December 24 in completion of **milestone PAGSM914M4 [NRG-7a & UZ4/5 Data to TDMS/RPC].**

The Alcove #8/Niche #3 infiltration continued. Data transmittal from the TCO for the large-plot experiment occurred in routine fashion, including a range of parameters for water application, temperature, humidity, and barometric pressure. Collection of data from the draining trench also continued; those pressure transducers can no longer read the tension (meaning tension drier than –300 mbar). Alternate instrumentation is monitoring dry-out to tension drier than –800 mbar, at which time the transducers will be pulled for calibration. Heat-dissipation probes left in-hole will provide continuous monitoring.

In the large-plot experiment, water application slowed, perhaps influenced by boundary conditions such as completion of lateral wet-up. With on-going filling of storage capacity, the system is expected to reach equilibrium. Much slower application than occurred with the trench experiment indicates probable trench fault *and* fracture transmission, but fracture-only transmission in the large-plot test. In related work, compilation of data packages continued.

On-going moisture monitoring continued in the ESF and the Cross Drift. Equipment functioned normally, and data were received from the TCO and used to update appropriate data records. Those data again indicated seasonal variation driven by ventilation with outside air. Falling temperature coincided with falling winter temperatures, and relative humidity responded to passing weather fronts.

Preparation of a data package reporting bulkhead moisture monitoring continued. Video data are in Denver awaiting an accession number for scientific notebook SN-133-v.1. Collection and preparation of temperature and relative-humidity (TRH), barometric-pressure, and wind-speed data continued. Opening of bulkheads and retrieval of instruments for closing calibrations tentatively is scheduled for February 20. Final compilation of the latter package requires those calibrations prior to technical review. The three most-distant (deepest) bulkheads have not been opened. The anticipated opening on December 16 for installation and replacement of equipment did not occur due to safety concerns after derailment of a man car, although personnel were on scene and prepared for data collection. With the bulkheads still closed, bulkhead moisture monitoring and related data collection continued, as did maintenance of related equipment. Receipt and processing of moisture-monitoring data continued, with biweekly monitoring by camera.

Testing to characterize lithophysal material continued, in deferred work. Samples, chosen from the SMF and needed for determination of spot and rim hydrologic properties, were received. Another set of samples is en route to the HRF from Sandia. Those samples will be used to evaluate spot and rim hydrologic properties (likely in early January). Sample protocols have been established for measurement and preparation of all samples upon receipt.

In work on water and gas chemistry, sampled in expanded characterization of the repository block, checking of the ECRB water, gas and water-vapor data package proceeded and is now complete.

In additional work on the chemical and isotopic composition of pore water, Z. Peterman and B. Marshall presented a poster at the Geological Society of America annual meeting entitled *Geochemistry of pore water from densely welded Topopah Spring Tuff at Yucca Mountain, Nevada.* That presentation also serves as an interim report on pore water. Two samples of Topopah Spring Tuff from the Cross Drift were spun in the ultra-centrifuge and yielded adequate water volumes for chemical analyses. The analyses began in December and are expected to be finished next month. In unscheduled work, the ultracentrifuge was moved to new laboratory space to facilitate clean-laboratory conditions. A flood in the lab complicated the process. Staff reviewed a white paper on the origin of the atypical composition of water collected from Borehole 75-2 shortly after heater turn-off and also responded to other reviewer comments on that report expected to be issued early next calendar year. Al Yang, retiring at the end of the month, started the USGS program in geochemistry at Yucca Mountain, and was the lead on many investigations related to pore water chemistry, stable isotopes, and tritium analyses.

In work on isotopic support to thermal testing, a preliminary data package containing the

U and Sr data collected in FY2002 was prepared. That package will serve as a place-holder, with the final package anticipated to be prepared next month.

Delineation of UZ flow zones proceeded, although a milestone regarding data submittal was not completed. The data package containing U-series isotope data, however, has received checker review, subsequent revision, and checker sign-off. The package currently is in final compilation and is expected to be submitted to the Data Management group by the end of January.

In addition, two report milestones were completed during December. Milestones **PAGSZ651M4 [Interpretive Report on Initial U-Series Data]** and **PAGSZ132M4 [Interpretive Report on Opal Geochronology]** were competed on December 13.

WATER-RESOURCES MONITORING

Ground-water levels were measured at 34 sites, and ground-water discharge was measured at one flowing well. Ground-water and spring-discharge data collected during November were checked and filed. Staff met with personnel from the National Park Service, the Fish and Wildlife Service, and the Department of Energy to discuss on-going monitoring programs.

USGS Milestone Report

October 1, 2002 - December 31, 2002

Sorted by Baseline Date

Level: 3

Deliverable		Due Date	Expected Date	Completed Date
PAGSC2040D	Training Cost Information Annual Update	12/19/2002	12/12/2002	12/12/2002

USGS Milestone Report

October 1, 2002 - December 31, 2002

Sorted by Baseline Date

Level: 4

Deliverable		Due Date	Expected Date	Completed Date
PAGSW932M4	Supplemental Fracture Data to TDB/RPC	10/25/2002	11/1/2002	11/1/2002
PAGSW258M4	Letter Report: 4th Qtr FY02	10/31/2002	10/31/2002	10/31/2002
PAGSM930M4	USGS Dir. Approval of Map of S. Expansion Area	11/8/2002	2/14/2003	
PAGSW930M4	Phase II Lithophysal Data to TDMS/RPC	11/15/2002	1/22/2003	
PAGSW931M4	Phase I Lithophysal Data to TDB/RPC	11/15/2002	1/22/2003	
PAGSM935M4	S. Expansion Area Data to TDMS/RPC	11/26/2002	2/28/2003	
PAGSZ132M4	Interpretive Rpt on Opal Geochronology	12/13/2002	12/13/2002	12/13/2002
PAGSZ651M4	Interpretive Rpt on Initial U-series Data	12/13/2002	12/13/2002	12/13/2002
PAGSM920M4	Phase 3 Lithologies Data Pkg to TDMS/RPC	12/17/2002	2/10/2003	
PAGSZ303M4	Final Report to Customer & TDMS	12/27/2002	3/13/2003	

USGS Milestone Report

October 1, 2002 - December 31, 2002

Sorted by Baseline Date

Level: 5

Deliverable		Due Date	Expected Date	Completed Date
PAGSM37EM5	Mtg Summary to TPO	10/31/2002	10/25/2002	10/25/2002
PAGSM37FM5	Mtg Summary to TPO	11/29/2002	11/29/2002	11/29/2002
PAGSM30AM5	Intro Chap Rpt Contribution to Rpt Editor	12/31/2002	12/20/2002	12/20/2002
PAGSM32CM5	Intro Chapters Rpt Contribution to Rpt Editor	12/31/2002	12/20/2002	12/20/2002
PAGSM32EM5	Mid-Year Progress HFM Discretization	12/31/2002	12/19/2002	12/19/2002
PAGSM32GM5	Prg Rpt - Updates Based on Hydrgeo Parameteriztn	12/31/2002	12/19/2002	12/19/2002
PAGSM34CM5	Intro Chapters Rpt Contribution to Rpt Editor	12/31/2002	12/20/2002	12/20/2002
PAGSM373M5	Annotated Outline of Report to TPO	12/31/2002	12/18/2002	12/18/2002
PAGSM37GM5	Mtg Summary to TPO	12/31/2002	12/20/2002	12/20/2002

YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey
Date Prepared 1/13/2003 03:13 PM

Fiscal Month/Year December 31, 2002

WBS ELEMENT	CURRENT MONTH END ACTUAL COSTS	CURRENT MONTH END PARTICIPANT HOURS	CURRENT MONTH END SUBCONTRACT HOURS	CURRENT MONTH END PURCHASE COMMITMENTS	CURRENT MONTH END SUBCONTRACT COMMITMENTS	CURRENT MONTH END ACCRUED COSTS	FISCAL YEAR APPROVED BUDGET	FISCAL YEAR APPROVED FUNDS	FISCAL YEAR CUMMULATIVE - COSTS
1.5.01.1	1	0	26	0	168	0	175	0	1
1.5.02.2	361	337	1879	0	896	0	4582	0	1073
1.5.04.6	392	5126	2322	0	925	0	8665	0	1299
	754	5463	4227	0	1989	0	13422	0	2373

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ESTIMATED COSTS FOR October 1, 2002 - December 31, 2002
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		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
4568-9U015	USGS Data Verification	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99
DTAG01	USGS Data Verification	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99
1.5.01.1.2.0	Data Verification	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99
1.5.01.1		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99
1.5.01		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.99
4568-9U004	USGS Support to Site Description	7.3	8.0	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.12
ANSG01	USGS Support to Site Description	7.3	8.0	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.12
1.5.02.2.3.0	Natural Systems	7.3	8.0	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.12
4568-9U048	Cross-hole Hydraulic & Tracer Testing AT	27.4	27.2	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.39
4568-9U049	Nye County EWDP Borehole Lithostratigr	12.3	10.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.72
4568-9U051	Deferred - Lithostratigraphic Support to Ny	0.0	0.0	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.63
4568-9U052	Deferred - X-Hole Hydraulic & Tracer Tstg	0.0	0.0	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.64
4568-9U053	Deferred - Map Proposed Repository Exp	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
ASZG01	USGS SZ Investigations	39.8	37.5	53.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.38
4568-9U082	Isotopic/Hydrochemical Support to the AT	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.14
4568-9U083	Hydrochronology of the Yucca Mountain F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01
4568-9U084	Site-Scale Hydrochemistry	19.4	-0.1	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.15
4568-9U092	Isotope/Hydrochemical Support to Nye Co	7.7	23.9	-1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.25
ASZG02	USGS SZ Isotope Hydrology	27.1	28.0	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.55
1.5.02.2.3	Saturated Zone	66.9	65.5	67.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	199.92
4568-9U050	Alcove 7/X-Drift Instrument Strains	7.8	5.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.24
4568-9U063	Alcove 8/Niche 3 Infiltration	25.9	22.1	29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.92
4568-9U064	Moisture Monitoring ESF & X-Drift	19.2	14.7	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.27
4568-9U065	Bulkhead Moisture Monitoring	8.2	7.7	21.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.22
4568-9U066	Support to UZ In-Situ Processes AMR	7.3	7.7	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.57
AUZG01	USGS UZ Moisture Studies	68.4	57.6	71.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197.22
4568-9U085	U-Series Delineation of UZ Flow Zones	26.8	5.8	20.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.63
4568-9U086	Complete Chlorine 36 Validation	5.0	13.8	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.56
4568-9U087	Chemical & Isotopic Composition of Pore	30.4	38.0	52.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.55

U.S. GEOLOGICAL SURVEY

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

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		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
4568-9U088	ECRB H2O, H2O Vapor & Gas Chemistry	0.0	4.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.23
4568-9U089	Microclimate Records in Fracture Minerals	13.9	17.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.13
AUZG02	USGS UZ Isotope Hydrology	75.9	79.2	99.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	254.09
4568-9U090	Isotope Support for Thermal Testing	7.9	12.9	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.48
AUZG03	USGS Drift-Scale Test ESF	7.9	12.9	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.48
1.5.02.2.3	Unsaturated Zone	152.2	149.7	188.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	490.79
4568-9U091	Geochem/Physical Characterization of ES	2.1	2.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.82
AEBG01	USGS Effects of Water-Rock Interaction	2.1	2.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.82
4568-9U067	Quantify Lithophysal Porosity - In Situ Tes	8.1	7.5	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.93
4568-9U070	Deferred - Core & Lithophysae Char Tstg	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.98
AEBG02	USGS Nevada Operations Support to E	8.1	7.6	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.91
4568-9U068	Rock Mechanics Testing in the ECRB (US	91.5	53.5	28.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	173.22
4568-9U069	Fracture & Lithophysal Characteristics of	43.7	53.1	48.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	145.44
4568-9U071	Deferred - QAS & Checking Support USB	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.13
AEBG03	USBR Testing Activities in Support of D	135.2	106.5	79.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	320.80
1.5.02.2.4	Engineered Barrier System	145.4	116.9	87.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	349.53
1.5.02.2		371.8	340.2	361.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,073.36
1.5.02		371.8	340.2	361.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,073.36
4568-9U001	Science Advisors	41.0	37.7	36.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	115.50
4568-9U010	Publications	19.2	34.2	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.28
4568-9U040	Tectonics	21.5	10.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.51
4568-9U041	Water Levels	3.4	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.10
4568-9U042	Geophysics	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.42
4568-9U060	Mapping Expertise (USBR)	14.6	8.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.05
4568-9U081	Geochemistry	11.7	11.5	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.44
819Y01	USGS Technical Advisory Capability	111.4	102.2	62.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	276.31
4568-9U002	Br Chief, Asst Br Chief, Deputy TPO, Tea	38.5	63.0	53.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	155.39
819Y11	USGS Branch Management	38.5	63.0	53.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	155.39

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		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
4568-9U011	Reports Specialists	18.0	18.5	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.93
4568-9U012	Data Management	49.3	30.9	31.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.49
4568-9U013	Records Support	22.2	2.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.49
4568-9U014	QAS Support	7.0	6.4	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.81
819Y12	USGS Data, Records & Reports	96.5	58.6	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	216.72
4568-9U021	Administrative Support & Personnel Servi	33.2	34.8	34.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	102.12
4568-9U022	Facilities Management	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
819Y13	USGS Administration & Facilities	33.2	34.8	34.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	102.32
4568-9U023	Training	15.8	17.2	25.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58 33
819Y14	USGS Training	15.8	17.2	25.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.33
4568-9U024	Computer/Network Support	26.4	25.5	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.58
819Y15	USGS Commputer/Network Support	26.4	25.5	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.58
4568-9U025	Property Management	24.1	20.5	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.59
819Y16	USGS Property Management	24.1	20.5	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.59
4568-9U003	Planning & Project Control	27.4	23.4	32.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.65
819Y21	USGS Planning & Project Control	27.4	23.4	32.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.65
4568-9U030	Regulatory Compliance Support	40.8	40.4	30.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.54
819Y31	USGS Regulatory Compliance Support	40.8	40.4	30.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	111.54
4568-9U061	Water Resources Monitoring	16.8	32.5	26.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.03
819Y41	USGS Water Resources Monitoring	16.8	32.5	26.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.03
4568-9U062	Safety	9.1	9.4	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.74
819Y51	USGS Safety	9.1	9.4	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.74
4568-9U043	Hydrogeologic Data Integration	13.4	12.2	-2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.99
4568-9U044	3D Hydrogeologic Model Development	1.2	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.21
4568-9U045	Flow Model Calibration and Evaluation	3.9	8.1	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.53
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

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819Y61	USGS Death Valley Regional Flow Mod	18.5	20.7	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.73
1.5.04.6.3.0	DOE Technical Support Services	458.5	448.3	392.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,298.91
1.5.04.6		458.5	448.3	392.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,298.91
1.5.04		458.5	448.3	392.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,298.91
1.5		830.3	788.5	754.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,373.26
1.5 OPERATING		830.3	788.5	754.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,373.26
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		830.3	788.5	754.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,373.26
FTEs														
FEDERAL		61.0	77.0	50.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CONTRACT		34.7	25.6	27.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TOTAL		95.6	102.6	77.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	