United States Department of the Interior

U. S. GEOLOGICAL SURVEY
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Denver Federal Center
Denver, Colorado 80225

IN REPLY REFER TO:

INFORMATION ONLY

September 11, 2003

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, August, 2003

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

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

Sincerely,

Raye Ritchey Arnold

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

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

August 2003

GEOLOGICAL STUDIES

On-going geologic work characterized lithology of Nye County early-warning drilling-program boreholes, including boreholes NC-EWDP-16P, -27P, and -28P. A particular focus fell on collection of lithologic information with relation to geophysical characteristics as well as to "confidence levels" of geologic interpretations. Additional time and effort had to be devoted to interpretation of the Optical Television Log obtained from NC-EWDP-28P. That hole apparently intercepted a significant fault at depth, which required additional scrutiny of the fracture system(s) presumably associated with the penetrated fault zone. The fault is interpreted to record several hundreds of feet of vertical separation and is atypical, in that it is a "down-to-the-East" fault. In addition, the original schedule for lithostratigraphic investigations was perturbed due to emergence of a higher priority for immediate review of the Technical Basis Document (TDB) and associated Appendices A and B. That unscheduled technical review required time away from efforts in Nye County lithologic characterization.

Progress continued on the geologic map of the area encompassed by the potential southern repository expansion. Final editing of the map has been completed, and the USGS Central Publications Group is preparing the publishable version. That process is expected to be finished in the next few weeks, with Director's approval to follow promptly.

The geologic team (from the USGS and from the Bureau of Reclamation) continued to provide mapping expertise for development of logistical plans for a materials-borrow and construction-aggregate exploration program, as part of on-going contributions to planning for underground excavations, as well as for surface facilities and for integration of testing and construction activities. The team also continued rock-mechanics testing for ECRB (Enhanced Characterization of the Repository Block) efforts, with continuation of the long-term creep test. No decision has been reported on decisions regarding the duration of that test.

Further work from that team developed understanding of the fracture and lithophysal character of the repository host horizon (RHH) from specific elements of fine-scale (thin-section) mineralogical and textural examination, mapping traverses of underground excavations, analysis of borehole data and borehole-derived lithophysal data, analysis of fractures, and assembly of information into chapters for the design AMR. Samples from the Thermal K (ThermK) and Geotechnical (GETC) boreholes were submitted for thin-

section preparation. Those boreholes provide fracture data from locations near (less than 0.5 m from) the tunnel wall, and resultant samples and data can be compared to samples taken near the total depths of those boreholes (typically 3 to 6 m from the tunnel wall) to evaluate possible influence of tunneling on the development of fractures. Maps of fractures have been made of the saw-cut slab face for each sample, and fracture characteristics (including presence or absence of rims, vapor-phase mineral linings, and coatings of minerals deposited under aqueous conditions, such as calcite and opal) have been identified for each fracture. Examination then is made of those same features of fractures in thin section, where the microscopic scale provides refinement of the data and better identification of features. Three-fold goals of that study include (1) determination of relative abundance, characteristics, and geometric relations of fractures developed during the cooling of the Topopah Spring Tuff versus those that developed after the unit cooled (including fractures resulting from structural or tectonic deformation or from drilling and mining processes); (2) evaluation of variations in abundance, characteristics, and geometric relations of fractures developed in lithophysal and nonlithophysal zones of the Topopah Spring Tuff (host rocks for the proposed repository, or RHH); and (3) evaluation of scaling effects of small-scale fractures relative to larger-scale macroscopic fracture data collected in detailed line-survey and full-periphery mapping of Yucca Mountain drifts and excavations.

Lithophysal mapping of 1-m by 3-m panels and angular traverses continued. The abundance of cm-sized lithophysae and spots in the upper lithophysal zone required modification of mapping methods to capture those features in panel maps. Rather than presentation of all mapped features on the 1-m by 3-m maps, only spots and lithophysae with cavities larger than 1 cm by 3 cm are illustrated on the 1-m by 3-m map; all small spots and lithophysae are mapped separately in two to four smaller (0.5 m by 0.5 m) squares. That hierarchical mapping method previously was used in maps produced for the slot tests. Data for the small-scale fracture traverses are being prepared for technical review.

Collection of linear-traverse data for lithophysal cavities in borehole USW WT-2 has been completed for the upper and lower lithophysal zones and for the middle and lower nonlithophysal zones of the Topopah Spring Tuff. Data gathered along two traverses have been summarized, and synthetic caliper logs have been created (using the assumption that the intercepted traverse length is the same as the depth of the cavity in the wall). Resulting synthetic caliper logs nicely illustrate variations in size and abundance of lithophysae and indicate "stratiform" variation within lithostratigraphic zones. Prior to use of that synthetic caliper-log documentation of lithophysae in borehole walls, examination of the detailed distribution of lithophysae in boreholes has been made only on the basis of logging of core from the "G"-series boreholes or from inferences drawn from geophysical logs.

Analysis of fractures continued, with particular emphasis on interpreted fracture geometries for the middle nonlithophysal Topopah Spring Tuff (the Tptpmn unit). Improved representation of observed data in calculated geometries and statistical comparisons (for use in the design AMR) is the goal of that on-going analysis.

As part of ongoing revisions to the Drift Degradation AMR, BSC engineers requested development of methods to use distribution of lithophysal cavities in the lower lithophysal zone of the Topopah Spring Tuff (observed in the ECRB Cross Drift) to approximate distributed lithophysal porosity in 50-m by 250-m cross sections perpendicular to the Cross Drift. An Excel workbook was made which (based on the Cross-Drift data) calculates porosity values in "model" cross sections. Basic calculations in the workbook utilize geometric relations of the somewhat layered character of the lithophysal distributions, and subsequently support projection of specific "windows" of those distributive statistical values along the apparent dip of the lithostratigraphic units. The resulting cross sections (which easily can be recalculated for various locations along the Cross Drift) not only preserve and display the general layered characteristics of the lower lithophysal zone but also closely maintain the statistical variations in each of the "windows" and in the total "modeled" cross section.

In agreement with the principal investigator in charge (Sandia National Laboratory), data collection for the Thermal K borehole tests in the South Ramp has been delayed. In situ tests to quantify lithophysal porosity are ongoing, and there is no direct schedule impact.

Comment resolution from technical review of the Deterministic Seismic Hazards Analysis (DSHA) report was completed in August. The subsequent task, submittal of the revised DSHA report for USGS Headquarters review and Director's approval, was initiated immediately following completion of review-comment resolution. The process has taken longer than anticipated, but completion of the DSHA report is expected by the end of the fiscal year. There is no impact from this carry-over item to budget or other program elements.

SATURATED-ZONE STUDIES

During August, work resumed on interpretation of barometric-efficiency data (and calculation of barometric efficiency for the Alluvial Test Complex [ATC]), and that task was completed at the end of the month. The non-Q ("unqualified") corroborative calculated efficiency for an alluvial zone in Nye County early-warning drilling program (EWDP) borehole NC-EWDP-19IM1 compared well with the Q value calculated for nearby well NC-EWDP-19D1 from similar background monitoring conducted from May to July 2002. Assembly of the related data package was completed in August, and the data received technical review. The data package was submitted to the USGS-YMPB data-management unit on **August 28** in completion of **milestone PAGSM434M5 [ATC Barometric Monitoring Data to DMU]**.

Work in Site-scale hydrochemistry continued. Samples collected (throughout August) from short-term pumping tests at Nye County boreholes NC-EWDP-22 pa, NC-EWDP -22 pb, and NC-EWDP-22 s currently are being analyzed. Results of those analyses are not yet available. Assembly of data from sampling of well J-12 was completed, and that data package was submitted for checker review. Completion of the USGS open-file

report (OFR) describing the hydrochemical data base was delayed in changing priorities of the mid-year re-plan (as was work in ECRB gas-phase hydrochemistry). That report will be updated as possible; in the meantime, the draft OFR and the data base are available for use by Project participants.

Modeling of the Death Valley regional flow system (DVRFS) continued during the reporting period. Various efforts refined hydrogeologic data integration, including arrangement of transient-model data to more effectively serve GeoPro (model-support software) usage, and development (with contractor reVision, Inc.) of applications to improve data flow. Development of, and strategies for management of, spatial data bases continued to provide support to the flow model. Three-dimensional hydrogeologic model development continued. Graphical images of other 3-D models used in construction of the DVRFS hydrogeologic framework model (HFM) were provided for inclusion in the HFM-construction chapter of the DVRFS flow-model report. The HFM was modified to include basin-fill deposits near the Owlshead Mountains. A draft of the report chapter covering construction of the HFM was completed. Other report contributions were underway, focused on chapters based on hydraulic properties.

Multiple efforts also were used in flow-model calibration and evaluation. Staff completed a hydraulic-head section of the report (including development of illustrations). Illustrations also were produced for other parts of the transient-flow model report. Work continued on flow-model calibration, as well as on writing of the flow-model chapter. Major recent changes included completion of most of the illustrations for the flow-modeling chapter and incorporation of revised discharge rates at Death Valley based on newly published measurements, as well as modification of the flow model to represent more accurately decreases in discharge at Pahrump over time. Staff also participated in the July knowledge-exchange meeting (held by teleconference on August 12). Improvements were made to flow calibration(s), to incompatibility problems with code packages, and to refinements to the draft hydrogeologic evaluations section of the DVRFS modeling report. Boundary conditions were updated to concur with National Park Service (NPS) consultants' most-recent estimates of boundary fluxes.

Knowledge exchange continued as an important aspect of the DVRFS work. The August knowledge-exchange meeting summary was assembled and delivered to the USGS NNSA (National Nuclear Security Administration) Program Manager and to the Yucca Mountain Project TPO, marking completion on **August 29 of milestone PAGSM370M5 [Knowledge Exchange Meeting Summary to USGS TPO]**. Editorial review of existing report chapters was underway, with several sections of the report in final "assembly" editing. Staff sent a memorandum documenting that on-going editing of the flow-model chapter of the DVRFS report; notification of that completed editing task by memorandum completed **milestone [Memo to TPO: Completion - Editing Flow Modeling Chapter, DVRFS Report] on August 29**. The flow-model chapter may be acceptable for publication as a USGS Bulletin.

Progress on DVRFS predictive capability was made in several areas. NewFields, Inc., (contractor) finalized work on development of the Dynamic Systems Model (DSM)

prototype using the DVRFS model for predicting response to pumping. Accompanying documentation was finalized. Staff produced a memo describing the DSM and documentation in completion of **milestone PAGSM36BM5 [Update on DVRFS Predictive Capability Progress] on August 29.**

UNSATURATED-ZONE STUDIES

Work on the Alcove #8/Niche #3 infiltration experiment continued during August, with continuation of routine data collection and initiation of a new phase of the large-plot experiment. Data were posted for weekly updates to spreadsheets, but the typical written and CD transmittal from the TCO has not occurred. Data collection from the large plot includes representation of the volume of water applied in the experiment, heat-dissipation probe (HDP) data collected around the large plot, alcove temperature and relative humidity, evaporation data, and barometric pressure measured behind the bulkhead. Data collection from the trench included only HDP information. During August, 12 new scales were installed and wired into the data system. Permeameters were cleaned, and replacements were fabricated for cracked tubes. In a new phase of the experiment, water application to all 12 plots began on August 28. The new tubes worked flawlessly, and the system appeared to be operating correctly. When steady-state flow conditions are reached, preparations will be made for the proposed application of tracers.

Moisture monitoring in the ESF and in the ECRB Cross Drift continued, albeit with distractions including moving office quarters to the pad and delays in access behind bulkheads. Data loggers were shut down and removed from stations XHDP01 through XHDP13 in the Cross Drift for final calibrations. Downloads from moisture-monitoring sites were received from the TCO and used to update data spreadsheets. Work continued on moisture-monitoring data packages and instrument calibrations. The assembled moisture-monitoring data package for the ESF and the ECRB Cross Drift received checking review. That review was completed, but resolution of review comments required additional attention. Other aspects of processing that data package moved forward.

Bulkhead moisture monitoring continued routinely during the month, although with power-related problems (see below). Collection (and subsequent preparation) of temperature, relative humidity, barometric pressure, and wind-speed data continued. Routine data transmittals from the TCO occurred, and subsequent processing was completed. Work continued on compilation of the data summary for bulkheaded Cross-Drift data gathered from November 2001 to May 2003. Interruption of power behind the bulkheads in the ECRB Cross Drift did cause on-going impacts to moisture monitoring in the bulkheaded areas. Data collection has been maintained at 5 of the 23 stations, but other stations either were removed or suffered battery failure. Opening of bulkheads and retrieval of instruments for maintenance and for closing calibrations, however, was delayed due to faulty ventilation in the drift. The bulkheads are scheduled for opening sometime in September, at which time instruments will be extracted for closing calibrations. The review/check process will follow after those steps are completed.

Characterization of the chemical and isotopic composition of pore water continued during the month with on-going documentation and assembly of records for the pore-water data package. Extraction and analysis of water from additional core samples from borehole USW SD-9 continued as well, in order to build a more-complete array of analyses of samples extending from the surface to the proposed repository horizon. Some of the new data will be presented at the Geological Society of America annual meetings.

Isotopic work in support of thermal testing also continued. A preliminary table of data was prepared for samples analyzed to date from borehole ESF-HD-CHEMSAMP3. Those data were transmitted to LBNL. Staff participated in teleconferences and in planning for the next workshop, now set for early October, where those data are likely to be presented to the thermal-test team. No water samples were collected for Sr and U analysis during the period.

Assembly of hydrochronological data for characterization of the hydrochronology of the Yucca Mountain flow system continued, but previously reported inability to retrieve instruments from behind closed bulkheads required changes in status of that data package. The currently anticipated completion for that hydrochronological data package is September. Interpretation of the available data and correlation with inorganic isotope data are complete. Preparation of the hydrochronology synthesis report and a brief summary of results has been started. Available hydrochronological data have been integrated into the USGS data base.

Uranium-series delineation of UZ flow zones continued, in on-going isotopic investigations. Additional whole-rock samples from various lithostratigraphic units in borehole USW SD-9 were chemically digested, processed for U and Th chemistry, and further analyzed by thermal-ionization mass spectrometry (TIMS). Although not yet reduced, the data will be used to evaluate variations in radioactive disequilibrium and associated water/rock interaction with depth in the repository block. A contract for a new TIMS instrument was awarded to Thermal Finnigan for purchase of a Triton instrument; the company has initiated fabrication of that spectrometer.

Investigation of fracture minerals and their use as microclimate records also continued. Arrangements were made with the University of California (UCLA) for ion-probe analyses of calcite to be conducted in early September. Samples for those analyses were selected and prepared, including thin-section preparation, mounting, and photographic documentation. In related work, sequential TIMS microdigestion analyses were completed on a botryoidal sheet of opal obtained from Alcove #5, where the opal sheet coated a thin blade of calcite. Ten analyses from the outer surface to successively deeper layers yielded U-series isotopic ratios and calculated ages ranging from recent to nearly 150 ka. Dates calculated for most—but not all—successive microdigestions are in successive chronological order. (Depths have not yet been calculated, so growth rates remain unknown.) Preliminary estimates may imply a history of growth more complex than the very slow, regular growth interpreted from analysis of hemispheres previously studied using the microdigestion technique.

Geochemical and physical characterization of ESF dust continued. Chemical analyses (including major and trace elements) of rock units encountered in the ESF are being compiled to better constrain the component of rock dust in the total dust load. Those data include analyses of representative samples from units penetrated in drill hole USW SD-6. The data compilation will be used in presentations at the Geological Society of America describing the geochemistry of the Paintbrush Group (to be given at the national meeting in Seattle, Washington, in early November). In related developments, characterization of ESF dust will utilize support from the Canadian nuclear agency. Atomic Energy of Canada, Ltd. (AECL), through direct funding from DOE, will support USGS dust studies by conducting analyses of polonium-210 (half life of 138 days) in aliquots of dust samples which were collected early in 2002. Polonium-210 is the second longest-lived isotope in the radon-222 decay chain, following lead-210 (^{210}Pb), which has a half life of 22 years. The resulting data will be used to assess further the efficacy of fine dust particles in sequestering radon daughter products. To extend that work, including ^{210}Pb analyses, USGS staff anticipate collection of dust samples behind the bulkheads in the Cross Drift before the end of the fiscal year. Dust in the sealed-off part of the Cross Drift will have been exposed to high ambient radon conditions because of the lack of ventilation.

Completion of the chlorine-36 (^{36}Cl) validation report currently is delayed pending qualification of the LLNL software (called Fudger), used to reduce the data from the accelerator mass spectrometer. With slow progress of that qualification, the ^{36}Cl report is likely to be delayed.

In unscheduled work, significant time during the period was spent preparing for presentation of the ^{36}Cl validation effort to the Nuclear Waste Technical Review Board (NWTRB) on September 16 in Amargosa Valley. Other YMPB Environmental Science Team staff are reviewing related slides before submittal for the dry run on September 4 in Las Vegas. Staff also reviewed a presentation on the ^{36}Cl validation study prepared for presentation to the National Academy of Sciences Board of Radioactive Waste Disposal on September 3. That latter presentation (by LANL staff) employed materials prepared by the USGS. In related deferred work, data packages containing isotopic data (tritium, U-series, and strontium data) derived from samples from ^{36}Cl boreholes were submitted in completion on **August 7 of FY 2002 milestone PAGSZ925M4**, containing data packages GS021208312272.005, GS030408312322.001, and GS030608312272.007.

WATER-RESOURCES MONITORING

Ground-water levels were measured at 34 sites, and ground-water discharge was measured at one flowing well, both in on-going routine monitoring. Ground-water and spring-discharge data collected during July were checked and filed. The summary water-resources monitoring report was submitted to the (USGS) Nevada District editorial staff on August 11 for preparation for publication. When the publication-ready report is proofed, it will be submitted for District approval, anticipated before September 30.

USGS staff discussed possible changes in the ground-water network for next fiscal year with representatives from the National Park Service and from the Department of Energy.

Compilation by **W. Clay Hunter, U.S. Geological Survey,** Yucca Mountain Project Branch.

USGS Milestone Report

October 1, 2002 August 31, 2003

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
PAGSC2050D	Annual Training Plan	6/30/2003	6/26/2003	6/26/2003
PAGSC2060D	Annual Training Needs Assessment	6/30/2003	6/26/2003	6/26/2003

USGS Milestone Report

October 1, 2002 August 31, 2003

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	9/22/2003	
PAGSW930M4	Phase II Lithophysal Data to TDMS/RPC	11/15/2002	1/31/2003	1/31/2003
PAGSW931M4	Phase I Lithophysal Data to TDB/RPC	11/15/2002	1/31/2003	1/31/2003
PAGSM935M4	S. Expansion Area Data to TDMS/RPC	11/26/2002	10/22/2003	
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	2/18/2003	2/18/2003
PAGSZ303M4	Final Report to Customer & TDMS	12/27/2002	10/16/2003	
PAGSW530M4	Rock Mech (Direct Shear) Data to TDMS/RPC	1/10/2003	6/13/2003	6/13/2003
PAGSW260M4	Letter Report: 1st Qtr FY03	1/31/2003	1/31/2003	1/31/2003
PAGSM925M4	Phase 3 X-sections DP to TDMS/RPC	2/21/2003	5/21/2003	5/21/2003
PAGSW22M4	Fault Infiltration/Tracer Exp Data Pkg--TDMS/RPC	2/28/2003	3/14/2003	3/14/2003
PAGSW937M4	Spot & Rim Hydrologic Prop DP - TDMS/RPC	3/31/2003	4/30/2003	4/30/2003
PAGSW262M4	Letter Report: 2nd Qtr FY03	4/30/2003	4/30/2003	4/30/2003
PAGSW605M4	Fract & Lithophysal Char Final Data to TDMS/RPC	5/30/2003	4/1/2004	
PAGSW85M4	ESF Moisture Monitoring Data Pkg to TDMS/RPC	5/30/2003	3/1/2004	
PAGSM203M4	Phase IV Lithostrat Data to TDMS/RPC	6/2/2003	10/21/2003	

USGS Milestone Report

October 1, 2002 August 31, 2003

Sorted by Baseline Date

Level: 4

Deliverable		Due Date	Expected Date	Completed Date
PAGSM435M4	ATC Barometric Monitoring Data to TDMS/RPC	6/2/2003	9/30/2003	
PAGSW26M4	Plot Infiltration/Tracer Exp Data Pkg - TDMS/RPC	6/30/2003	6/30/2003	6/30/2003
PAGSW537M4	Rock Mechanics (Creep Test) Data to TDMS/RPC	7/8/2003	4/16/2004	
PAGSW264M4	Letter Report: 3rd Qtr FY03	7/31/2003	7/31/2003	7/31/2003

USGS Milestone Report

October 1, 2002 August 31, 2003

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
PAGSM32AM5	Progress HFM Updates - Transient Model	1/31/2003	1/31/2003	1/31/2003
PAGSM37HM5	Mtg Summary to TPO	1/31/2003	2/7/2003	2/7/2003
PAGSM30BM5	Update Hydrogeologic Data Integration Progress	2/28/2003	2/28/2003	2/28/2003
PAGSM36AM5	Update on Predictive Capability Progress	2/28/2003	2/28/2003	2/28/2003
PAGSM37AM5	Memo to TPO: Completion - Editing Intro Chapters	2/28/2003	2/28/2003	2/28/2003
PAGSM37IM5	Mtg Summary to TPO	2/28/2003	2/28/2003	2/28/2003
PAGSM32DM5	Report Contribution to Report Editor	3/31/2003	3/31/2003	3/31/2003
PAGSM34AM5	Progress Report Flow Modeling	3/31/2003	3/31/2003	3/31/2003
PAGSM37JM5	Mtg Summary to TPO	3/31/2003	3/31/2003	3/31/2003
PAGSM202M5	Phase IV Lithostrat Data to USGS DMG	4/1/2003	10/9/2003	

USGS Milestone Report

October 1, 2002 August 31, 2003

Sorted by Baseline Date

Level: 5

Deliverable		Due Date	Expected Date	Completed Date
PAGSM434M5	ATC Barometric Monitoring Data to DMU	4/1/2003	8/28/2003	8/28/2003
PAGSM37KM5	Mtg Summary to TPO	4/30/2003	4/30/2003	4/30/2003
PAGSM37BM5	Memo to TPO: Completion - Editing HFM/Db Chap	5/30/2003	5/30/2003	5/30/2003
PAGSM37LM5	Mtg Summary to TPO	5/30/2003	6/6/2003	6/6/2003
PAGSM32BM5	Progress HFM Updates - Transient Model	6/30/2003	6/30/2003	6/30/2003
PAGSM34DM5	Report Contribution to Report Editor	6/30/2003	6/30/2003	6/30/2003
PAGSM37MM5	Mtg Summary to TPO	6/30/2003	6/30/2003	6/30/2003
PAGSM32FM5	Year-End Progress HFM Discretization	7/31/2003	7/31/2003	7/31/2003
PAGSM32HM5	Prg Rpt - Updates Based on Hydrgeo Parameteriztn	7/31/2003	7/31/2003	7/31/2003
PAGSM37NM5	Mtg Summary to TPO	7/31/2003	7/31/2003	7/31/2003
PAGSM30CM5	Update Hydrogeologic Data Integration Progress	8/29/2003	8/29/2003	8/29/2003
PAGSM36BM5	Update on Predictive Capability Progress	8/29/2003	8/29/2003	8/29/2003
PAGSM37CM5	Memo to TPO: Compl - Editing Flow Modeling Chapt	8/29/2003	8/29/2003	8/29/2003
PAGSM37OM5	Mtg Summary to TPO	8/29/2003	8/29/2003	8/29/2003

YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey
Date Prepared 9/11/2003 02:17 PM

Fiscal Month/Year August 31, 2003

	CURRENT MONTH END						FISCAL YEAR		
WBS ELEMENT	ACTUAL COSTS	PARTICIPANT HOURS	SUBCONTRACT HOURS	PURCHASE COMMITMENTS	SUBCONTRACT COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMMULATIVE COSTS
1.5.01.01	260	2213	343	0	58	0	3444	0	2906
1.5.01.05	48	447	297	0	0	0	543	0	434
1.5.01.06	63	510	754	0	41	0	748	0	579
1.5.01.07	68	752	5	0	0	0	579	0	445
1.5.01.09	149	1253	890	0	33	0	2326	0	1897
1.5.03.03	167	1260	1467	0	77	0	2029	0	1663
1.5.03.04	89	-641	501	0	0	0	1808	0	1594
1.5.03.07	107	294	87	0	17	0	1430	0	1127
1.5.03.13	26	336	134	0	152	0	175	0	89
1.5.03.14	12	218	0	0	33	0	148	0	74
	989	6642	4478	0	411	0	13230	0	10808

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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
4568-9U001	Science Advisors	41.0	37.7	36.8	42.2	42.0	46.8	39.6	32.6	42.3	44.5	61.7	0.0	467.20
4568-9U010	Publications	19.2	34.2	3.9	8.3	11.4	7.8	3.9	4.0	53.9	-14.3	0.4	0.0	132.67
4568-9U040	Tectonics	21.5	10.3	1.7	4.6	6.0	3.3	0.0	2.4	7.2	6.2	0.4	0.0	63.67
4568-9U041	Water Levels	3.4	0.0	4.7	0.9	2.8	3.0	6.5	0.1	4.0	3.2	12.0	0.0	40.58
4568-9U042	Geophysics	0.0	0.4	0.0	0.0	0.0	0.0	5.3	-1.5	0.0	0.4	8.1	0.0	12.78
4568-9U060	Mapping Expertise (USBR)	14.6	8.0	4.5	9.2	6.1	5.8	3.7	15.4	7.9	7.0	1.6	0.0	83.71
4568-9U081	Geochemistry	11.7	11.5	11.2	11.4	8.3	729.0	0.1	1.3	1.2	206.5	46.5	0.0	1,038.86
819Y01	USGS Technical Advisory Capability	111.4	102.2	62.8	76.6	76.6	795.7	59.0	54.3	116.6	253.6	130.8	0.0	1,839.48
4568-9U002	Br Chief, Asst Br Chief, Deputy TPO, Tea	38.5	63.0	53.9	68.1	91.7	91.2	44.2	27.7	36.6	89.9	65.3	0.0	670.04
819Y11	USGS Branch Management	38.5	63.0	53.9	68.1	91.7	91.2	44.2	27.7	36.6	89.9	65.3	0.0	670.04
4568-9U003	Planning & Project Control	27.4	23.4	32.8	33.1	24.0	31.1	42.5	28.9	42.7	47.1	63.9	0.0	396.78
819Y21	USGS Planning & Project Control	27.4	23.4	32.8	33.1	24.0	31.1	42.5	28.9	42.7	47.1	63.9	0.0	396.78
1.5.01.01	Project Support - Project Manageme	177.2	188.6	149.5	177.8	192.3	918.0	145.7	110.9	195.8	390.5	260.0	0.0	2,906.30
1.5.01		177.2	188.6	149.5	177.8	192.3	918.0	145.7	110.9	195.8	390.5	260.0	0.0	2,906.30
4568-9U030	Regulatory Compliance Support	40.8	40.4	30.3	44.8	35.8	47.1	53.6	22.5	29.2	42.3	47.7	0.0	434.44
819Y31	USGS Regulatory Compliance Support	40.8	40.4	30.3	44.8	35.8	47.1	53.6	22.5	29.2	42.3	47.7	0.0	434.44
1.5.01.05	Project Support - Compliance Manag	40.8	40.4	30.3	44.8	35.8	47.1	53.6	22.5	29.2	42.3	47.7	0.0	434.44
1.5.01		40.8	40.4	30.3	44.8	35.8	47.1	53.6	22.5	29.2	42.3	47.7	0.0	434.44
4568-9U024	Computer/Network Support	26.4	25.5	23.6	27.2	24.8	19.3	32.2	25.6	28.0	27.3	32.7	0.0	292.65
819Y15	USGS Commputer/Network Support	26.4	25.5	23.6	27.2	24.8	19.3	32.2	25.6	28.0	27.3	32.7	0.0	292.65
4568-9U025	Property Management	24.1	20.5	27.0	23.4	20.2	32.5	29.5	28.9	25.3	24.7	30.4	0.0	286.45
819Y16	USGS Property Management	24.1	20.5	27.0	23.4	20.2	32.5	29.5	28.9	25.3	24.7	30.4	0.0	286.45
1.5.01.06	Project Support - Information Manag	50.6	46.0	50.6	50.6	44.9	51.8	61.7	54.5	53.4	52.0	63.0	0.0	579.09
1.5.01		50.6	46.0	50.6	50.6	44.9	51.8	61.7	54.5	53.4	52.0	63.0	0.0	579.09
4568-9U061	Water Resources Monitoring	16.8	32.5	26.7	22.2	31.1	3.6	75.2	19.9	29.9	28.7	54.5	0.0	341.10
819Y41	USGS Water Resources Monitoring	16.8	32.5	26.7	22.2	31.1	3.6	75.2	19.9	29.9	28.7	54.5	0.0	341.10
4568-9U062	Safety	9.1	9.4	9.3	9.3	9.8	8.9	8.3	7.0	10.2	9.9	13.0	0.0	104.06

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819Y51	USGS Safety	9.1	9.4	9.3	9.3	9.8	8.9	8.3	7.0	10.2	9.9	13.0	0.0	104.06
1.5.01.07	Project Support - Environmental, Saf	25.9	41.9	35.9	31.5	40.9	12.4	83.5	26.9	40.1	38.6	67.5	0.0	445.16
1.5.01		25.9	41.9	35.9	31.5	40.9	12.4	83.5	26.9	40.1	38.6	67.5	0.0	445.16
4568-9U011	Reports Specialists	18.0	18.5	18.5	20.1	17.4	17.3	18.3	13.7	14.8	19.5	14.3	0.0	190.19
4568-9U012	Data Management	49.3	30.9	31.3	35.4	33.8	33.7	34.5	34.7	34.9	22.9	36.2	0.0	377.68
4568-9U013	Records Support	22.2	2.8	4.5	5.7	21.5	-9.1	6.1	7.0	7.1	4.5	5.3	0.0	77.51
4568-9U014	QAS Support	7.0	6.4	7.3	12.5	29.6	-21.7	6.4	6.6	0.2	-1.6	0.0	0.0	52.76
819Y12	USGS Data, Records & Reports	96.5	58.6	61.6	73.6	102.3	20.1	65.4	62.0	57.0	45.3	55.8	0.0	698.15
4568-9U021	Administrative Support & Personnel Servi	33.2	34.8	34.1	67.5	26.0	75.8	15.0	18.2	26.2	53.8	40.1	0.0	424.81
4568-9U022	Facilities Management	0.0	0.0	0.2	10.8	43.0	55.2	218.1	87.4	42.8	122.1	44.6	0.0	624.23
819Y13	USGS Administration & Facilities	33.2	34.8	34.3	78.3	69.0	131.0	233.1	105.6	69.0	175.9	84.6	0.0	1,049.04
4568-9U023	Training	15.8	17.2	25.4	18.5	6.9	13.7	15.8	12.4	8.3	7.1	9.1	0.0	150.02
819Y14	USGS Training	15.8	17.2	25.4	18.5	6.9	13.7	15.8	12.4	8.3	7.1	9.1	0.0	150.02
1.5.01.09	Project Support - General Project Ser	145.5	110.6	121.2	170.5	178.2	164.8	314.4	180.0	134.3	228.3	149.5	0.0	1,897.20
1.5.01		145.5	110.6	121.2	170.5	178.2	164.8	314.4	180.0	134.3	228.3	149.5	0.0	1,897.20
4568-9U050	Alcove 7/X-Drift Instrument Strains	7.8	5.5	3.9	20.4	7.7	0.2	3.8	2.2	4.7	-0.5	5.0	0.0	60.64
4568-9U063	Alcove 8/Niche 3 Infiltration	25.9	22.1	29.9	21.4	28.3	22.4	21.5	23.4	17.1	10.5	16.3	0.0	238.80
4568-9U064	Moisture Monitoring ESF & X-Drift	19.2	14.7	13.3	20.8	11.6	23.6	13.6	19.2	53.2	33.5	18.6	0.0	241.47
4568-9U065	Bulkhead Moisture Monitoring	8.2	7.7	21.4	17.6	14.9	32.4	-14.9	33.4	26.3	18.7	51.5	0.0	217.01
4568-9U066	Support to UZ In-Situ Processes AMR	7.3	7.7	2.6	5.0	-0.9	0.2	9.2	5.6	6.6	8.1	2.2	0.0	53.62
AUZG01	USGS UZ Moisture Studies	68.4	57.6	71.2	85.3	61.6	78.8	33.1	83.8	107.9	70.3	93.5	0.0	811.55
4568-9U085	U-Series Delineation of UZ Flow Zones	26.8	5.8	20.1	17.3	9.2	3.7	13.4	15.1	10.8	-13.9	14.1	0.0	122.37
4568-9U086	Complete Chlorine 36 Validation	5.0	13.8	11.8	9.9	24.3	10.9	13.0	28.7	19.7	-19.6	4.3	0.0	121.74
4568-9U087	Chemical & Isotopic Composition of Pore	30.4	38.0	52.2	32.4	25.3	23.6	36.4	16.1	21.9	-26.2	27.1	0.0	277.11
4568-9U088	ECRB H2O, H2O Vapor & Gas Chemistry	0.0	4.6	1.6	0.3	5.2	26.8	9.2	1.8	5.6	1.9	3.3	0.0	60.32
4568-9U089	Microclimate Records in Fracture Mineral	13.9	17.0	13.3	16.6	20.1	41.8	28.2	20.7	26.4	-51.4	22.4	0.0	168.83
AUZG02	USGS UZ Isotope Hydrology	75.9	79.2	99.0	76.6	83.9	106.8	100.2	82.4	84.4	-109.2	71.2	0.0	750.36
4568-9U090	Isotope Support for Thermal Testing	7.9	12.9	18.7	29.0	-2.5	12.5	16.5	6.4	4.5	-7.9	2.7	0.0	100.68

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AUZG03	USGS Drift-Scale Test ESF	7.9	12.9	18.7	29.0	-2.5	12.5	16.5	6.4	4.5	-7.9	2.7	0.0	100.68
1.5.03.03	Safety Analyses - Unsaturated Zone	152.2	149.7	188.9	190.9	143.1	198.1	149.8	172.6	196.8	-46.9	167.4	0.0	1,662.58
1.5.03		152.2	149.7	188.9	190.9	143.1	198.1	149.8	172.6	196.8	-46.9	167.4	0.0	1,662.58
4568-9U043	Hydrogeologic Data Integration	13.4	12.2	-2.6	4.0	3.5	114.0	-47.9	17.2	99.6	132.1	-8.8	0.0	336.75
4568-9U044	3D Hydrogeologic Model Development	1.2	0.5	0.5	5.4	0.0	0.0	22.0	18.4	104.2	17.6	14.2	0.0	183.96
4568-9U045	Flow Model Calibration and Evaluation	3.9	8.1	6.6	5.7	8.8	47.8	6.6	8.4	24.0	25.2	0.0	0.0	145.06
4568-9U046	DVRFS Knowledge Exchange Protocol	0.0	0.0	0.0	0.0	0.0	0.0	37.0	23.3	9.6	2.0	-2.9	0.0	69.10
4568-9U047	DVRFS Predictive Capability	0.0	0.0	0.0	0.0	0.0	69.6	0.0	0.0	0.0	4.2	0.0	0.0	73.78
819Y61	USGS Death Valley Regional Flow Mod	18.5	20.7	4.5	15.0	12.3	231.5	17.7	67.4	237.4	181.0	2.6	0.0	808.64
4568-9U048	Cross-hole Hydraulic & Tracer Testing AT	27.4	27.2	18.7	14.6	17.3	21.7	14.0	25.1	22.3	15.1	16.1	0.0	219.54
4568-9U049	Nye County EWDP Borehole Lithostratigr	12.3	10.2	1.1	17.9	10.0	10.6	16.0	7.9	10.9	-8.6	16.8	0.0	105.38
4568-9U051	Deferred - Lithostratigraphic Support to N	0.0	0.0	18.6	4.2	-1.5	0.0	1.3	1.2	0.1	-2.9	0.0	0.0	21.07
4568-9U052	Deferred - X-Hole Hydraulic & Tracer Tstg	0.0	0.0	14.6	7.1	13.0	8.8	8.7	2.6	8.1	9.1	3.6	0.0	75.49
4568-9U053	Deferred - Map Proposed Repository Exp	0.0	0.0	0.0	0.0	0.0	0.0	9.0	-0.4	7.5	9.6	0.0	0.0	25.68
4568-9U072	Support to Proposed Surface Workover T	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	43.7	38.8	41.1	49.0	36.5	48.9	22.3	36.5	0.0	447.17
4568-9U082	Isotopic/Hydrochemical Support to the AT	0.0	4.1	0.0	0.2	0.1	1.6	0.0	-1.2	1.2	3.1	0.9	0.0	10.00
4568-9U083	Hydrochronology of the Yucca Mountain	0.0	0.0	0.0	0.0	11.8	-1.3	0.6	0.1	0.8	-0.2	0.0	0.0	11.90
4568-9U084	Site-Scale Hydrochemistry	19.4	-0.1	15.8	15.0	6.3	13.5	47.1	25.2	19.8	27.3	34.6	0.0	224.00
4568-9U092	Isotope/Hydrochemical Support to Nye C	7.7	23.9	-1.4	6.4	17.1	-7.7	6.2	9.5	9.8	5.4	14.8	0.0	91.83
ASZG02	USGS SZ Isotope Hydrology	27.1	28.0	14.4	21.6	35.4	6.1	53.9	33.6	31.7	35.6	50.3	0.0	337.72
1.5.03.04	Safety Analyses - Saturated Zone Flo	85.4	86.3	72.0	80.3	86.5	278.7	120.7	137.5	318.0	238.9	89.4	0.0	1,593.53
1.5.03		85.4	86.3	72.0	80.3	86.5	278.7	120.7	137.5	318.0	238.9	89.4	0.0	1,593.53
4568-9U091	Geochem/Physical Characterization of E	2.1	2.8	1.8	3.8	1.5	38.4	4.1	2.7	0.4	1.2	3.4	0.0	62.33
AEBG01	USGS Effects of Water-Rock Interactio	2.1	2.8	1.8	3.8	1.5	38.4	4.1	2.7	0.4	1.2	3.4	0.0	62.33
4568-9U067	Quantify Lithophysal Porosity - In Situ Te	8.1	7.5	5.4	8.2	-0.2	1.2	0.5	0.4	0.4	0.1	8.3	0.0	39.83
4568-9U070	Deferred - Core & Lithophysae Char Tstg	0.0	0.1	0.9	6.1	5.3	27.8	18.7	-2.8	-0.5	0.5	0.0	0.0	56.11
AEBG02	USGS Nevada Operations Support to E	8.1	7.6	6.3	14.3	5.1	29.0	19.2	-2.5	-0.1	0.6	8.3	0.0	95.94

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4568-9U068	Rock Mechanics Testing in the ECRB (U	91.5	53.5	28.2	46.4	35.2	6.1	7.7	16.1	2.7	4.8	10.3	0.0	302.49
4568-9U069	Fracture & Lithophysal Characteristics of	43.7	53.1	48.7	81.5	65.1	31.0	45.3	99.9	72.2	34.2	85.2	0.0	659.82
4568-9U071	Deferred - QAS & Checking Support USB	0.0	0.0	2.1	3.6	0.2	0.0	0.0	0.0	0.7	-0.7	0.0	0.0	5.94
AEBG03	USBR Testing Activities in Support of D	135.2	106.5	79.1	131.5	100.4	37.2	53.0	115.9	75.6	38.3	95.5	0.0	968.25
1.5.03.07	Safety Analyses - EBS Performance	145.4	116.9	87.2	149.6	107.0	104.6	76.3	116.2	75.9	40.1	107.3	0.0	1,126.52
1.5.03		145.4	116.9	87.2	149.6	107.0	104.6	76.3	116.2	75.9	40.1	107.3	0.0	1,126.52
4568-9U016	USGS Data Verification	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	14.9	19.9	26.5	0.0	72.19
APAGD5	USGS Data Verification	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	14.9	19.9	26.5	0.0	72.19
4568-9U015	USGS Data Verification	0.0	0.0	1.0	2.1	1.1	5.8	6.2	1.2	-4.0	3.2	0.0	0.0	16.51
DTAG01	USGS Data Verification	0.0	0.0	1.0	2.1	1.1	5.8	6.2	1.2	-4.0	3.2	0.0	0.0	16.51
1.5.03.13	Safety Analyses - Technical Data Ma	0.0	0.0	1.0	2.1	1.1	5.8	6.2	12.1	10.9	23.1	26.5	0.0	88.70
1.5.03		0.0	0.0	1.0	2.1	1.1	5.8	6.2	12.1	10.9	23.1	26.5	0.0	88.70
4568-9U004	USGS Support to Site Description	7.3	8.0	17.8	1.1	14.0	-1.9	-0.7	0.8	0.5	14.7	3.3	0.0	64.89
4568-9U006	Support to LANL Cesium Study	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	8.93
ANSG01	USGS Support to Site Description	7.3	8.0	17.8	1.1	14.0	-1.9	-0.7	0.8	0.5	14.7	12.2	0.0	73.82
1.5.03.14	Safety Analyses - Yucca Mountain SI	7.3	8.0	17.8	1.1	14.0	-1.9	-0.7	0.8	0.5	14.7	12.2	0.0	73.82
1.5.03		7.3	8.0	17.8	1.1	14.0	-1.9	-0.7	0.8	0.5	14.7	12.2	0.0	73.82
1.5		830.3	788.5	754.5	899.1	843.8	1,779.4	1,011.1	833.9	1,054.8	1,021.5	990.4	0.0	10,807.35
1.5 OPERATING		830.3	788.5	754.5	899.1	843.8	1,779.4	1,011.1	833.9	1,054.8	1,021.5	990.4	0.0	10,807.35
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	899.1	843.8	1,779.4	1,011.1	833.9	1,054.8	1,021.5	990.4	0.0	10,807.35
FTEs														
	FEDERAL	62.3	75.5	50.2	52.7	54.6	52.2	61.4	61.2	60.1	49.3	44.0	0.0	
	CONTRACT	34.7	26.8	27.1	29.2	26.6	29.2	33.5	34.2	30.5	30.1	28.7	0.0	
	TOTAL	97.0	102.4	77.3	81.9	81.2	81.5	94.8	95.3	90.5	79.4	72.7	0.0	