



Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
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QA: N/A

JUN 07 1999

OVERNIGHT MAIL

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High Level Waste & Uranium Recovery
Division of Waste Management
Office of Nuclear Material Safety & Safeguards
U.S. Nuclear Regulatory Commission
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Rockville, MD 20852

SUBMITTAL OF PARTICIPANT'S MONTHLY PROGRESS REPORT

As you have requested, the U.S. Nuclear Regulatory Commission is on distribution to receive a copy of the Yucca Mountain Site Characterization Project participant's monthly status report on a regular basis. Enclosed is the U.S. Geological Survey Progress Report for April 1999.

If you have any questions, please contact Bertha M. Terrell at (702) 794-1348.

Stephan Brocoum
Acting Assistant Manager, Office of
Licensing and Regulatory Compliance

OL&RC:BMT-1391

Enclosure:
Ltr, 5/17/99, Craig to Kozai, w/encl.

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IN REPLY REFER TO

INFORMATION ONLY

May 17, 1999

Wayne Kozal
Yucca Mountain Site Characterization
Project Office
U. S. Department of Energy
P.O. Box 30307
Las Vegas, Nevada 89038-0307

SUBJECT. Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS)
Progress Report, April 1999

Attached is the USGS progress report in the required format for the month of April, 1999.

If you have any questions or need further information, please call Raye Ritchey Arnold at
(303)236-0516, ext. 282.

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 EXECUTIVE SUMMARY

April 1999

COORDINATION and PLANNING

The U.S. Geological Survey-Yucca Mountain Project Branch continued processing of some 49 documents prepared by USGS authors. Of these listed items, 36 are USGS reports (split evenly between geological and hydrological topics), five are journal or Proceedings articles (all hydrological in topic), and eight are abstracts. During April, one publication package (WRIR-98-4041) was sent to the Records Coordinator for transmittal to the Records Processing Center. One OSTI package was sent to DOE.

In an unreported accomplishment from March 1999, one water-resources investigation report was published:

Rousseau, J.P., Kwicklis, E.M., and Gillies, D.C., eds., 1999, Hydrogeology of the unsaturated zone, North Ramp area of the Exploratory Studies Facility, Yucca Mountain, Nevada: U.S. Geological Survey Water-Resources Investigations Report 98-4050, 244 p.

GEOLOGY

Structural mapping staff provided support to isotopic age studies with work on edits and clean-up of field notes from the Cross Drift in scientific notebook SN-103 in preparation for submittal of the notebook for review. Fault-zone data were compiled, and preliminary analysis of results was made.

Construction of geologic cross sections in support of the Death Valley regional flow model continued as scheduled. Production of the next set of sections (due May 28) began as scheduled on April 1. Specific technical activities included work on cross-section templates and initial construction of several cross sections. Staff spent several days in fieldwork reviewing surface geology relevant to several cross sections. Visited localities included Point of Rocks, the Specter Range, Grapevine Springs, and the Grapevine Mountains and the western Bullfrog Hills.

HYDROLOGY

Unsaturated-Zone Hydrology

Air-permeability work continued. The North Ghost Dance fault (NGDF) data package has completed technical review, and all reviewers' comments were incorporated. The NGDF report likewise has completed technical review, and comments and suggestions have been incorporated. Further QA (AP-3.10Q) reviews are underway.

In work on modeling of infiltration, work continued on development of the users' manual for the modified INFIL code and on finalizing model test cases to satisfy software QA requirements. Efforts toward organizing and compiling input/output files, model codes, and test applications onto CD-ROMs also continued. Development of new composite future-climate input data sets was completed. The developed data package received technical review and was transferred to CD-ROMs. Transfer of the new future-climate input sets to the TDMS was not completed because the YMP data-management group determined that a technical review by a non-YMP technical reviewer was needed, and a competent reviewer has not yet been identified by the data-management group. Calibration of the new net-infiltration model, which uses a layered root-zone system and a coupled net-infiltration—surface-water flow-routing algorithm, continued by use of available stream-flow records. Work also continued on an integrated model calibration using a combination of data sets including measured water-content profiles. Development of a snow-cover module was completed. Work on analysis of model uncertainty and interpretation of model results also continued.

Various aspects of moisture monitoring in the ESF facilities continued, with emphasis on monitoring and in planning for additional tests. Monitoring of temperature, relative humidity, and barometric pressure continued in the ESF Main Drift, niches, and in Alcove #7. Data were collected from 51 heat-dissipation (HD) probes in Alcove #7. Eight surface-based HD probes monitored the soil moisture potential in and adjacent to the Ghost Dance fault. Twenty-one HD probes monitored the rock water potential in Niche #1. The Alcove #7 drip-detection cloths were checked on April 28, and no drips from the rock were detected. Several of the rock bolts above the cloth, however, had dripped water. Several of the drip cloths were developing mold and should be replaced soon. Planning began for the cross-drift experiment. Plans are being developed for instrumentation placement and the location and number of necessary boreholes, and an initial draft of the plan has been submitted to the Test Coordination Office. Tracer-injection systems have been tested. A system for measuring bromide in water samples was developed and tested. Water applications were resumed above Alcove #1 on February 19. All of the water-collection system in the alcove has been installed and tested. To date, 25,000 gallons of water have been applied to the surface above Alcove #1. Seepage into the alcove began on March 6. To date, approximately 2007 gallons of water have been collected in the alcove. All instrumentation has been checked and is working correctly.

Physical properties and saturated hydraulic conductivity were determined for samples from Busted Butte as part of the evaluation of hydraulic properties at Busted Butte. An interim data package was submitted to the TDB. Samples were prepared for laboratory processing to finalize measurements required for the data submittal.

Various efforts in hydrochemistry continued. Work on the draft report describing geochemical modeling to correct perched-water ^{14}C ages at Yucca Mountain continued by P. Glynn (USGS). In analytical work, one ESF and five USW WT-24 pore-water samples, one surface-water sample provided by J. Stuckless, and samples from USGS

SRWS M-150 were analyzed for cation, anion, silica, and alkalinity concentrations. Samples obtained by compression were sent for radiocarbon analysis. Five USW SD-9 and five WT-24 pore-water samples extracted by centrifuge and compression methods were delivered for determination of $^{18}\text{O}/^{16}\text{O}$ and D/H isotopic ratios. Eight USW SD-6 and WT-24 pore-water samples were prepared for tritium analysis and counted for tritium concentration, and the data were reduced. Pore water was extracted by centrifuge methods from three WT-24 core samples. Extracted water will be analyzed for major-ion chemistry, $^{18}\text{O}/^{16}\text{O}$, and D/H. Similar extractions were conducted for additional WT-24 and ESF samples which will undergo similar analyses, in particular to evaluate variance of chemical and isotopic character with relation to time interval of collection. Extractions were made using vacuum distillation on some 16 core samples from SD-6, SD-9, and WT-24; extracted water will undergo isotopic analysis described above. Dissolved CO_2 was extracted for carbon isotope analyses from water distilled from one ESF core sample. Tritium analyses will be conducted on that water. Calcite from a WT-24 core sample was acidified under vacuum, and the evolved CO_2 was collected for carbon analysis. Additional core samples from areas of high tritium values were requested from the SMF. Further work continued on development of a spreadsheet for preparation of regressions on pH-buffer measurements. The method will be used to recalculate pH measurements of pore water.

Two data packages, GS990308315215.003 and GS990308315215.004, for strontium isotope data on pore water were submitted to the USGS Engineering Assurance Office for checker reviews. Work began on hydrochemical data from SD-6 and WT-24 for the FY1999 milestone report. Staff wrote a section on the estimated UZ percolation flux calculated from moisture contents and ^{14}C values from several boreholes. An approved abstract was submitted to the Third International Conference on Isotopes (to be held in Vancouver in September) for the session on radiocarbon dating techniques. Water samples collected by centrifuge, compression, and distillation methods during April were recorded in the water-collection data base. Water analyses for tritium were recorded in the tritium data base. Anion, cation, silica, and alkalinity values of pore-water samples analyzed during April were recorded in the major-ion data base. The LKB liquid scintillation counter was calibrated. Background samples (including Arvada [Colorado] well water and additional background standards) were measured for tritium activity. Staff received training in operation of the ion chromatograph. Staff resolved QA issues related to flood-destroyed raw-data sheets that supported USW UZ-14 stable isotope data published in USGS WRIR-98-4132.

Saturated-Zone Hydrology

Water-level measurements were made at several sites, including USW H-5 (upper interval) on April 1; USW H-6 (upper interval) on April 6; USW H-5 (lower interval) on April 7; USW H-3 (upper and lower intervals) and USW WT-1 on April 12; UE-25 WT#6, UE-25 WT#16, UE-25 WT#15, UE-25 p#1, UE-25 WT#4, and USW H-4 (lower interval) on April 15; USW G-2, USW H-1 (tubes 1, 2, 3, and 4), UE-25 WT#14, UE-25 WT#13, and UE-25 J-11 on April 16; USW H-6 (lower interval), USW WT-7, USW WT-10, and USW VH-1 on April 19; UE-25 I-13, UE-25 J-12, and UE-25 WT#12 on

April 20; UE-25 WT#17 and UE-25 WT#3 on April 21; USW WT-24 on April 23; and USW SD-6ST1 on April 27. In routine calibration work, Druck transducer s/n 732399 was removed from the hole, calibrated, and returned to borehole USW H-4 on March 31. Calibrated Druck transducer s/n 732391 was placed in borehole USW H-5 on April 1. In addition, a calibrated Druck transducer was inserted in borehole USW H-6 on April 6.

Review was performed on water-level data collected during the second quarter of FY1999, and that data package was submitted for review. Processing of water-level altitude data from the Periodic Network (collected during the period October to December 1998) was completed, and that data set was submitted to the TDB and RPC on April 30 in completion of Level 4 milestone SPH38QM4 [Water-level altitude data from the Periodic Network, October 1998 through December 1998]. Draft tables and figures of 1997—1998 water-level data were prepared. Report preparation also began with writing of preliminary text.

Saturated-zone testing in borehole USW SD-6 finally regained momentum with installation of equipment for sidetrack (whipstock) drilling above the obstruction in that hole. The sidetrack hole was given the designation USW SD-6ST1, and all data collected from the sidetrack location to the bottom of the hole will be recorded as collected from SD-6ST1. Exact location of the sidetrack is unknown at this time, but the bottom of the whipstock forcing the deviation off the old (SD-6) track into the sidetrack is at 2,417.70 ft bls. The whipstock cement came up to 2,386.18 ft bls. Drilling resumed on April 12 at a depth of 2,386.18 ft, and by April 16 the depth was 2,446.50 ft. (The sidetracked hole is assumed to have begun sometime between April 12 and April 16.) Through April 29, total drilled depth of SD-6ST1 was 2,645.08 ft. A water-quality sample was collected on April 26, and a water-level measurement was made on April 27. Depth to water is approximately 2,508.66 ft bls. (That depth is preliminary and does not include borehole or cable correction.) In preparatory work, the transducer in borehole USW H-4 (upper interval) was recalibrated on March 31. Transducers were placed in USW H-5 (upper interval) and USW H-6 (upper interval) on April 1 and April 6, respectively. Each of those boreholes will be used to monitor drawdown when SD-6ST1 is pumped.

Modeling of the Death Valley regional flow system (DVRFS) continued as a very active multi-faceted effort. Highlights of the April work included strong participation and support to the workshop "Status of Geologic Research and Mapping in Death Valley National Park" (held in Las Vegas) and progress on manipulation of MODFLOW2000 data, analysis of water-level hydrographs, compilation of geologic maps, and calibrations of the regional SZ flow model. Database work included compilation of historical water-level measurements from published reports. Work continued on development of ACCESS forms which facilitate pre- and post-processing with MODFLOW2000. Those forms allow data stored in the DVRFS data base to be compiled easily and formatted for input into the regional flow model. Annotations were entered for all water-level sites within the Yucca Mountain site-model boundary and for sites on Pahute Mesa. Staff completed analysis of water-level hydrographs within the YM site boundary and the Pahute Mesa area, as well as annotation to indicate acceptability for use in hydrologic study, particularly for head observations in the steady-state regional model. Additional

modifications were made for the ARCVIEW project for analysis of DVRFS water levels, with emphasis on improving productivity related to annotation of data with hydrologic uses. Compilation and synthesis of hydrochemical data continued in ongoing development of the hydrochemical data bases. Staff working on data-base issues prepared and presented a poster at the "Status of Geologic Research and Mapping in Death Valley National Park" workshop held April 9—11 in Las Vegas and also attended the "Devils Hole" workshop held just prior (April 7—8) in Beatty. (Many members of the regional modeling staff attended those workshops.)

Compilation of geologic maps for the synthesis of the Death Valley regional geologic map also was an active topic. Level 4 milestone SPH743M4 [Geologic Interpretations—Progress Report I] was completed and submitted on April 30. ARCINFO was used to compile new mapping of Quaternary units into the Mine Mountain and Skull Mountain quadrangles for the revised NTS (Rev. 4) map. The program also was used to analyze fault data on that map and to synthesize new data and existing fault data. Results of bedrock mapping in the Daylight Pass and Thimble Peak areas were digitized in GSMCAD, and preliminary incorporation into ARCINFO coverages used for Rev. 4 began. Bounding frames were created in GSMCAD for printing of quadrangles along the eastern border of the Rev. 4 map, clipping data from the Indian Springs and Pahranaagat Range maps and adjusting the Rev. 4 plotting parameters to handle those additional data. Modifications to the Rev. 4 geologic map of the Nevada Test Site also continued, including compilation of surficial deposits shown on the eastern part of the Beatty 1:100,000-scale sheet. That mapping of Quaternary units will be adapted for the regional geologic map, and work also continued on correlation of subsurface data from boreholes in the Amargosa Desert. An ACCESS data base was developed to store the borehole data and correlations in a retrievable format for use in cross-section development. Efforts continued on the generalization and compilation of geology of the Pahranaagat 1° sheet and additional parts of Lincoln County. Those data were sent for digitization into geologic and tectonic maps of the Death Valley flow system. Landsat photos (1:250,000-scale) were received for use in compilation of those geologic and tectonic maps. Gravity maps (completed by USGS Menlo Park staff) also were used in compilation of faults beneath basins in those map regions. Numerous cross sections were under construction, and computer-based templates were created for several of the sections. Staff continued compilation of Quaternary geology from previous mapping for eight quadrangles on the Pahranaagat Range and Indian Springs 1:100,000-scale sheets, and staff spent several days in field work in and near Death Valley examining Pliocene-Quaternary geology. Other geologic mapping was carried out in the Funeral/Grapevine Mountains adjacent to the Amargosa Desert to improve understanding of structure and stratigraphy of the Amargosa Desert for the development of cross sections of that area. Staff examined surface geology (also described in the Geology section above) relevant to cross sections G-2, H-25, and G-5; localities included Point of Rocks, the Specter Range, Grapevine Springs, and the Grapevine Mountains and western Bullfrog Hills. Progress of such mapping was a major topic of the "Status of Geologic Research and Mapping in Death Valley National Park" conference (convened by J. Slate, and also noted above). Some 125 people attended those sessions. An example of staff-presented talks at the conference is *Architecture and Miocene evolution of the northeastern Death Valley*

detachment fault system, Nevada and California (by C. Fridrich). Several other posters were presented on aspects of surficial mapping and subsurface correlations in support of the DVRFS modeling. Presented at the Devils Hole workshop was a paper titled *Geologic/hydrologic overview of the Oasis Valley discharge area*. In other geologic work, facies analysis of units of the Lower Carbonate Aquifer continued, with particular attention to their impacts on regional flow.

Several elements of Quaternary mapping continued. The initial sets of Landsat image-map prints and specially processed scenes (for mapping Quaternary surficial deposits) were delivered, laminated to prevent degradation due to usage and exposure to ultraviolet light. Those images have been cataloged, and several have been used in support of field work. The image maps will cover the entire area of the regional geologic map and will be used directly to map and to compile surficial geology. Staff printed seven acetate overlays which contain topography, road networks, and selected registration for the most critical set of the 1:100,000-scale topographic sheets. Those overlays will be placed over the image maps to assist in mapping of surficial deposits. Similar acetate overlays will be printed for the 14 remaining 1:100,000-scale topographic sheets in the regional geologic map. A second order for NHAP black-and-white prints (nominal 1:80,000 scale) was submitted for the remaining sections of the DVRFS model included in all or parts of the Pahute Mesa, Quinn Canyon Range, Timpahute Range, Pahrangat Range, Indian Springs, Las Vegas, Mesquite Lake, and Owshead Mountains 1:100,000-scale topographic sheets. The 358 prints in the order had been received at the end of the reporting period but have not yet been cataloged. All of the DVRFS model area is now covered by high-altitude aerial photography except for a few high-security areas on the Nellis bombing range which do not have NHAP coverage. (Those areas will be backfilled with supplemental USGS aerial photography at identical scale.) The high-altitude photography will assist in field work and additionally will support the primary mapping conducted on the processed satellite images, especially in inaccessible areas. Staff compiled details of surficial deposits on the westernmost parts of geologic maps for the Indian Springs and Pahrangat Range 1:100,000-scale sheets and completed additional compilation of surficial deposits on the eastern part of the Beatty 1:100,000-scale sheet. Several days of fieldwork were conducted (by YMP staff and Geologic Division geologists) in central and northern Death Valley, in areas contained on the Death Valley Junction, Beatty, Saline Valley, and Last Chance Range 1:100,000-scale sheets. Work began on the Sarcobatus Flat-Bonnie Claire areas on the Last Chance Range sheet. Surficial units were mapped on topographic maps and NHAP aerial photographic images. The satellite image maps were used to identify areas needing field checking. A portable PLGR Global Positioning System unit was used for determining the positions and altitudes of stations during field traverses which mainly were concentrated along major roads.

Development of the preliminary Site SZ hydrogeologic framework model continued. The geologic map and cross sections for the 1:50,000-scale map were received on April 26 to supplement the site framework model. Stratigraphic units from the 1:50,000-scale map were lumped into hydrogeologic units and will be combined with elevation data to obtain X-Y-Z points for hydrogeologic units at the land surface. Work began for incorporation

of the cross sections into the hydrogeologic framework model. Water-level data were examined for evidence of perching conditions and applicability to the site flow model. (Site-scale water-level data should match, as closely as possible, the water-level data for the existing regional model.) Planning efforts continued for use of Nye County water-level and stratigraphic data and for AP-3.10Q work related to the water-level data.

Staff continued efforts to refine regional recharge estimates using geospatial soil data. The updating of the recharge model being used for calibration of stream-flow records was completed. That new model uses a multi-layered "cascading bucket" model for the root zone, includes a snow-cover module, and incorporates air-temperature records in the daily-climate input. The new model will allow improved calibration and will be used as supporting information for the FY1999 regional recharge map which is being developed using the FY1996 version of the net-infiltration model. Model input was updated to include the northward extension of the Death Valley regional ground-water flow-system boundary.

The regional SZ flow-model calibration and evaluation continued as modifications were made to boundaries and boundary conditions. Hydrogeologic unit inputs (from the hydrologic flow model) and flow-model layers were modified to produce grids for each unit in the flow model. Additional model-calibration processing routines were developed. Improvements also were made to the MODFLOW2000 handling of vertical conductance. Representation of uncertainty levels in flow-model prediction was improved, and work on parallelizing MODFLOW2000 continued. Documentation was prepared for a post-processing program for MODFLOW's Advective-Transport Observation (ADV) package. That program was developed to support the advective transport-prediction sensitivity analysis which uses the three-layer DVRFS model. Staff began incorporating previous MODFLOWP Horizon Flow Barrier package coding into MODFLOW2000. Level 4 milestone SPH719M4 [Mid-year Progress Report on model calibration] was completed and submitted to the USGS TPO on April 30, describing status of those changes.

In PA interaction, staff completed and submitted a memo to the USGS TPO describing participation in the PA workshop on "SZ Flow and Transport Modeling" and summarizing USGS-PA interactions to date, fulfilling Level 4 milestone SPH608M4 [Letter Report: Results of PA workshops and sensitivity analyses] on April 13.

CLIMATE and PALEOHYDROLOGY

In work on the report on the basis of future-climate predictions, a relation between precession, eccentricity, and the Devils Hole stable isotope data set has been devised. The beginnings and endings of glacial periods can be identified with orbital parameters and, assuming that relation holds into the future, can be used to identify the beginning and end of future glacial periods. The latter is one of two key issues the report must cover for the TSPA/LA. Graphical presentations are being developed to illustrate that relation. Work also continued on refinements to the chronology of the Owens Lake

record during the interval being used to forecast climate for the next 10,000 years. A defensible basis for the forecasted future climate states is a fundamental component of the refinement of the Climate Tables. Coarse-sand grain counts are being used to identify general changes in the paleodischarge of the Owens River during the past-climate period that serves as a future-climate analog.

In isotopic work on paleodischarge at Nye County sites, staff visited the SMF and selected 20 intervals of material from core runs from three holes drilled at the Lathrop Wells diatomite deposit and the Crater Flat Wash deposit along Highway 95. Core recovery from all three holes was poor, and a very limited amount of material is available for observation and analysis. Ten samples of calcite-cemented sandy to gravelly deposits from Nye County borehole NC-EWDP-01D were identified between depths of 17.7 and 54.5 ft. Eight samples of unconsolidated fine sand and silt from borehole NC-EWDP-09Sx were identified between depths of 0 to 21 ft, and two similar samples were identified from NC-EWDP-09S between 9.7 and 18.7 ft. Sample requests covering those intervals were submitted to the SMF for processing. No new water samples were received from Nye County drill holes in April for analysis of perched water. Nye County currently is performing development on the wells and deploying downhole packer systems in anticipation of sampling discrete zones starting in May. Collection of new samples and analytical work are expected to resume by the end of May.

Work on fracture-mineral dating produced a report titled *Ages and origins of calcite and opal in the Exploratory Studies Facilities tunnel, Yucca Mountain, Nevada* which has received final review by co-authors and currently is in the final round of edits from the publication specialist. Once those edits are complete, final revisions will be made. The revised report is expected to be resubmitted to the Publications Unit by late June.

Work continued on determination of water flux through the repository block and development of the uranium-evolution model for fracture minerals. Water was extracted from the welded upper lithophysal unit of the Topopah Spring Tuff (Ttpul) by ultracentrifugation. Approximately three milliliters of water was obtained and processed for combined uranium and strontium isotopic analyses. The resulting $^{234}\text{U}/^{238}\text{U}$ activity ratio for the pore water was approximately 2.5. That value is substantially lower than calculated initial $^{234}\text{U}/^{238}\text{U}$ activity ratios obtained from calcite and opal at that same stratigraphic level in the ESF. Ultracentrifuged pore water should not be significantly affected by water-rock interaction during the extraction process and thus should reflect the inherent uranium isotopic composition in the matrix. The large difference between $^{234}\text{U}/^{238}\text{U}$ activity ratios in the one measured pore-water analysis and the fracture-lining minerals may reflect a lack of equilibrium between fracture and pore water. Additional pore water from welded tuffs currently is being obtained.

Planning for fluid-inclusion studies resulted in agreements to begin joint sampling (USGS, UNLV, and State of Nevada) on April 22 and to continue extensive sampling in May (for an anticipated total of six to eight weeks of sampling). Discussion also covered the newly developed UNLV QA program and distribution of sampled material among participants. One day of sampling took place in the Cross Drift.

SPECIAL STUDIES

Site Characterization Progress Report #20 was distributed for M&O/USGS management review during the week of April 24. The USGS TPO and the USGS Technical Lead submitted 21 review comments on behalf of the USGS. Comments focused on the inadequacy of illustrations in the draft PR, the absence of information about the Busted Butte transport test in the Executive Summary, and various fairly minor technical and editorial issues. It was noted that nearly all of the input provided by the USGS was used in the draft PR, in particular, announcements about publication of three key USGS reports that support the Viability Assessment.

WATER-RESOURCES MONITORING

Work on the tipping-bucket rain-gauge network continued. All data were downloaded from the 17 tipping-bucket gauges during the first week of April. All stations were in good operating condition. The data are being reviewed and assembled into electronic data records.

USGS Level 3 Milestone Report

October 1, 1998 - April 30, 1999

Sorted by Baseline Date

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
Letter Report: 4th Qtr FY98 Milestone Number: SSH14HM3	10/30/98	10/29/98	10/29/98	
Letter Report: 1st Qtr FY99 Milestone Number: SSH14IM3	1/29/99	1/28/99	1/28/99	
Preliminary Geologic Map for SZ Site Area Milestone Number: SPG258M3	3/5/99	5/28/99		
Submit UZ-7a & UZ-14 Rpt for Director's Approval Milestone Number: SPG630M3	3/15/99	9/30/99		
Ghost Dance Fault Data Pkg and Testing Report Milestone Number: SP3515M3	3/30/99	5/28/99		
Geo/Geotech Data fm X-Block Drift Project Milestone Number: SPG42GM3	3/31/99	8/16/99		
Letter Report: 2nd Qtr FY99 Milestone Number: SSH14JM3	4/30/99	4/29/99	4/29/99	

USGS Level 4 Milestone Report

October 1, 1998 - April 30, 1999

Sorted by Baseline Date

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comment</u>
<i>FY99 milestones (from FY98/outyears schedule) delivered in October</i>				
Water-Level Altitude Data from the Periodic Network 10/1/97 through 6/30/98 Milestone SPH37KM4	10/30/98	10/30/98	10/9/98	Not in FY99 planning
<i>Late FY98 milestones delivered in October</i>				
Memo to TPO: Analy Cond for Input to Site Scale Mdl Milestone SPH253M4	9/30/98	9/30/98	10/2/98	
Memo to TPO: Analy Boundary Conds Oct-Jul 98 Milestone SPH225M4	9/30/98	9/30/98	10/2/98	
Memo to TPO: Chem/Iso Analy on Wtr Samples WT-17 Milestone SPC34CM4	9/15/97	9/30/98	10/2/98	

USGS Level 4 Milestone Report

October 1, 1998 - April 30, 1999

Sorted by Baseline Date

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
Cross-Drift Q Stratigraphic Picks to TDB Milestone Number: SPG470M4	10/15/98	12/1/98	12/1/98	
Geologic Investigation Strategy Developed Milestone Number: SPH741M4	11/30/98	11/30/98	11/30/98	
Early Progress Model Calibration Milestone Number: SPH731M4	11/30/98	11/30/98	11/30/98	
UZ-7a & UZ-14 Draft Rpt to Tech Review Milestone Number: SPG626M4	12/2/98	12/9/98	12/9/98	
Index Map-Poten Areas Detail Geol Invest Milestone Number: SPH776M4	12/15/98	12/15/98	12/15/98	
1st Qtr Status of Data Package Development Milestone Number: SP37A1M4	12/30/98	1/8/99	1/8/99	
1st Qtr Status Supp Line Org Doc Issues/Backlog Milestone Number: SE9601M4	12/31/98	12/31/98	12/31/98	
Water-Level Data 4th Qtr FY98 DP to RPC/TDB Milestone Number: SPH38PM4	12/31/98	12/31/98	12/31/98	
Well Data Compiled/Analyzed Detail Geol Invest Milestone Number: SPH772M4	12/31/98	12/23/98	12/23/98	
Preliminary Maps to Hydrologists Milestone Number: SPH742M4	1/15/99	1/15/99	1/15/99	
HFM-Progress Report I Milestone Number: SPH730M4	1/29/99	1/29/99	1/29/99	
Climate Tables for TSPA-LA Milestone Number: SPC316M4	2/1/99	2/19/99	2/19/99	

<u>Deliverable</u>	<u>Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
Status of Prow Pass Involvement Milestone Number: SPH401M4	2/12/99	2/12/99	2/12/99	
Se Isotopic System in Pore Wtr to RPC/TDB Milestone Number: SPH514M4	2/12/99	5/28/99		
ESF Monitoring Data Pkg to RPC/TDB Milestone Number: SPH336M4	2/19/99	6/15/99		
Alcove I Infil Expt DP to RPC/TDB Milestone Number: SPH36M4	2/19/99	6/15/99		
Interp Rpt: Synthesis Frac Min Dating/Cl-36 Milestone Number: SPH28M4	2/26/99	7/2/99		
Mid-Yr Update on Evaluation of Transient Data Milestone Number: SPH703M4	2/26/99	2/26/99	2/26/99	
Progress on Regional Recharge Estimates Milestone Number: SPH729M4	2/26/99	2/26/99	2/26/99	
Dissolved Ion & Isotopic Analysis DP to RPC/TDB Milestone Number: SPH471M4	3/26/99	5/28/99		
2nd Qtr Status Supp Line Org Doc Issues/Backlog Milestone Number: SE9602M4	3/31/99	3/29/99	3/29/99	
2nd Qtr Status of Data Package Development Milestone Number: SP37A2M4	3/31/99	3/24/99	3/24/99	
Mid-Year Status EST Closeout Activities Milestone Number: SPC71AM4	3/31/99	3/31/99	3/31/99	
Mid Year Status-Tectonic Closeout Milestone Number: SPG221M4	3/31/99	5/20/99		
Mid-Year Status Topical Reports Milestone Number: SPG41AM4	3/31/99	3/30/99	3/30/99	
Mid-Year Status Peer Reviews Milestone Number: SPG51AM4	3/31/99	3/30/99	3/30/99	

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
Mid-Year Status KTIs Milestone Number: SPG61AM4	3/31/99	3/30/99	3/30/99	
Interp Rpt: Corrcn Pched Wir C-14 Ages Milestone Number: SPH517M4	3/31/99	5/28/99		
Mid-Yr Update on Regional SZ Mdig Data Merge Milestone Number: SPH701M4	3/31/99	3/31/99	3/31/99	
Mid-Yr Update on Regional Spatial Data Merge Milestone Number: SPH707M4	3/31/99	3/31/99	3/31/99	
Core Geologic Sections Completed Milestone Number: SPH753M4	3/31/99	3/31/99	3/31/99	
Update Regional SZ Hydrochem Data I Milestone Number: SPH755M4	3/31/99	3/31/99	3/31/99	
Work Plan-Detail Geol Invest Milestone Number: SPH777M4	3/31/99	5/28/99		
Rev Draft: Rpt Corr of Lithostrat & Geophysics Milestone Number: SPG636M4	4/1/99	9/30/99		
Water-Level Data 1st Qtr FY99 DP to RPC/TDB Milestone Number: SPH38QM4	4/30/99	4/30/99	4/30/99	
Model Results to RPC Milestone Number: SPH442M4	4/30/99	6/16/99		
Letter Rpt: Rslts PA Wkshps & Sensit Analyses Milestone Number: SPH608M4	4/30/99	4/13/99	4/13/99	
Mid-Year Progress Model Calibration Milestone Number: SPH719M4	4/30/99	4/30/99	4/30/99	
Geol Interps-Progress Report I Milestone Number: SPH743M4	4/30/99	4/30/99	4/30/99	

YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey
Date Prepared 5/12/99 10:41 AM

Fiscal Month/Year April 30, 1999
Page 1 of 1

CURRENT MONTH END

FISCAL YEAR

SPAM	ACTUAL COSTS	PARTICIPANT HOURS	SUBCONTRACT HOURS	PURCHASE COMMITMENTS	SUBCONTRACT COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMULATIVE COSTS
AMLX	44	400	861	0	221	0	639	0	301
AMRO	7	150	30	0	14	0	123	0	28
AMNE	74	904	245	0	0	0	1235	0	721
AMNT	0	0	0	0	0	0	35	0	0
AMNW	643	10828	2033	0	761	0	7801	0	3477
AMPP	183	3543	1847	0	305	0	3194	0	1408
AMPW	212	2625	658	0	153	0	2050	0	1301
AMRF	25	648	0	0	0	0	200	0	99
	1188	19086	5674	0	1454	0	15297	0	7333

YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey
Date Prepared 5/12/99 10:41 AM

Fiscal Month/Year April 30, 1999
Page 1 of 1

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
1.2.1	47	994	226	0	33	0	669	0	330
1.2.3	791	14109	3711	0	992	0	11016	0	5047
1.2.4	7	150	30	0	14	0	158	0	28
1.2.5	48	360	661	0	221	0	639	0	300
1.2.8	78	668	188	0	41	0	663	0	282
1.2.9	60	935	185	0	53	0	600	0	339
1.2.12	4	200	0	0	0	0	100	0	43
1.2.15	152	1690	473	0	100	0	1450	0	862
	1187	19096	5674	0	1454	0	15297	0	7333

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 1984 April 30, 1999

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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
06335881 Provide Technical Data Coordination	38.8	31.1	43.1	25.4	35.6	41.7	40.4	0.0	0.0	0.0	0.0	0.0	256.03
81912470U1 Technical Data Management FY89	38.8	31.1	43.1	25.4	35.6	41.7	40.4	0.0	0.0	0.0	0.0	0.0	256.03
81912470	38.8	31.1	43.1	25.4	35.6	41.7	40.4	0.0	0.0	0.0	0.0	0.0	256.03
063322881 Conduct Satellite Records Operations	10.3	8.8	10.2	4.1	3.6	4.1	4.0	0.0	0.0	0.0	0.0	0.0	45.12
81919197U1 USGS Satellite Records Operations	10.3	8.8	10.2	4.1	3.6	4.1	4.0	0.0	0.0	0.0	0.0	0.0	45.12
81919197	10.3	8.8	10.2	4.1	3.6	4.1	4.0	0.0	0.0	0.0	0.0	0.0	45.12
AMDX	49.1	39.9	53.3	29.6	39.2	45.8	44.4	0.0	0.0	0.0	0.0	0.0	301.16
06400881 EBS Testing for LADS - Backfill (Before	0.0	0.0	5.9	2.0	6.9	5.9	7.1	0.0	0.0	0.0	0.0	0.0	27.78
81912382U1 EBS Testing for LADS	0.0	0.0	5.9	2.0	6.9	5.9	7.1	0.0	0.0	0.0	0.0	0.0	27.78
81912382	0.0	0.0	5.9	2.0	6.9	5.9	7.1	0.0	0.0	0.0	0.0	0.0	27.78
AMMQ	0.0	0.0	5.9	2.0	6.9	5.9	7.1	0.0	0.0	0.0	0.0	0.0	27.78
0632212885 Evaluate Short Trace Length Fract. Distr	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	4.29
0632212887 Conduct Geologic Mapping of the ECRB	0.0	16.3	78.0	77.4	71.7	58.0	48.8	0.0	0.0	0.0	0.0	0.0	330.17
81912050U2 Geologic Mapping in the ECRB FY89	0.0	16.3	78.0	77.4	71.7	58.0	53.1	0.0	0.0	0.0	0.0	0.0	354.45
0633124888 Eval Percolation Flux Across Repository	3.6	12.6	16.8	21.9	24.9	-2.9	11.7	0.0	0.0	0.0	0.0	0.0	88.59
0633124889 Conduct Moisture Monitoring in the ESF	17.1	27.8	20.5	21.6	13.9	20.2	0.1	0.0	0.0	0.0	0.0	0.0	121.22
0636221884 Cond E-W X-Drill Frac Min Ding & Isoto	21.2	-14.1	4.9	2.7	-0.5	3.9	9.0	0.0	0.0	0.0	0.0	0.0	27.01
81912050U3 Moisture Monitoring & Infiltration St	41.9	26.3	42.3	46.2	38.2	21.2	20.8	0.0	0.0	0.0	0.0	0.0	236.82
0632212885 Conduct Geologic Mapping of the ECRB	75.0	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00
81912050U1 Geologic Mapping of the ECRB (Def	75.0	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.00
81912050	116.9	97.6	120.3	123.6	109.9	79.1	73.9	0.0	0.0	0.0	0.0	0.0	721.27
AMNE	116.9	97.6	120.3	123.6	109.9	79.1	73.9	0.0	0.0	0.0	0.0	0.0	721.27
06400881 EBS Testing for LADS - Backfill (After 8	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
81912383U1 EBS Testing for LADS	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
81912383	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

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 1998 April 30, 1999

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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
AMNT	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
0633124188 Conduct Air-K & Hydrochemistry Testing	62.0	11.7	23.1	11.6	4.0	11.9	2.5	0.0	0.0	0.0	0.0	0.0	126.83
063312418F Characterize Seepage into Alcoves I	14.1	18.6	18.7	8.8	13.8	0.8	2.7	0.0	0.0	0.0	0.0	0.0	77.56
063312418G Characterize Seepage into Alcoves II	1.7	4.1	7.7	21.1	23.7	12.6	0.0	0.0	0.0	0.0	0.0	0.0	70.94
0633127182 Conduct Isotopic & Hydrochemical Anal	16.2	20.8	26.3	6.4	9.3	11.6	12.3	0.0	0.0	0.0	0.0	0.0	102.06
0634221181 Conduct Field Inclusion Studies	4.4	20.9	12.0	10.0	11.7	8.3	14.6	0.0	0.0	0.0	0.0	0.0	81.04
0634221183 Cond Frac Mineral Dtg & Iso Anly - ES	32.2	21.3	16.2	19.9	23.0	15.0	9.0	0.0	0.0	0.0	0.0	0.0	136.59
81912023U1 Milestone Monitoring & Fault Fractur	130.7	97.4	104.0	77.8	85.5	60.3	41.1	0.0	0.0	0.0	0.0	0.0	596.64
0634221185 Water Flat Thru Repository Block	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.09
81912023U2 Geochronology of Fracture Minerals	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.09
81912023	130.7	97.4	104.0	77.8	85.6	60.3	41.1	0.0	0.0	0.0	0.0	0.0	596.73
0633131182 Cond. Hydraulic & Tracer Testing of Pro	39.9	34.4	57.9	-1.5	13.2	0.8	3.1	0.0	0.0	0.0	0.0	0.0	169.83
0633132181 Cond Isotopic & Hydrochemical Studies	8.6	29.9	26.8	3.4	16.4	25.5	14.8	0.0	0.0	0.0	0.0	0.0	123.44
0634221188 Paleodischarge at Nye County Site	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	2.83
0630000181 Oversee Nye County Drilling Program	8.3	-5.2	4.8	1.9	11.8	7.2	19.0	0.0	0.0	0.0	0.0	0.0	47.98
0630000183 Provide SMF Well-Site Support	0.0	3.9	30.9	36.5	27.0	22.9	6.5	0.0	0.0	0.0	0.0	0.0	127.64
81912029U1 SZ Data Analysis for SR FY98	56.8	62.9	120.5	40.3	70.5	56.5	46.2	0.0	0.0	0.0	0.0	0.0	453.72
81912029	56.8	62.9	120.5	40.3	70.5	56.5	46.2	0.0	0.0	0.0	0.0	0.0	453.72
0633133187 Comp. Geo. Interpretations - Geologic	7.4	16.0	12.3	9.9	12.7	12.8	11.9	0.0	0.0	0.0	0.0	0.0	83.01
0633133182 Conduct LA SZ Flow Model Sensivity A	0.0	3.0	5.6	2.1	8.5	9.0	14.6	0.0	0.0	0.0	0.0	0.0	42.80
0633133183 Refine Geologic Framework Model	0.0	0.4	8.4	3.1	3.5	6.7	7.3	0.0	0.0	0.0	0.0	0.0	29.41
0633133188 Develop Regional SZ Model	0.0	6.3	15.6	23.0	39.9	25.1	32.2	0.0	0.0	0.0	0.0	0.0	142.17
0633133180 Comp. Geo. Interpretations - Hydrostruc	2.4	13.6	-0.7	6.2	4.2	5.2	9.9	0.0	0.0	0.0	0.0	0.0	40.84
063313318E Comp. Geo. Interpretations - Cross Sect	2.1	6.5	17.5	9.7	13.7	13.8	16.8	0.0	0.0	0.0	0.0	0.0	80.07
063313318F Comp. Geo. Interpretations - Amargosa	2.5	10.7	7.2	8.9	10.1	10.4	7.5	0.0	0.0	0.0	0.0	0.0	57.41
063313318G Hydrogeologic Framework Model	8.1	2.5	-6.0	0.9	9.6	6.6	3.5	0.0	0.0	0.0	0.0	0.0	25.23
063313318H Reduce Uncertainty - Recharge Work	0.0	0.0	2.2	0.8	1.9	3.0	3.7	0.0	0.0	0.0	0.0	0.0	11.63
063313318I Reduce Uncertainty - Hydrochemical Flo	0.0	0.0	3.5	6.0	12.3	6.5	10.4	0.0	0.0	0.0	0.0	0.0	38.78
063313318J Ground Water Flow Modeling	0.4	12.7	20.7	9.0	6.4	15.2	6.7	0.0	0.0	0.0	0.0	0.0	71.17
81912031U1 Regional and Site Scale Saturated Z	22.9	71.8	86.4	79.6	123.1	114.1	124.6	0.0	0.0	0.0	0.0	0.0	622.52

U.S. GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 1998 April 30, 1999

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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
0633132NE2 Iso & Hydrochem Studies SZ Water (WT	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
0633133NE7 Refine Regional Hydrogeologic Framew	0.0	0.0	85.3	-85.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
0633133NE8 Reduce Uncertain Flux Values to Calibr	0.0	0.0	0.8	7.2	16.4	13.3	18.7	0.0	0.0	0.0	0.0	0.0	56.56
81912031UX SZ Modeling & Hydrochem Studies (0.0	0.0	86.1	-78.1	16.4	13.3	18.7	0.0	0.0	0.0	0.0	0.0	56.56
81912031	22.9	71.8	172.6	1.5	139.5	127.4	143.3	0.0	0.0	0.0	0.0	0.0	679.08
0632211NE3 Complete Stratigraphic Descriptions UZ-	0.6	8.3	11.8	4.0	7.8	4.1	1.5	0.0	0.0	0.0	0.0	0.0	38.06
0632211NE5 Complete Lithostratigraphy & Geophysic	0.0	0.0	0.2	0.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.20
0632212NE1 Provide Structural Support to Isotopic A	4.0	0.2	6.8	2.9	2.0	2.7	0.6	0.0	0.0	0.0	0.0	0.0	19.17
0632212NE2 Conduct Fracture Syn in Sup of Resposit	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
0632212NE3 Conduct Spatial Analysis of Fracture Int	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
0632212NE4 Provide Geo Sup to LBNL Geophys Inve	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
0632212NE6 Char. Structure of Alcove - X-Drill Infil E	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
0632212NE8 Conduct Fault Zone Studies	0.9	5.8	3.5	10.8	2.7	3.0	4.3	0.0	0.0	0.0	0.0	0.0	30.97
0632212NE9 Provide Structural Support to TSPA/VA	29.8	18.9	9.8	13.5	13.1	13.0	24.1	0.0	0.0	0.0	0.0	0.0	122.16
06395NE1 Provide USGS Support to 3-D Model G	17.4	0.0	-9.3	-3.9	14.2	8.9	15.4	0.0	0.0	0.0	0.0	0.0	42.67
06395NE2 Provide USGS Support to 3-D Model St	0.0	0.0	0.0	11.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.79
81912210U1 Geologic Studies FY98	53.1	32.8	22.8	39.4	40.1	31.6	46.2	0.0	0.0	0.0	0.0	0.0	266.02
0632211NE2 Conduct Stratigraphic Descriptions	8.9	14.0	-0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.12
81912210UX Stratigraphic Description of SDEWT	8.9	14.0	-0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.12
81912210	62.0	46.8	22.6	39.8	40.1	31.6	46.2	0.0	0.0	0.0	0.0	0.0	289.14
0633123NE2 Hydraulic properties - Busted Butte Core	0.0	4.6	-0.7	0.8	1.2	21.6	28.6	0.0	0.0	0.0	0.0	0.0	56.08
0633124NEF Characterize Seepage into Alcoves I	0.0	13.7	13.0	0.5	-10.3	1.4	7.5	0.0	0.0	0.0	0.0	0.0	25.81
0633124NEG Characterize Seepage into Alcoves II	0.0	4.3	0.0	0.0	2.3	8.3	52.3	0.0	0.0	0.0	0.0	0.0	67.25
0633127NE2 Cond Iso/Hydrochem Studies of UZ & P	0.0	0.0	0.0	0.0	1.4	0.0	9.3	0.0	0.0	0.0	0.0	0.0	10.63
0633127NE4 Chlorine 36 Validation Studies	0.0	0.0	0.0	0.0	9.5	8.8	12.5	0.0	0.0	0.0	0.0	0.0	30.83
0636221NE1 Continue Fluid Inclusion Studies	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
0636221NE1 Continue Fluid Inclusion Studies	0.0	0.0	0.0	0.0	0.0	0.0	20.8	0.0	0.0	0.0	0.0	0.0	20.85
0636221NE9 Continue Frac Min Dtg & Isotopic Anlys	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
81912215U1 Moisture Monitoring & Fault Fractur	0.0	22.6	12.4	1.3	4.0	40.1	131.0	0.0	0.0	0.0	0.0	0.0	211.44
0636221NE7 Paleodischarge/Paleoclimate - Deferred	0.0	0.0	15.2	8.4	0.1	7.3	4.7	0.0	0.0	0.0	0.0	0.0	35.71
81912215UX Paleodischarge/Paleoclimate (Deferr	0.0	0.0	15.2	8.4	0.1	7.3	4.7	0.0	0.0	0.0	0.0	0.0	35.71

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	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	
81912215	0.0	22.6	27.6	9.7	4.1	47.5	135.7	0.0	0.0	0.0	0.0	0.0	247.15
0054XX Provide Support to Performance Assess	0.9	6.1	5.4	11.8	5.1	6.6	8.1	0.0	0.0	0.0	0.0	0.0	43.95
81912220U1 USGS Support to Performance Assess	0.9	6.1	5.4	11.8	5.1	6.6	8.1	0.0	0.0	0.0	0.0	0.0	43.95
81912220	0.9	6.1	5.4	11.8	5.1	6.6	8.1	0.0	0.0	0.0	0.0	0.0	43.95
0033131N03 C-Well Demobilization	0.0	0.0	0.0	0.0	0.0	0.7	1.8	0.0	0.0	0.0	0.0	0.0	2.58
0033132N01 Cond Isotopic & Hydrochemical Studies	0.0	0.0	0.0	0.0	0.7	0.4	3.6	0.0	0.0	0.0	0.0	0.0	4.44
0036221N09 Paleodischarge at Nye County Sites	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.83
0030000N02 Overseas Nye County Drilling Program	0.0	0.0	0.0	0.0	0.0	0.9	8.4	0.0	0.0	0.0	0.0	0.0	9.35
81912245U1 SZ Data Analysis for SR/LA FY99	0.0	0.0	0.0	0.0	3.5	2.0	13.8	0.0	0.0	0.0	0.0	0.0	19.40
0033127N03 Iso & Hydrochem Studies of UZ Water at	0.0	3.9	7.9	12.1	8.2	9.4	6.9	0.0	0.0	0.0	0.0	0.0	48.44
0033131N08 SZ Hydrologic Testing	9.0	7.2	2.8	4.9	9.2	6.1	13.0	0.0	0.0	0.0	0.0	0.0	52.20
81912245U2 SZ Testing & UZ Hydrochemistry (D	9.0	11.2	10.6	17.0	17.3	15.5	20.0	0.0	0.0	0.0	0.0	0.0	100.65
81912245	9.0	11.2	10.6	17.0	20.9	17.6	33.8	0.0	0.0	0.0	0.0	0.0	120.05
00398009 Support Preparation of the WDLA	26.3	23.1	54.1	24.5	40.0	45.1	40.7	0.0	0.0	0.0	0.0	0.0	253.79
81916105U1 Support for Preparation of the WDL	26.3	23.1	54.1	24.5	40.0	45.1	40.7	0.0	0.0	0.0	0.0	0.0	253.79
0032834N01 Rvw Impacts of New Data on Volcanic &	15.7	-11.4	22.6	5.6	5.2	6.9	2.2	0.0	0.0	0.0	0.0	0.0	46.74
0032000N01 LADS Support - Expansion Area	0.0	0.0	1.3	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.70
0033129N01 Provide Updated UZ Model Abstractions	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
0033130N01 Provide Support to Flow & Transport Mo	3.9	7.9	5.0	8.8	-0.4	1.0	9.2	0.0	0.0	0.0	0.0	0.0	35.45
0033000N01 LADS Support	0.0	5.1	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.77
81916105U2 Review of Literature and Special Stu	19.7	1.6	28.6	14.4	4.8	7.8	11.8	0.0	0.0	0.0	0.0	0.0	88.67
0032834N02 Tectonic Closeout Activities	0.0	1.5	0.9	1.8	7.7	5.0	43.2	0.0	0.0	0.0	0.0	0.0	60.15
0033121N01 Coupled Infiltration Surface Water Flow	0.0	1.8	4.7	4.4	15.7	28.9	13.9	0.0	0.0	0.0	0.0	0.0	69.31
0033123N01 Surface Based Testing Closeout Activit	0.0	9.1	46.7	44.5	34.2	31.1	27.6	0.0	0.0	0.0	0.0	0.0	193.20
0036221N06 Climate Closeout Activities	0.0	12.1	49.1	19.4	21.6	53.2	8.7	0.0	0.0	0.0	0.0	0.0	164.15
003980A1 Supports KTIs	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
003980A1 Support Topical Rpts; NWTRB, ACNW,	5.8	-5.1	0.5	1.9	3.2	18.2	8.1	0.0	0.0	0.0	0.0	0.0	32.69
003980A1 Support Semiannual Progress Reports	0.0	5.0	2.3	0.4	0.0	2.7	5.0	0.0	0.0	0.0	0.0	0.0	15.43
003980A1 Support Peer Reviews	4.9	-2.0	-0.5	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	4.53
003980A1 Support Closeout Activities	0.0	0.0	0.0	4.9	5.9	36.9	15.7	0.0	0.0	0.0	0.0	0.0	63.49

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	EST	EST	EST	EST	EST	EST							
0639MB2 Support Hydrologic Modeling Team Clos	0.0	0.0	0.0	0.0	4.4	20.5	11.1	0.0	0.0	0.0	0.0	0.0	35.94
81916105U3 Technical Interactions and Special P	10.7	22.3	103.7	77.5	92.7	198.7	133.3	0.0	0.0	0.0	0.0	0.0	638.89
81916105	56.7	47.0	186.4	116.4	137.5	231.6	185.8	0.0	0.0	0.0	0.0	0.0	981.33
0633127MB1 Conduct Chem. & Isotopic Analyses Drif	9.3	17.9	5.4	16.0	10.4	4.6	2.4	0.0	0.0	0.0	0.0	0.0	65.93
81916107U1 Isotope Support for Thermal Testing	9.3	17.9	5.4	16.0	10.4	4.6	2.4	0.0	0.0	0.0	0.0	0.0	65.93
81916107	9.3	17.9	5.4	16.0	10.4	4.6	2.4	0.0	0.0	0.0	0.0	0.0	65.93
AMRW	348.2	383.8	655.1	330.2	513.6	603.7	642.5	0.0	0.0	0.0	0.0	0.0	3,477.10
061CMB1 Conduct Engineering Assurance Activiti	38.0	36.6	38.7	35.1	40.4	44.4	38.6	0.0	0.0	0.0	0.0	0.0	271.87
81912019U1 Engineering Assurance FY99	38.0	36.6	38.7	35.1	40.4	44.4	38.6	0.0	0.0	0.0	0.0	0.0	271.87
061CMB2 Personnel Qualifications - Deferred	3.0	3.9	4.3	3.5	3.9	2.2	0.3	0.0	0.0	0.0	0.0	0.0	21.23
061CMB2 Support Line Org. Doc. Issues/Backlog	2.8	3.0	1.7	2.9	7.8	9.7	8.6	0.0	0.0	0.0	0.0	0.0	36.66
81912019UX Support Line Organization, Docume	5.9	6.9	6.0	6.5	11.7	11.9	8.9	0.0	0.0	0.0	0.0	0.0	57.89
81912019	43.9	43.6	44.7	41.6	52.2	56.3	47.5	0.0	0.0	0.0	0.0	0.0	329.76
	0.0	3.4	2.5	2.4	4.3	1.0	4.6	0.0	0.0	0.0	0.0	0.0	18.07
Unfunded Work	91.7	97.0	-23.4	-11.6	-1.7	-50.5	-86.4	0.0	0.0	0.0	0.0	0.0	15.10
0631MB1 Support Scientific Programs Mgmt & Int	9.8	24.6	16.0	21.8	17.2	22.3	22.4	0.0	0.0	0.0	0.0	0.0	134.14
0631MB2 Manage Nevada Operations/Earth Scien	40.4	57.7	45.8	37.6	29.2	39.8	48.2	0.0	0.0	0.0	0.0	0.0	298.73
81919090U1 USGS SP&I FY99	141.9	182.7	40.9	50.2	49.1	12.5	-11.3	0.0	0.0	0.0	0.0	0.0	466.04
0639BA1C Provide Site Investigations Technical Su	27.1	38.5	34.1	55.6	40.0	46.3	65.6	0.0	0.0	0.0	0.0	0.0	307.22
0639BA1D Provide Quality Checks for Documents	0.0	0.0	0.0	1.3	8.0	8.0	3.1	0.0	0.0	0.0	0.0	0.0	20.33
81919090U3 USGS Site Investigations Technical	27.1	38.5	34.1	56.9	48.1	54.2	68.6	0.0	0.0	0.0	0.0	0.0	327.56
0639BA1F Support QA Compliance, Implementatio	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
81919090U4 QA Compliance, Implementation, an	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
81919090	169.0	221.2	75.0	107.2	97.1	66.8	57.4	0.0	0.0	0.0	0.0	0.0	793.59
06825MB1 Implement Federal Safety & Occupation	6.8	7.6	7.9	7.9	6.7	8.8	7.8	0.0	0.0	0.0	0.0	0.0	53.54
81919121U1 Federal Occupational Safety & Healt	6.8	7.6	7.9	7.9	6.7	8.8	7.8	0.0	0.0	0.0	0.0	0.0	53.54
06847MB1 Conduct Water Resources Studies	15.8	34.0	25.0	23.2	27.4	31.9	53.7	0.0	0.0	0.0	0.0	0.0	211.11
81919121U2 Water Resources FY99	15.8	34.0	25.0	23.2	27.4	31.9	53.7	0.0	0.0	0.0	0.0	0.0	211.11
06847MB2 Water Appropriation Hearings	0.0	0.7	0.6	0.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	8.65

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	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
	EST	EST	EST	EST	EST	EST							
81919121U3 Water Appropriation Hearings	0.0	0.7	0.6	0.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	8.65
06843083 Tipping Bucket Rain Gage Monitoring	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	9.96
81919121U4 Precipitation Gage Monitoring	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	9.96
81919121	22.6	42.3	33.5	31.1	34.1	40.7	77.8	0.0	0.0	0.0	0.0	0.0	282.26
AMPP	235.5	307.1	153.1	179.9	183.5	163.8	182.7	0.0	0.0	0.0	0.0	0.0	1,405.62
06F23081 Provide Support/Personnel Services	18.8	22.6	23.1	26.2	22.7	22.0	21.8	0.0	0.0	0.0	0.0	0.0	157.25
06F23083 Provide Procurement & Property Manag	0.0	0.0	0.0	0.0	5.7	6.7	10.0	0.0	0.0	0.0	0.0	0.0	22.48
06F23086 Provide Computer Support	13.6	25.2	16.1	18.3	39.8	33.0	33.8	0.0	0.0	0.0	0.0	0.0	179.91
81919110U1 Personnel, Procurement, Property S	32.4	47.8	39.2	44.5	68.2	61.8	65.6	0.0	0.0	0.0	0.0	0.0	359.64
06F23082 Provide Facilities Management (space)	65.3	65.3	65.3	65.3	65.3	65.3	65.3	0.0	0.0	0.0	0.0	0.0	457.33
06F23083 Provide Facilities Management (comput	13.7	13.7	13.7	13.7	13.7	13.7	13.7	0.0	0.0	0.0	0.0	0.0	93.67
06F23084 Provide Facilities Management (other)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	17.58
81919110U2 Facilities Management (USGS)	81.5	81.5	81.5	81.5	81.5	81.5	81.5	0.0	0.0	0.0	0.0	0.0	570.58
06F3081 Provide USGS Training Support	6.1	1.7	4.1	4.8	3.7	6.8	4.6	0.0	0.0	0.0	0.0	0.0	31.79
81919111U1 USGS Training Support	6.1	1.7	4.1	4.8	3.7	6.8	4.6	0.0	0.0	0.0	0.0	0.0	31.79
81919110	120.0	131.0	124.8	130.8	153.4	150.1	151.7	0.0	0.0	0.0	0.0	0.0	961.92
06912081 Provide TPO Office Support	14.3	26.9	25.2	27.2	23.6	31.0	38.8	0.0	0.0	0.0	0.0	0.0	187.12
81919135U1 USGS Project Management FY99	14.3	26.9	25.2	27.2	23.6	31.0	38.8	0.0	0.0	0.0	0.0	0.0	187.12
06922081 Conduct Project Control Activities	27.7	22.4	19.7	20.6	18.2	22.0	21.2	0.0	0.0	0.0	0.0	0.0	151.88
81919135U2 USGS Project Control FY99	27.7	22.4	19.7	20.6	18.2	22.0	21.2	0.0	0.0	0.0	0.0	0.0	151.88
81919135	42.0	49.3	44.9	47.8	41.8	53.1	60.0	0.0	0.0	0.0	0.0	0.0	338.92
AMPW	162.1	180.3	169.8	178.6	195.2	203.2	211.7	0.0	0.0	0.0	0.0	0.0	1,300.85
0633131081 Conduct Water-Level Monitoring	7.3	8.3	9.3	19.9	11.8	16.5	25.4	0.0	0.0	0.0	0.0	0.0	98.58
81917027U1 Long-Term PC Monitoring FY99	7.3	8.3	9.3	19.9	11.8	16.5	25.4	0.0	0.0	0.0	0.0	0.0	98.58
81917027	7.3	8.3	9.3	19.9	11.8	16.5	25.4	0.0	0.0	0.0	0.0	0.0	98.58
AMRF	7.3	8.3	9.3	19.9	11.8	16.5	25.4	0.0	0.0	0.0	0.0	0.0	98.58

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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
1.2 OPERATING	919.0	1,017.0	1,166.8	863.7	1,060.1	1,118.0	1,187.8	0.0	0.0	0.0	0.0	0.0	7,332.35
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	919.0	1,017.0	1,166.8	863.7	1,060.1	1,118.0	1,187.8	0.0	0.0	0.0	0.0	0.0	7,332.35
FTEs													
FEDERAL	86.0	96.4	99.5	88.5	78.9	92.4	110.1	0.0	0.0	0.0	0.0	0.0	
CONTRACT	29.2	27.4	32.8	26.8	27.5	33.2	36.4	0.0	0.0	0.0	0.0	0.0	
TOTAL	115.2	123.7	132.4	115.3	106.4	125.6	146.5	0.0	0.0	0.0	0.0	0.0	