



**Department of Energy**  
Office of Civilian Radioactive Waste Management  
Yucca Mountain Site Characterization Office  
P.O. Box 30307  
North Las Vegas, NV 89036-0307

QA: N/A

**DEC 09 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  
Two White Flint North  
Rockville, MD 20852

**SUBMITTAL OF PARTICIPANTS' 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 participants' monthly status report on a regular basis. Enclosed is the U.S. Geological Survey Progress Report for October 1999.

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

Stephan Brocoum  
Assistant Manager, Office of  
Licensing and Regulatory Compliance

OL&RC:BMT-0332

Enclosure:  
Ltr 12/1/99, Craig to Kozai, w/encl

NH03

DEC 09 1999

cc w/encl:

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# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Box 25046 M.S. 421

Denver Federal Center

Denver, Colorado 80225

INFORMATION ONLY

December 1, 1999

Wayne Kozai  
Yucca Mountain Site Characterization  
Project Office  
U. S. Department of Energy  
P.O. Box 30307  
Las Vegas, Nevada 89036-0307

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

Attached is the USGS progress report in the required format for the month of October, 1999. This report was delayed this month due to difficulties with reconciling the baseline schedule.

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

Sincerely,

<sup>50</sup> 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

October 1999

## COORDINATION and PLANNING

Processing of some 63 documents prepared by U.S. Geological Survey authors continued during October by the USGS-Yucca Mountain Project Branch. Of these listed documents, 27 are USGS reports (14 with hydrologic topics and 13 with geologic topics), six are journal articles (all but one on geologic topics), nine are Proceedings articles (split between five of hydrologic subject matter and four with geologic topics), and 17 are abstracts. The USGS reports include nine water-resources investigations reports (WRIRs), 17 open-file reports (OFRs; mostly of geologic topic), and one report of mapping investigations (an I-map). In addition, four reports (three on water topics) fell in the overall category of milestone reports, AMRs, and administrative reports.

During October, one publication package (Water-Resources Investigations Report 99-4166) was sent to the Records Coordinator for transmittal to the RPC, and the related OSTI package was sent to DOE.

## GEOLOGY

Work continued on stratigraphic interpretations of the lower part of borehole USW SD-6. Samples of that lower part of SD-6 were examined at the SMF in early October. Development of geophysical interpretations also continued. Technical and checker review was underway on stratigraphic workbooks summarizing geophysical, stratigraphic, and lithological information on boreholes. The underground-mapping team continued preparations for mapping in the Busted Butte excavations. In unscheduled work, members of that team presented results of recent small-scale fracture mapping in the ECRB to DOE and M&O personnel on October 12. In addition, members of the mapping team accompanied NRC staff on an inspection of the ESF on October 18.

## HYDROLOGY

### Unsaturated-Zone Hydrology

Several aspects of moisture monitoring continued. Preparations for completion of the ESF niche analyses also continued. All of the moisture-monitoring equipment has been removed from the niches. All calibrated equipment is being returned to the vendors for final closing calibrations. The infiltration experiment at Alcove #1 continued. All efforts have been made to maintain a 2.0 to 2.2 cm/day application of water at the surface above the alcove. The second round of tracer tests began October 15, using a tracer which contains approximately 300 ppm of LiBr. The water collected in the alcove is being

checked each day for that new tracer. To date, 64,665 gallons of water have been applied to the surface above the alcove, in water application begun on February 19, 1999. A total of 7938 gallons of water have been collected to date in the alcove. Checker reviews for the Alcove #1 infiltration-experiment data package have been completed. All of the final needed items have been assembled. The data package has been sent to Denver for additional review and processing. The data package is expected to be submitted to the RPC/TDB by the end of November.

Moisture monitoring in the ESF and the Cross Drift continued, with emphasis on E-W Bulkhead and Alcove #7 monitoring. Data were downloaded and organized. Seepage monitoring in Alcove #7 continued. Processing of core samples from the Cross Drift for measurement of hydrologic properties began.

All technical and QA reviews for the North Ghost Dance fault (NGDF) air-permeability report have been completed, and the report is ready for printing and delivery to DOE. The data packages covering the geothermal, pneumatic monitoring, air-injection testing, and tracer testing were completed and submitted to the Records Center. The final NGDF data packages, covering the core-water tritium data and gas-geochemistry data, currently are in QA checker review.

Work continued on the infiltration-model AMR (rev. 0). Several efforts were conducted to verify and qualify data sets used in the net-infiltration modeling, including work on rock and soil hydrologic-properties data, geologic map data, and meteorological data. Similar efforts were directed at verification and qualification of software routines used to develop input files for infiltration modeling, as well as to verification and qualification of the actual modeling software. Editorial and technical reviews of the draft AMR package were completed. Technical and procedure-related errors were identified, and those are being corrected prior to submittal for checking. Work continued to process the report through the checking step.

In isotopic and chemical support to thermal investigations, four water samples from the Drift-Scale Test arrived in October. All of those samples are in preparation for strontium and uranium analyses. Preparations were initiated for compilation of related dissolved-ion and isotopic data packages.

The chlorine-36 ( $^{36}\text{Cl}$ ) validation team met in Denver on October 22 to discuss progress and problems in conducting that validation study. Present at the meeting were Zell Peterman, Brian Marshall, Leonid Neymark, Gary Patterson, and Joe Whelan (all of the USGS), Marc Caffee (LLNL), and Mel Gascoyne (AECL). The first 13 core samples had been distributed to the participants several months ago, and Peterman reported that a second batch of 12 core samples is being distributed to the USGS, LLNL, and AECL. Gary Patterson reported that water has been extracted from 10 of the 13 core samples, and with the lifting of CAR-02 against the NWQL, the samples are being submitted for tritium analyses. Marc Caffee reported that the LLNL technical procedures finally have been approved, and he is now ready to start  $^{36}\text{Cl}$  analyses on the first 13 distributed cores. He also presented results of a study of iodine-129 ( $^{129}\text{I}$ ) in alluvium at another site on the

NTS. (Iodine-129 is a bomb-pulse isotope with a half-life of about 15 million years.) Results were so encouraging that the group discussed the possibility of conducting  $^{129}\text{I}$  analyses as part of the  $^{36}\text{Cl}$  validation effort. Iodine-129 is almost totally of bomb-pulse origin and so avoids the ambiguity inherent in assigning occurrences of  $^{36}\text{Cl}$  to a bomb origin. Mel Gascoyne presented preliminary bulk-rock uranium-series results for subsamples of the first 13 core samples. Nearly all of those samples show disequilibrium values, with  $^{234}\text{U}/^{238}\text{U}$  ratios slightly less than unity. Gascoyne suggested that  $^{234}\text{U}$  is preferentially concentrated in the pore water by alpha recoil, leaving the bulk rock deficient in that isotope with the pore water being continuously removed. Those systematics, if verified, offer the potential of developing an independent, isotope-based flux model. Coincidentally during the meeting, Peterman received a call from Leon Reiter (NWTRB) asking if data would be available by the time of the next NWTRB meeting (January 2000), and if so, if presentations could be made. Peterman replied in the affirmative. The  $^{36}\text{Cl}$ -validation group will meet again prior to that January NWTRB meeting.

Numerous efforts in hydrochemistry continued. Water extraction and hydrochemical and isotopic analysis of water from USW SD-6 and USW WT-24 continued. Pore water was distilled, and dissolved  $\text{CO}_2$  was extracted, from one ESF core sample. That pore water will be analyzed for tritium as part of the  $^{36}\text{Cl}$  validation study. The draft interpretive report on UZ hydrochemistry and isotopic data continued in editorial review. In on-going work to complete reviews of the manuscript describing correction of perched-water  $^{14}\text{C}$  ages, PHREEQC software (version 2.0.38) was documented and qualified by the M&O for use in  $^{14}\text{C}$  age correction. Twenty-two core specimens, delivered to the UZ Hydrochemistry Laboratory cold storage room, were inventoried. The LKB Liquid Scintillation Counter was calibrated.

Various elements of hydrochemical data handling proceeded. Staff met with QA implementation staff to determine status of data packages and to focus additional effort. Discussions were held to resolve deficiency issues with balance calibrations, thermometer calibrations for core held in coolers, and modifications to technical procedures to reflect current work practices. Those deficiencies will be addressed in DR-USGS-00-D-008. A transcription check of the tritium data (hardcopy versus electronic media) for the data package titled "Analysis of tritium concentration, during FY98 and FY99, in pore water extracted from boreholes UZ-7A, UZ-14, NRG-7A, WT-24, SD-6, SD-7, SD-9, and SD-12" was performed. Preparation of the data package "Analysis of carbon-14, carbon 13/12 ratio, and stable isotope composition, during FY98 and FY99, in pore water and dissolved  $\text{CO}_2$  extracted from boreholes SD-6, WT-24, UZ-7a, and SD-12" was completed. Sections of the data package included a spreadsheet file for data tracking, compression and  $\text{CO}_2$  distillation records, laboratory reports from Beta Analytical Laboratory, calibration certifications, and custody receipts for core specimens, and that package was sent for technical and checker review. Staff met with the Data Coordinator to discuss changes and additions to the data package titled "Analysis of carbon isotopes of pore water from ESF-NR-MoistStdy #13, WT-24, NRG-7A and SD-7, extracted from core by compression and  $\text{CO}_2$  distillations," DTN GS981208312272.005. Approximately 10 changes and additions have been made in that package, including

listing of staff qualifications and training records, maintenance reports for balance calibrations, and addition of technical procedures HP-126 and HP-131. Confirmation searches were made in the ATDT system for several data sets for chemical compositions from boreholes UZ-4 and UZ-5. UZ Hydrochemistry personnel compiled additional calibration records, corrected tritium concentration values based on revised sample collection dates, and wrote calibration justifications (for scales and out-of-balance thermometers) for a data package containing tritium data.

#### Saturated-Zone Hydrology

Water-level measurements (depth-to-water) were collected in boreholes at and near Yucca Mountain, including USW WT-2, USW H-4 (lower and upper intervals), UE-25 p#1, and UE-25 WT#14 on October 6; USW H-1 (tubes 1 through 4), and UE-25 WT#13 on October 7; USW G-2, UE-25 WT#4, UE-25 WT#6, UE-25 WT#16, and UE-25 WT#15 on October 12; UE-25 J-11 on October 13; USW H-3 (upper and lower intervals), USW WT-1, and USW H-5 (upper and lower intervals) on October 14; USW H-4 (lower interval) on October 18; USW VH-1, USW H-6 (upper and lower intervals), USW WT-7, and USW WT-10 on October 19; UE-25 J-13, USW SD-6ST-1, UE-25 WT#12, and UE-25 J-12 on October 20; and UE-25 WT#17, UE-25 WT#3, and USW WT-24 on October 21.

Numerous activities supported water-level data collection. Staff made field measurements to calibrate the Mt. Sopris multiconductor cable unit on October 13, after cutting off damaged cable and reheading the cable. The "depth-to-water measurement" field sheet was revised and put into use on October 6. Temperature-log data used for steel-tape expansion-correction computations were extracted from YMP data bases. Calculation began of mean borehole temperatures using a spreadsheet analysis. Comparison of spreadsheet results to previously published estimated borehole mean temperatures also began. Borehole-deviation results for about one half of the boreholes in the YMP network were pulled from gyroscopic-survey data bases; the remaining logs were not found. Revisions also began to the "Work Sheet—Water-Level Measurement" form for use in electronic spreadsheet format. Corrections to water-level measurements for mechanical stretch, thermal expansion, and borehole deviation were previously made based on average depth-to-water values. That new spreadsheet will allow easy computation for correction factors for each individual measurement. Design of the spreadsheet will accommodate appropriate significant figures in the computations and in the final result. Altitude data for borehole land elevations from non-Q USGS sources and YMP Q sources were compiled for comparison, because previous USGS reports and data packages have used non-Q data to compute water altitudes, but recent M&O data packages using GPS data may not agree with USGS data. Design began of enhancements to the water-level data base for management of water-level network data. Preliminary estimates of costs and manpower needs to re-start continuous water-level monitoring for documentation of earthquake effects on YMP water were compiled.

In work on compilation of water-level results and reports, staff compiled fourth-quarter FY1999 data, reviewed portions of the data pertinent to monitoring of SD-6 hydraulic testing, and forwarded the data set from Denver to Las Vegas offices for further



processing by Las Vegas staff. The third-quarter FY1999 water-level data were submitted to the RPC on October 22. Electronic copies of some of the files used to generate the 1997—1998 report were transferred from Denver to Las Vegas. Those files will be used as templates for the FY1999 report.

Planning operations for the Alluvial Testing Complex (ATC) continued. During October, instrumentation of the ATC borehole(s) to be drilled in FY2000 was discussed in weekly conference calls involving the M&O (TCO, EPD, LANL, SNL), Nye County, and the USGS. The location and drilling methodology of the ATC hole(s) also were discussed. The USGS and LANL communicated requirements for the proposed hydraulic and tracer testing in the ATC hole during those conference calls and during a meeting in Denver on September 28. Nye County, through its contractor Questa Engineering, then prepared a drilling and instrumentation proposal for the first ATC well. A meeting in Denver is planned for November 10 to discuss that proposal. (Drilling of Nye County Phase II wells is planned to start the first week of November. Drilling of the first ATC well is expected around April of 2000.)

Efforts in demobilization continued at the C-well complex. The ParoScientific transducers removed from the C-holes in FY1999 were sent to the vendor on October 29 for closing calibrations. The data package for data collected with those transducers will be updated when the closing calibrations are provided by the manufacturer. Arrangements for flowmeter calibrations continued.

Hydrologic-properties testing of borehole USW SD-6 continued. Preparation of the SZ data package from SD-6 was completed and was submitted for technical review and checker review.

## CLIMATE and PALEOHYDROLOGY

Work on the climate-modeling AMR continued. New diatom data used in the climate-model AMR were reviewed. The Climate Model AMR was submitted for USGS review on October 12 and is now in the editing and checking processes.

In work on analysis of fluid inclusions, the fluid-inclusion analytical instrumentation, requisitioned in August, finally is scheduled for delivery in early November. Set-up and calibration activities will follow.

## WATER-RESOURCES MONITORING

Review of work to date on the 1997/1998 water-level data report was initiated. Sources of data were reviewed. Final figures for the water-level data were prepared.

Tipping-bucket rain-gage data were downloaded as scheduled. Tipping-bucket monitoring data were submitted to the RPC/TDB, in completion (on October 29) of milestone SSH525M5 [Tipping Bucket Monitoring Data to RPC/TDB].

**USGS Level 3 Milestone Report**  
**October 1, 1999 - October 29, 1999**  
Sorted by Baseline Date

<b>Deliverable</b>	<b>Due Date</b>	<b>Expected Date</b>	<b>Completed Date</b>
<b>SP3515M3</b> Ghost Dance Fault Data Pkg and Testing Report	10/15/99	11/30/99	
<b>SPG42GM3</b> Geology of ECRB X-Drift	10/29/99	11/12/99	

**USGS Level 4 Milestone Report**  
**October 1, 1999 - October 29, 1999**  
Sorted by Baseline Date

<b>Deliverable</b>	<b>Due Date</b>	<b>Expected Date</b>	<b>Completed Date</b>
<b>SPI018M4</b> Strat Workbook-Qualified/Verified Data Available	10/29/99	11/15/99	

**USGS Level 5 Milestone Report**  
**October 1, 1999 - October 29, 1999**  
 Sorted by Baseline Date

Deliverable	Due Date	Expected Date	Completed Date
<b>SPH110M5</b> UZ Monit Data to RPC/TDB	10/15/99	11/15/99	
<b>SSH525M5</b> Tipping Bucket Monitoring Data to RPC/TDB	10/29/99	10/29/99	10/29/99
<b>SPH39TM5</b> Water-Level Data 3rd Qtr FY99 DP to RPC/TDB	10/29/99	11/5/99	
<b>SPH338M5</b> ESF Monitoring Data Pkg to RPC/TDB	10/29/99	11/30/99	
<b>SPH504M5</b> Prelim X-Sects to Hydrologists	10/29/99	11/30/99	
<b>SPH506M5</b> Work Plan-Detail Geol Invest	10/29/99	11/30/99	
<b>SPH508M5</b> Preliminary Maps to Hydrologists	10/29/99	11/30/99	
<b>SPH918M5</b> Hydro Prop Busted Butte to RPC/TDB	10/29/99	11/30/99	
<b>SSH15HM5</b> Letter Report: 4th Qtr FY99	10/29/99	11/30/99	
<b>SPG461M5</b> Strat Interps (for ISM) DP to RPC/TDB	10/29/99	12/1/99	
<b>SPH535M5</b> Sr Isotope Pore-Water Anlys DP to RPC/TDB	10/29/99	12/1/99	
<b>SPH355M5</b> X-Drift Moist Monitoring Data Pkg to RPC/TDB	10/29/99	12/30/99	
<b>SP6B341M5</b> TDMS/RPC: Submit USW SD-6 Strat Data	10/29/99	1/3/00	

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ESTIMATED COSTS FOR October 1, 1999 - October 31, 1999  
11/8/99 11:00:08 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
4889-21221 YMSD Rev. 1 for SRCR Analysis & Writin	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
81912122U1 YMSD Rev.1 for SRCR Anlys & Writn	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
4889-21222 YMSD Product Checking - FY00	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
81912122U2 YMSD Product Checking - FY00	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
4889-21223 YMSD Data, Models, Software V/Q; PVA	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
81912122U3 YMSD Data, Software V/Q, PVAR - F	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.54
4889-21224 YMSD M&I & Regulatory Support - FY00	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.54
81912122U4 YMSD M&I & Regulatory Support - F	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.28
GS6105 USGS YMSD Science Support to SR	30.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.28
1.2.21.2.2	30.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.16
1.2.21.2	30.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.16
4889-10506 Performance Assessment	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.16
81912132U1 Support to Performance Assessment	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.80
GS2397 USGS TSPA for SR	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.80
1.2.21.3.2	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.80
4889-21311 DE PMR rev. 0 for SRCR Analysis & Writn	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.80
8191213DU1 DE PMR Rev.0 for SRCR Anlys & Wr	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.68
4889-21310 DE Data Verification	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.68
4889-21312 DE Product Checking - FY00	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.69
8191213DU2 DE Product Checking - FY00	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.49
4889-21313 DE Data, Models, Software V/Q; PVAR -	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.18
8191213DU3 DE Data, Software V/Q; PVAR - FY0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.68
4889-21314 DE M&I & Regulatory Support - FY00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.68
8191213DU4 DE M&I & Regulatory Support - FY00	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
GS9093 USGS - Tectonic Hazards PMR - Sr	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
1.2.21.3.D	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.54
													37.54

U S GEOLOGICAL SURVEY

ESTIMATED COSTS FOR October 1, 1999 - October 31, 1999

11/8/99 11 00 08 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
4889-21321 Hydrologic Characterization of Backfill Ma	17.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.65
4889-21322 Geochemical/Mineralogical Characterizati	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.32
8191213EU1 EBS PMR Support - FY00	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.97
GS9099 USGS - EBS Degradation Flow and Tr	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.97
1 2 21 3 E	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.97
4889-21336 Stratigraphic Workbooks	20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.97
8191213IU1 ISM PMR Rev 0 for SRCR Anlys & W	20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.91
4889-21332 ISM Product Checking - FY00	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.91
8191213IU2 ISM Product Checking - FY00	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.20
4889-21330 ISM Data Verification	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.20
4889-21333 ISM Data, Models, Software V/Q, PVAR -	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.95
8191213IU3 ISM Data, Software V/Q, PVAR - FY0	60.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.41
4889-21334 ISM M&I & Regulatory Support - FY00	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.37
8191213IU4 ISM M&I & Regulatory Support - FY0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.81
4889-21198 Stratigraphic Descriptions UZ-7a & UZ14	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.81
4889-21199 Support Stratigraphic Workbooks - USBR	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.19
8191213IUX Geologic Investigations - Deferred	31.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.48
GS2210 USGS - Integrated Site Model PMR - S	121.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.67
1 2 21 3 I	121.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.96
4889-21341 NF Support - FY00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.96
8191213NU1 NF Support - FY00	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
4889-21345 NF/Thermal Investigations	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
8191213NU5 NF/Thermal Investigations - FY00	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.47
GS2253 USGS Near Field Environment PMR -	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.47
1 2 21 3 N	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.47
4889-21357 Hydrogeologic Framework AMR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.47
4889-21358 Water Level AMR	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
													5.44

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8191213SU1 SZ PMR Rev 0 for SRCR Anlys & Wrt	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.44
4889-21352 SZ Product Checking - FY00	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.20
8191213SU2 SZ Product Checking - FY00	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.20
4889-21350 SZ Data Verification	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.96
4889-21353 SZ Data, Models, Software V/Q, PVAR -	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.57
8191213SU3 SZ Data, Software V/Q, PVAR - FY00	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.53
4889-21354 SZ M&I & Regulatory Support - FY00	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.47
8191213SU4 SZ M&I & Regulatory Support - FY00	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.47
4889-11012 Merge Regional Flow Model SZ Data Bas	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.51
4889-11017 Hydrogeologic Framework Model - Refine/	44.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.51
4889-11019 Reduce Uncertainty - Hydrochemical Flow	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.62
4889-11020 Conduct Regional SZ Flow Model Calibrat	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.48
4889-12013 Alluvial Testing Complex Using Nye Coun	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.94
8191213SU5 SZ Investigations - FY00	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.06
4889-12099 SZ Hydrologic Testing SD-6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.29
4889-12199 C-Well Demobilization	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.52
8191213SUX SZ Investigations - Deferred	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.80
GS2031 USGS - SZ Flow and Transport PMR -	138.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	138.50
1.2.21.3.S	138.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	138.50
4889-21371 Climate AMR	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.28
4889-21372 Infiltration AMR	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.86
4889-21373 Support to Geochemistry AMR	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.04
8191213UU1 UZ PMR Rev.0 for SRCR Anlys & Wrt	23.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.18
4889-21362 UZ Product Checking - FY00	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.67
8191213UU2 UZ Product Checking - FY00	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.67
4889-21360 UZ Data/Software Verification	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.00
4889-21363 UZ Data, Models, Software V/Q; PVAR -	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.84



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8191213UU3 UZ Data, Software V/Q; PVAR - FY0	16.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4889-21364 UZ M&I & Regulatory Support - FY00	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.85
8191213UU4 UZ M&I & Regulatory Support - FY00	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.43
4889-21301 EW Bulkhead & Alcove 7 Moisture Monito	34.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.43
4889-21302 Crossover Alcove (Seepage into Niche 3)	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.63
4889-21303 Crossover Alcove (Tracer Testing)	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.64
4889-21304 Complete ESF Niche Analysis	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.64
4889-21305 Complete Alcove 1 Analysis	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.83
4889-27009 Complete CL36 Validation Analysis	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.66
4889-62213 Complete Fracture Mineral Analysis	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.86
4889-62219 Complete Fluid Inclusions Analysis	20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.62
8191213UU5 UZ Investigations - FY00	100.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.89
4889-21365 Hydrologic Properties - Busted Butte Core	16.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.78
4889-21368 Busted Butte Mapping - USBR	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.95
8191213UU6 UZ Investigations - Busted Butte - FY	29.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.62
4889-21299 Geologic Framework	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.57
8191213UUX UZ Investigations - Deferred	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.20
GS2027 USGS - UZ Flow and Transport PMR -	184.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.20
1.2.21.3 U	184.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	184.67
1.2.21.3	517.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	184.67
4732-16300 Water Resources	16.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	517.91
81912152U1 Water Resources - FY00	16.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.80
4889-10715 Federal Occupational Health/Safety	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.80
81912152U2 Federal Occupational Safety & Health	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.55
4889-84001 Precipitation Gage Monitoring	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.55
81912152U3 Precipitation Gage Monitoring	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.69
4889-84709 Water Appropriation Hearings	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.69
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81912152U4 Support to Water Appropriation Heari	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
GS9121 USGS ES & H Core Program - SR	32.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.25
1.2.21.5.2	32.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.29
4889-10535 Technical Data Management	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.29
81912153U1 Technical Data Management - FY00	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.82
GS2470 Technical Data Management - SR	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.82
4889 10714 Records	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.82
81912153U2 Satellite Records Operations - FY00	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.00
GS9197 USGS Document Control, Records &	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.00
1.2.21.5.3	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.00
4889-10710 Project Management TPO	24.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.81
81912154U1 Project Management TPO - FY00	24.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.71
4889-10713 Project Control/Planning	40.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.71
81912154U2 Project Control/Planning - FY00	40.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.66
4889-11201 Regulatory Product Integrity (formerly EA)	27.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.66
81912154U3 Regulatory Product Integrity - FY00	27.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.20
GS9135 USGS Project Planning & Control - SR	92.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.20
1.2.21.5.4	92.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.56
4889-21501 Lithostratigraphy of Nye County Borehole	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.56
4889-21502 SZ Hydrochemistry of Nye County Borehol	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.19
4889-21504 Monitory UNLV 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	9.17
8191215TU1 Support to Nye County/Cooperative	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4889-23009 Shut Down Pneumatic Monitoring Borehol	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.36
8191215TU8 Shut Down Pneumatic Monitoring Bor	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.03
4889-21509 Long-Term PC Monitoring - FY00	30.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.03
8191215TU9 Long-Term PC Monitoring - SR - FY0	30.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.25
													30.25

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4889-21599 Water Level Monitoring	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.36
4889-62299 Paleodischarge at Nye County Sites	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
8191215TUX Testing and Analysis - Deferred	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
GS8621 USGS Test Coordination/Support for Si	91.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.36
1 2 21 5 T	91.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00
1 2 21 5	251.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.00
4889-10401 Support & Personnel Services	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	251.66
4889-10402 Procurement & Property Management	21.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.83
4889-10403 Facilities Management (Space)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.89
4889-10404 Facilities Management (Computers/Phone)	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
4889-10405 Facilities Management (Other)	51.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.68
4889-10406 Computer Support	28.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.80
81912161U1 Administration - FY00	130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.67
GS9110 USGS Administrative Support - SR	130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.86
4889-10711 Training	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.86
81912161U2 Training - FY00	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
GS9111 USGS Training Program - SR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
1 2 21.6.1	130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
1 2 21.6	130.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.86
1.2.21	930.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	130.86
													930.60

U S GEOLOGICAL SURVEY  
 ESTIMATED COSTS FOR October 1, 1999 - October 31, 1999  
 11/8/99 11 00 08 AM

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
1 2 OPERATING	930 6	00	00	00	00	00	00	00	00	00	00	00	930.60
CAPITAL EQUIPMENT	00	00	00	00	00	00	00	00	00	00	00	00	0.0
GRAND TOTAL	930 6	00	00	00	00	00	00	00	00	00	00	00	930.60
FTEs													930.60
FEDERAL	696	00	00	00	00	00	00	00	00	00	00	00	
CONTRACT	409	00	00	00	00	00	00	00	00	00	00	00	
TOTAL	1105	00	00	00	00	00	00	00	00	00	00	00	

YMP PLANNING AND CONTROL SYSTEM (PACS)

MONTHLY COST/FTE REPORT

Participant U.S. Geological Survey  
Date Prepared 11/10/99 08:04 AM

Fiscal Month/Year October 31, 1999  
Page 1 of 1

WBS ELEMENT	<u>CURRENT MONTH END</u>						<u>FISCAL YEAR</u>		
	ACTUAL COSTS	PARTICIPANT HOURS	SUBCONTRACT HOURS	PURCHASE COMMITMENTS	SUBCONTRACT COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMMULATIVE COSTS
1.2.21.2.2	30	494	0	0	0	0	590	0	30
1.2.21.3.2	6	120	0	0	0	0	100	0	6
1.2.21.3.D	38	579	181	0	140	0	335	0	38
1.2.21.3.E	21	138	451	0	238	0	517	0	21
1.2.21.3.I	121	948	1426	0	285	0	1267	0	121
1.2.21.3.N	9	208	0	0	0	0	130	0	9
1.2.21.3.S	139	2845	682	0	488	0	2040	0	139
1.2.21.3.U	185	2090	1172	0	820	0	2945	0	185
1.2.21.5.2	32	514	92	0	25	0	625	0	32
1.2.21.5.3	36	256	688	0	308	0	585	0	36
1.2.21.5.4	93	1522	154	0	120	0	1047	0	93
1.2.21.5.T	91	1353	562	0	280	0	1319	0	91
1.2.21.6.1	131	999	966	0	520	0	1946	0	131
	932	12066	6374	0	3224	0	13446	0	932