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October 28, 1992

INFORMATION ONLY

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SUBJECT: U.S. Geological Survey (USGS) Detailed Monthly Status Report for September, 1992

Dear Carl:

Enclosed is the USGS detailed monthly status report for September, 1992. If you have any questions or comments, please contact Raye Ritchey at 303-236-0517.

Sincerely,

John S. Stuckless

for

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Department of the Interior
United States Geological Survey
YUCCA MOUNTAIN PROJECT
Monthly Highlights and Status Report
SEPTEMBER 1992

DISCLAIMER

Quality Assurance checks on data contained in this report have been performed only to determine that the data have been obtained and documented properly. Any information is preliminary and subject to change as further analyses are performed. This report has not been reviewed for conformity with U.S. Geological Survey technical and editorial standards and stratigraphic nomenclature. Company names are for descriptive purposes only and do not constitute endorsement by the U.S. Geological Survey.

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ACRONYM LIST

A&E	architectural and engineering
ABC	American Borate Corporation
ACD	advanced conceptual design
ACM	alternative conceptual model
ACNW	Advisory Committee on Nuclear Waste
ACP	Area Characterization Plan
ACSR	Activity Control Specification Report
ACS	American Chemical Society
ACWP	actual cost of work performed
ADN	Affected Document Notice
ADP	automated data processing
ADTS	Automated Data Tracking System
AEC	Atomic Energy Commission
AECB	Atomic Energy Control Board
AECL	Atomic Energy of Canada, Ltd.
AEG	Association of Engineering Geologists
AFOS	Automated Field Operating System
AFR	Audit Finding Report
AGU	American Geophysical Union
AIH	American Institute of Hydrology
ALARA	as low as reasonably possible
ALTS	Apache Leap Tuff Site
AMA	Assistant Manager for Administration
AMFM	alternative means of financing and managing
AML	Arc Macro Language
AMP	Administrative Management Procedure
AMD	Administrative Management Section
ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSTO	Australian Nuclear Science and Technical Organization
AO	Administrative Officer
AP	Administrative Procedure
APQ	Administrative Procedure Quality
ARR	Area Recommendation Report
ARS	Automated Records System
ASA	American Statistical Association
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASR	Annual Status Report
ASTM	American Society for Testing and Materials
AT	acoustic televiewer
ATC	Asynchronous Terminal Concentrator
ATLAS	Alternatives to License Application Strategies
ATS	Activity Tracking System
AVL	Approved Vendors List
AVS	Application Visual System
BA	Biological Assessment

BAC	budgets at completion
BAMG	Branch of Atlantic Marine Geology
BBC	British Broadcasting Company
BBS	Bulletin Board System
BCWP	budgeted cost for work performed
BCWS	budgeted cost for work scheduled
BDR	Basic Data Recorder
BFD	Basis for Design
BG&H	Bond Gold and Hydrosearch
BGRA	Branch of Geologic Risk Assessment
BIG	Branch of Isotope Geology
BLM	Bureau of Land Management
BP	before present
BPA	blanket purchase agreement
BPO	blanket purchase order
BQA	Branch of Quality Assurance
BRC	below regulatory concern
BRG	Branch of Central Regional Geology
BSP	balanced cross section modeling program
BSR	Bi-annual Status Report
BWIP	Basalt Waste Isolation Project
C/SCR	Cost and Schedule Change Report
C&C	consultation and cooperation
CA	Construction Authorization
CADD	Computer-Aided Drafting and Design
CAE	Computer-Aided Engineering
CAM	Cost Account Manager
CAP	cost account plan
CAR	Corrective Action Report
CASY	Committee for the Advancement of Science in the YMP
CATS	Corrective Action Tracking System
CBI	Controlled Blasting Investigation
CCB	Change Control Board
CCC	Configuration Control Committee
CD	Consultative Draft
CDP	Career Document Profile
CDR	Conceptual Design for the Repository
CFR	Code of Federal Regulations
CFS	cubic feet per second
CGC	Center for Geoscience Computing
ChemTrec	Chemical Transportation Emergency Center
CHLW	commercial high-level waste
CIRF	Configuration Identification Request Form
CMR	Branch of Central Mineral Resources
COB	close of business
COCORP	Consortium for Continental Reflection Profiling
CODMU	Computer Operations and Data Management Unit
COGS	Computer-Oriented Geological Society
COSIM	conditional simulation
CPR	Cost Performance Report
CR	Central Region

CRF	Central Records Facility
CRF	Comment Response Form
CRG	Central Regional Geology
CRGB	Central Regional Geology Branch
CRW	comment resolution workshop
CSCS	Cost Schedule Control System
CSI	Campbell Scientific, Inc.
CSM	Colorado School of Mines
CVO	Cascade Volcanoes Observatory
CWP	Center for Wave Phenomena
CY	calendar year
D&E	development and evaluation
DAA	Design Acceptability Analysis
DAS	data acquisition system
DCP	data collection platform
DDP	Director's Decision Plan
DEC	Digital Equipment Corporation
DECUS	Digital Equipment Corp Users Group
DEIS	Draft Environmental Impact Statement
DFC	Denver Federal Center
DHLW	defense high-level waste
DISA	Downhole Instrument Station Apparatus
DMS	Desktop Mapping System
DOE	Department of Energy
DOE/HQ	Department of Energy Headquarters
DOE/NV	Department of Energy/Nevada Operations Office
DOE/NVO	Department of Energy/Nevada Operations Office
DOP	Department Operating Procedures
DOT	Department of Transportation
DR3M	Distributed Routing Rainfall-Runoff Model
DRC	Document and Records Center
DRI	Desert Research Institute
DRMS	Data Records Management System
DRS	document review sheet
DTN	document transmittal notice
DTP	Detailed Test Plan
DWMD	Defense Waste Management Department (REECo)
DWPF	Defense Waste Processing Facility
DVNM	Death Valley National Monument
EA	Environmental Assessment
EAC	estimate at completion
EAEG	European Association of Exploration Geophysicists
EBS	engineered barrier system
ECD	electron capture detector
ECR	Engineering Change Report
EDBH	engineered design borehole
EDF	Environmental Defense Fund
EDM	Equivalent Discontinuum Model
EDXRF	energy-dispersive x-ray fluorescence
EEI	Edison Electric Institute
EEP	Emergency Evaluation Plan
EFAP	Environmental Field Assessment Plan

EIA	Emergency Information Administration
EIS	Environmental Impact Statement
EKES	Electronic Keyed-Entry System
EM	electromagnetic
EMP	electron-microprobe
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ERC	Engineering Request Change
ERDA	Energy Research and Development Administration
EROS	Earth Resource Observatory System
ERTP	Environment Requirements Training Program
ES	exploratory shaft
ESF	Exploratory Studies Facility
ESF/DRD	Exploratory Shaft Facility Design Requirements Document
ESQAT	Earth Science Quality Assurance Team
ESR	electron spin resonance
ESSE	Early Site Suitability Evaluation
ESTC	Exploratory Shaft Test Coordination
ESTP	Exploratory Shaft Test Plan
ESTP-C	Exploratory Shaft Test Plan Committee
ET	evapotranspiration
EV	earned value
FEHMS	Finite Element Heat Mass and Stress
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FFS	Federal Financial System
FFS	Federal financial system
FFT	Fast-Fourier Transform
FID	Flame Ionization Detector
FIS	Federal interim storage
FITS	Facilities Important to Safety
FMMG	Fracture Matrix Mesh Generator
FMN	Fortymile neutron
FOLD	Federally Owned Landsat Data
FP	final procedures
FPC	final procurement and construction
FOI	Federal Quality Institute
FR	Federal Register
FRD	Functional Requirement Document
FRHP	Fractured Rock Hydrology Program
FSN	Fenix and Scisson, Nevada
FSU	Florida State University
FTE	full-time equivalent
FWP	field work proposal
FY	fiscal year
G&A	Goodson and Associates
GAO	Government Accounting Office
GAP	Geostatistical Analysis Package
GC	gas chromatograph
GCM	Global Climate Model
GCP	Geochronological Procedure
GD	Geologic Division

GEMLink	General Electric Microwave (communications) Link
GEOEAS	Geostatistical Environmental Software
GET	General Employee Training
GETT	grants equal to taxes
GID	Ground Water Site Investigation
GIS	Geologic Information System
GIS	Graphic Information System
GIT	Geochemistry Integration Team
GMP	Geologic Modeling Program
GMT	Greenwich Mean Time
GOCO	government-owned contractor-operated
GOES	Geostatistical Environmental Operational Satellite
GP	Geologic Procedure
GPO	Government Printing Office
GPP	Geophysical Procedure
GPR	ground-penetrating radar
GPS	global positioning satellite
GQA	Graded Quality Assurance
GRESS	Gradient Enhanced Software System
GSA	Geological Society of America
GSA	General Services Administration
GSIS	Geoscientific Information System
GSP	Geologic Studies Program
GTUF	G-Tunnel Underground Facility
GW	ground water
GWE	Gigawatts Electrical
GWTT	ground water travel time
GXP	Geochemical Procedure
H&N	Holmes and Narver
HIP	Hydrologic Investigations Program (formerly NHP)
HITF	Hydrology Integration Task Force
HLRW	high-level radioactive waste
HLW	high-level waste
HP	Hewlett Packard
HP	Hydrologic Procedure
HQ	Headquarters
HRF	Hydrologic Research Facility
HRMP	Hydrology and Radionuclide Migration Program
HRU	hydrologic-response unit
HSPF	Hydrological Simulation Program
IBM	International Business Machines
IC	ion chromatograph
ICE	Independent Cost Estimate
ICG	International Geologic Congress
ICIAM	International Conference on Industrial and Applied Mathematics
ICN	Interim Change Notice
ICWG	Interface Control Working Group
IDAS	Integrated Data Acquisition System
IDS	Information Data System
IFS	Iterated Function System
IG	Integration Group

IGIS	Interactive Graphics Information System
IGT	Institute of Gas Technology
IHLWM	International High Level Radioactive Waste Management
IMS	Information Management System
INEL	Idaho National Engineering Laboratory
INSTAAR	Institute of Arctic and Alpine Research
INTRAVAL	International Transport Code Validation
IPA	Intergovernmental Personnel Act
IR	infrared
IRG	Interagency Review Group
ISA	Instrument Society of America
ISD	Information Systems Division
ISM	Interactive Surface Modeling
ISO	International Standards Organization
ITR	Information Technology Resources
IVV	Independent Verification and Validation
JGR	<i>Journal of Geologic Research</i>
LA	license application
LACT	laser alignment and centering target
LAN	local area network
LANL	Los Alamos National Laboratory
LBL	Lawrence Berkeley Laboratories
LCS	Liquid Scintillation Counter
LDRP	litigation discovery request procedure
LDS	lightning detection system
LLNL	Lawrence Livermore National Laboratory
LLP	Lightning Location & Protection, Inc.
LLW	low-level waste
LOE	level of effort
LPRS	large plot rainfall simulator
LRC	Local Records Center
LRE	latest revised estimate
LRGS	Local Read-Out Ground Station
LRP	long-range planning
LRP/IPS	Long Range Plan/Integrated Project Schedule
LRS	Litton Resource System
LSC	liquid scintillation counter
LSP	laser safety plan
LSS	Licensing Support System
LWS	Lathrop Wells aeromagnetic survey
LV	Las Vegas
MAs	Management Agreements
MADS	Meteorological Alert Distribution System
MCL	Maximum Contaminant Level
MEDA	Meteorological Data Acquisition Network
MFC	mass flow controller
MGDS	Mined Geologic Disposal System
MIC	Management Information Center
MISIS	Micro Integrated Storm Information System
MLT	materials testing laboratory
MMDS	Martin Marietta Data Systems

MOA	Memorandum of Agreement
MODFE	Modular Finite Element
MOT	Management Overview Team
MOU	Memorandum of Understanding
MPBA	multipurpose borehole activity
MPBH	multipurpose borehole
MPM	Management Procedure Manual
MPU	Manuscript Prep Unit
MRIR	Material Receiving and Inspection Report
MRS	monitored retrievable storage
MSA	major system acquisition
MSHA	Mine Safety and Health Administration
MSIS	Management System Information Strategy
MSL	mean sea level
MSS	Multispectral Scanner
MT	magneto-telluric
M&TE	measuring and test equipment
MTL	main testing level
MTU	metric tons of uranium
MW	mixed waste
NARUC	National Association of Regulatory Utility Commissioners
NBMG	Nevada Bureau of Mines and Geology
NBS	National Bureau of Standards (now NIST)
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center
NCR	Nonconformance Report
NCTM	National Computer Technology Meeting
NEA	Nuclear Energy Agency
NEPA	National Environmental Policy Act
NFS	Nuclear Fuel Services
NGS	National Geodetic Survey
NHP	Nuclear Hydrology Program (now HIP)
NIST	National Institute of Standards and Technology
NLT	no later than
NMD	National Mapping Division
NMIMT	New Mexico Institute of Mining and Technology
NNWSI	Nevada Nuclear Waste Storage Investigation
NOAA	National Oceanic and Atmospheric Administration
NOO	Nevada Operations Office
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRP	National Research Program
NSTF	near-surface test facility
NTC	National Training Center
NTS	Nevada Test Site
NTSO	Nevada Test Site Office
NVO	Nevada Operations Office
NWF	Nuclear Waste Fund
NWIS	Nevada Water Information System
NWIS	National Water Information System
NWM	Nuclear Waste Management

NWN	Nuclear Waste News
NWPA	Nuclear Waste Policy Act
NWPO	Nuclear Waste Projects Office
NWQL	National Water Quality Laboratory
NWTRB	Nuclear Waste Technical Review Board
OBS	organization breakdown structure
OCRWM	Office of Civilian Radioactive Waste Management
OEVE	Office of Earthquakes, Volcanoes and Engineering
OF	Open file
OFR	open-file report
OGR	Office of Geologic Repositories
OMB	Office of Management and Budget
OMR	Office of Mineral Resources
OPCNM	Organ Pipe Cactus National Monument
OPFM	Office of Project and Facilities Management
OPIO	Office of Policy, Integration, and Outreach
ORM	Office of Resource Management
ORNL	Oak Ridge National Laboratory
OSTS	Office of Storage and Transportation Systems
OWQSU	Ocala Water Quality Services Unit
P&S	planning and scheduling
PA	performance assessment
PAC	planning and control
PACE	Performance Assessment Calculation Exercise
PACS	Planning and Control System
PAGEOPH	<i>Pure and Applied Geophysics</i>
PAGIS	Performance Assessment of Geological Isolation Systems
PAL	Project Acronym List
PAMP	Performance Assessment Management Plan
PAP	Performance Assessment Plan
PASP	Performance Assessment Strategy Plan
PBEI	prototype blast effects on instrumentation
PBQ&D	Parson, Brinkerhoff, Quade, and Douglas
PBS	pyramid beam splitter
PC	personal computer
PCBI	Prototype Controlled Blasting Investigation
PCCB	Program Change Control Board
PCM	pivoting camera mount
PCSB	Program Cost and Schedule Baseline
PC&TS	Program Coordination and Technical Support
PD	Position Description
PDA	Participant Data Archives
PDCR	prototype dry coring of rubble
PDHI	prototype drill hole instrumentation
PDM	Problem Definition Memorandum
PDS	Project Decisions Schedule
PEET	prototype excavation effects test
PI	Principal Investigator
PIP	Prototype Investigation Plan
PIR	Precision Infrared Radiometer
PL	Public Law

PMB	Performance Measurement Baseline
PMF	probable maximum flood
PMI	Phase Measuring Interferometry
PMIS	Program Management Information System
PMP	Program Management Plan
PMR	performance measurement review
PMS	Program Management System
PNL	Pacific Northwest Laboratories
PPWE	prototype pore-water extraction
PQM	Project Quality Management
PRBP	project review briefing package
PRC	Project Records Center
PRDA	Program Research and Development Announcement
PRESS	Project-related Engineering and Scientific Studies
PRMS	Precipitation Runoff Modeling System
PSAR	Preliminary Safety Analysis Report
PSI	pounds per square inch
PTP	Prototype Test Plan
PTS	Petroleum Testing Services
QA/OC	quality assurance/quality control
QA	Quality Assurance
QAG	Quality Assurance Grading
QAGR	Quality Assurance Grading Report
QALA	Quality Assurance Level Assignment
QALAS	Quality Assurance Level Assignment Sheet
QAM	Quality Assurance Manager
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
QAPO	Quality Assurance Project Officer
QAPP	Quality Assurance Program Plan
QAR	Quality Assignment Records
QARD	Quality Assurance Requirements Document
QASC	Quality Assurance Support Contractor
QMP	Quality Management Procedure
QMPR	Quality Management Policies and Requirements
ORA	Quality Related Activities
ORB	Quality Review Board
QVC	Quality Verification Check
OWL	quality of work life
R&D	research and development
R&H	receiving and handling
R&LSD	Research and Laboratory Services Division
RALD	right angle laser deflectometer
RAM	responsibility assignment matrix
RASA	Regional Aquifer Study Assessment
RASRA	radial arm strike rail assembly
RCR	Regional Characterization Report
RCRA	Resource Conservation and Recovery Act
REBS	Radiation Energy Balance Systems
REECo	Reynolds Engineering and Electrical Company
RFP	Request for Proposal
RGEG	Research Grade Evaluation Guide

RIB	Reference Information Base
RIDS	Record and Information Disposition Schedule
RIS	Records Information System
RMF	Records Management Facility
RMNMD	Rocky Mountain National Mapping Division
RMP	Records Management Plan
RMS	Records Management System
ROD	Record of Decision
RPC	Report Package Collection
RQPG	right angle prism goniometer
RRL	reference repository location
RSED	Regulatory and Site Evaluation Division
RSN	Raytheon Services Nevada
RTISA	request to initiate site activity
RW	radioactive waste
RWMNFC	Radioactive Waste Management and the Nuclear Fuel Cycle
RWMS	Radioactive Waste Management Site
s-p	surface-propagated
SA	study activities
SAG	Software Advisory Group
SAGEEP	Symposium on the Application of Geophysics to Engineering and Environmental Problems
SAIC	Science Applications International Corporation
SAR	Safety Analysis Report
SAS	Statistical Analysis System
SBTFRD	Surface-Based Test Facility Requirements Document
SBTP	Surface-Based Test Prioritization
SCA	Site Characterization Analysis
SCC	substantially complete containment
SCI	Software Configuration Items
SCIF	software checklist and indexing form
SCM	Software Configuration Management System
SCP	Site Characterization Plan
SCPB	Site Characterization Program Baseline
SDR	Standard Deficiency Report
SDRD	Subsystems Design Requirement Document
SE	Senior Engineer
SE&D	Systems Engineering and Development
SEG	Society of Exploration Geophysicists
SEM	scanning electron microscopy
SEMP	System Engineering Management Plan
SEPDB	Site and Engineering Properties Data Base
SES	Scientific and Engineering Software
SF	spent fuel
SG	Senior Geologist
SGB	Southern Great Basin
SGBSN	Southern Great Basin Seismic Network
SGR	Seismic Group Recorders
SIP	Scientific Investigation Plan
SIR	Scientific Investigations and Research
SIR	Special Investigative Review
SIT	Site Integration Team

SKB	Swedish Nuclear Fuel and Waste Management Company
SMF	Sample Management Facility
SMS	Sample Management System
SNF	spent nuclear fuel
SNL	Sandia National Laboratories
SNP	Scientific Notebook Plan
SNSN	Southern Nevada Seismic Network
SOBART	Southern Basin and Range Transects
SOC	Sample Overview Committee
SOIR	status of open items report
SOP	Standard Operating Procedure
SP	Seismic Procedure
SP	Study Plan
SPA	Study Plan Assessment
SPE	Society of Petroleum Engineers
SPOC	submersible pressurized outflow cell
SPR	Semi-annual Progress Report
SPR	Software Problem Report
SPRS	small plot rainfall simulator
SQA	Software Quality Assurance
SOAP	Software Quality Assurance Plan
SRD	system requirements and description
SRG	strike rail goniometer
SRM	standard reference material
SRP	Site Recommendation Report
SSF	software summary forms
SSF	specified software forms
SSR	Site Selection Report
SSSA	Soil Science Society of America
STC	Southern Tracer Complex
SWO	stop-work order
SZ	saturated zone
T&MSS	Technical and Management Support Services
T&MSS SP	T&MSS Standard Practice Procedure
TAR	Technical Assessment Review
TBD	to be determined
TBM	Tunnel Boring Method
TC	Technical Contact
TC	Training Coordinator
TCD	thermal conductivity detector
TCP	telescoping camera pedestal
TCPAL	Thermocouple Psychrometer Calibration
TDAG	Technical Data Advisory Group
TDB	Technical Data Base
TDD	Test Descriptions Document
TDF	task definition form
TDIF	Technical Data Information Form
TDR	time domain reflectometry
TDS	total dissolved solids
TEF	Test and Evaluation Facility
TESS	TRW Environmental Safety Systems
TFA	Temporary Field Assistant

TIC	Technical Information Center
TM	thematic mapper
TP	Technical Procedure
TPEC	Technical Proposal Evaluation Committee
TPO	Technical Project Officer
TPP/JPP	Test Planning Package/Job Planning Package
TPT	Testing Prioritization Task
TQM	Total Quality Management
TRIG	Technical Review and Integration Group
TRIMS	Technical and Regulatory Information Management System
TRU	Transuranic
TSR	Technical Status Report
TVA	Tennessee Valley Authority
UARW	Upper Amargosa River Watershed
UNE	Underground Nuclear Explosion
UNLV	University of Nevada at Las Vegas
UNR	University of Nevada, Reno
UNRSL	University of Nevada Reno Seismic Laboratory
UPS	Uninterrupted Power Supply
URL	underground research laboratory
USBLM	U.S. Bureau of Land Management
USBR	U.S. Department of the Interior Bureau of Reclamation
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USNSN	U.S. National Seismic Network
UTM	Universal Trans Mercator
UZ	unsaturated zone
UZFRHP	Unsaturated Zone Fractured Rock Hydrology Project
UZIG	Unsaturated Zone Interest Group
UZSBP	Unsaturated Zone Surface-Based Borehole Project
VAR	Variance Analysis Report
VARS	Video Archival Retrieval System
VLF	very low frequency
VOC	Validation Oversight Committee
VOG	Validation Oversight Group
VSP	vertical seismic profiling
WA	Western Atlas
WAC	Waste Acceptance Criteria
WAS	Work Authorization Submission
WAS/FWP	Work Authorization System/Field Work Proposal
WBS	work breakdown structure
WIPP	Waste Isolation Pilot Plant
WIT	Working Integration Team
WMNFC	Waste Management and Nuclear Fuel Cycle
WMSD	Waste Management Systems Description
WNRE	Whiteshell Nuclear Research Establishment
WORM	Write Once Read Many
WP	waste package
WP	Weapons Program

WPDRD	Waste Package Design Requirements Document
WRCC	Western Region Climate Center
WRD	Water Resources Division
WRG	Western Region Geology
WRI	Water Resources Investigations
WRIR	Water Resources Investigations Report
WRR	Water Resources Research
WSA	Wilderness Study Area
WSNSO	Weather Service Nuclear Support Office
WSP	Water Supply Paper
WT	water table
WVDP	West Valley Demonstration Project
WY	water year
XRD	x-ray defraction
XRF	x-ray fluorescence
YM	Yucca Mountain
YMP	Yucca Mountain Project
YMPB	Yucca Mountain Project Branch
YMPO	Yucca Mountain Project Office

1.2.1 SYSTEMS

OBJECTIVE

To integrate systems with the Geologic Repository Program and to describe the YMP Mined Geologic Disposal System (MGDS); and to evaluate the performance of the natural, engineered barrier, and total systems for meeting regulatory standards.

WBS 1.2.1.1 Management and Integration

Principal Investigator - L. Hayes

OBJECTIVE

To manage and integrate work performed within the systems WBS elements.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.1.2 Systems Engineering

OBJECTIVE

To develop and implement a Systems Engineering Management Plan that will provide DOE/NV with a means of integrating and documenting the technical development of the waste management system requirements; and to ensure that systems engineering techniques are consistently applied during the various phases of the Yucca Mountain Mined Geologic Disposal System life cycle.

WBS 1.2.1.2.4 Systems Engineering Implementation

Principal Investigator - L. Hayes

OBJECTIVE

To provide for the integration of Project technical activities in order to move toward an efficient Mined Geologic Disposal System for the Yucca Mountain site that meets DOE and regulatory requirements.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.1.2.5 Configuration Management and Plans and Procedures Control

Principal Investigator - L. Hayes

OBJECTIVE

To determine and control Project baselines, management plans, and procedures, ensuring and documenting the Project management system and processes, and the physical and functional characteristics of configuration items and associated process documents.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.1.2.6 Yucca Mountain Site Characterization Project (YMP) support to the Management Systems Improvement Strategy (MSIS)

Principal Investigator - L. Hayes

OBJECTIVE

To manage the YMP resources and perform work in support of the MSIS being conducted by the Office of Civilian Radioactive Waste Management (OCRWM).

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.1.3 Technical Data Base Management

OBJECTIVE

To manage, maintain, and accumulate technical data and information produced by site characterization, design development, and performance assessment activities for the Project.

WBS 1.2.1.3.5 Technical Data Base Input

Principal Investigator - L. Hayes

OBJECTIVE

To provide the hardware, software, personnel, and procedures needed to provide data to the technical base.

ACTIVITIES AND ACCOMPLISHMENTS

Twenty-seven data submittals were received in the PDA.

A memo was sent out to give guidance in completion of TDIFs and data record package tables of contents.

Plans are being made for tracking data submittal schedules and other procedures to be added to the duties of the technical data office.

WBS 1.2.1.4 Performance Assessment

OBJECTIVE

To conduct investigations and develop mathematical models examining the performance of the MGDS in the preclosure and postclosure phases; to verify, validate, benchmark, and document codes for assessing the performance of the overall waste isolation system; and to analyze the performance of the total system and subsystems.

WBS 1.2.1.4.4 Site Performance Assessment

OBJECTIVE

To integrate physical process submodels and data into computational models for prediction of performance of the site (including uncertainties); and assess whether the site will meet requirements for ground-water travel time in 10 CFR 60.113(a) (2). (SCP Sections 8.2.2 and 8.3.5)

WBS 1.2.1.4.4.2 Favorable and Adverse Conditions

Principal Investigator - A. Flint

OBJECTIVE

To assess site performance characteristics under the favorable and adverse conditions listed in 10 CFR 60.122; and assess engineered barrier system (EBS) performance characteristics under the potentially adverse conditions in 10 CFR 60.122, which refers to impacts on EBS performance. (SCP Section 8.3.5.17)

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPA007 Sensitivity analysis model mesh size to 1-dimensional infiltration.

This work is complete for FY92. The conclusions will be presented in a report. In general, the mesh needs to correctly account for the heterogeneous nature of the soil. Any distinctly soil layers, i.e. caliche, must be added to the mesh even if the thickness is a few inches. This makes the modeling of Yucca Mountain dependent on correctly incorporating large contrasts in soil or rock properties, which becomes critical if meshes need to average 10 thick block of rock or soil.

3GPA003 Imbibition experiment for input to analysis solution

The imbibition experiments are complete for FY92. The data has been sent to LBL for incorporation into the new numerical formulation for relative permeability and water characteristic functions. Analysis also will include the application of the Van Genuchten and Brooks and Corey functions.

WBS 1.2.1.4.6 Development and Validation of Flow and Transport Models

Principal Investigator - A. Flint

OBJECTIVE

To develop and validate the calculational models that (1) are used primarily in assessments of performance for the resolution of Issues 1.1, 1.2, 1.3, 1.6, 1.8, and 1.9; (2) describe fluid flow or the transport of energy/or radionuclides; and (3) are not used exclusively in the resolution of a single issue; and to follow applicable quality-assurance procedures.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GVF002 Heating experiment lab analyses

The preliminary heating experiment is complete. A paper was submitted to the International High Level Waste Symposium. In general, it has been determined that increased temperature permanently alters (increases) the permeability of both the welded Topopah Spring and the nonwelded Calico Hills. The porosity and bulk density also change but recover upon rewetting. There is a large increase in fractures in the nonwelded tuff, which may be of some concern for water and air flow. A more indepth study planned for FY93 to further explore other affected units and well as look at water characteristic functions.

3GVF006 Develop software preliminary analysis thermal conduct heat cap

The development is complete. Several different rock types were tested and appear to work well. The analysis of thermal conductivity and heat capacity as a regular measurement in the matrix properties laboratory will be added. The data collected is needed for unsaturated flow water where non-isothermal conditions exist.

3GVF015 Finalize geostatistical software and text

The text is complete and was submitted for technical review. The software also is complete and in the Beta mode.

WBS 1.2.1.4.7 Supporting Calculations for Postclosure Performance Analyses

Principal Investigator - A. Flint

OBJECTIVE

To provide documentation and results of calculations used in analyses of postclosure performance that support design efforts, contribute to the resolution of Issue 1.3, and indirectly support activities carried out under other performance assessment WBS elements.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPC002 Develop method to determine moisture retention-CX-2

This work is complete. A paper has been submitted to AGU for the upcoming meetings in San Francisco. A paper will be submitted to the Soil Science Society of America Journal after the presentation at AGU. The technique works well but has a standard error of 0.2 MPa. This is not a problem over most of the range of a water characteristic curve, but makes estimations at the wet end uncertain, but no less certain than applying van Genuchten for determining relative permeability. There is, however, more data available over a wider range than was available before which may make errors at the wet end inconsequential.

1.2.3 SITE

OBJECTIVE

To characterize Yucca Mountain and vicinity to identify and technically qualify a possible site for the construction and operation of a mined geologic repository for high-level radioactive waste.

WBS 1.2.3.1 Management and Integration

Principal Investigator - L. Hayes

OBJECTIVE

To manage and integrate the work performed within the site WBS elements.

M&I - Geologic Studies Program 0G3192G1

Summary Account Manager - J. Stuckless

ACTIVITIES AND ACCOMPLISHMENTS

J. Stuckless continued work on Trench 14 issue resolution with H. Mooney (SAIC) and D. Vaniman (LANL). Stuckless spent several days preparing a sole source justification for a contract with UNRSL to run the seismic net at NTS. Stuckless participated as a bus leader for an open house at Yucca Mountain.

M&I OA Implementation GSP 0G3192G2

Summary Account Manager - J. Stuckless

ACTIVITIES AND ACCOMPLISHMENTS

The following technical procedures or scientific notebooks were formatted or revised and returned to HIP or GSP.

HP-241T, R0	Air Permeability Testing
HP-246, R0	Mapping Fractures on Outcrops for Hydrologic Studies
HP-250, R0	Intact Fracture Sampling Radio Sampling
HP-252, R0	Method for Sealing core Samples During Drilling at Unsaturated Zone Boreholes

The Technical Procedure Status List was updated and forwarded to the YMP-USGS QA Office. Submittal of all completed record packages to the LRC is current.

Limited assistance was provided to the Chief, GSP during the accumulation and summarization of data related to the technical evaluation of calcite-silica data. The technical evaluation will follow the AP-5.9Q process to qualify data supporting the origin of calcite-silica deposits that will become an integral part of the technical basis for the eventual DOE topical report.

Coordination continued for orientation, training, document control, and personnel qualifications for new GSP personnel. Follow-up and tracking overdue DTNs and instruction assignments for the GSP continued.

Monitored and/or provided input to the following open items: YM-CAR-92-063, CAR-91-01, CAR-91-03, CAR-91-05, CAR-91-07, CAR-92-05, CAR-92-07, CAR-92-09, NCR-90-37, NCR-91-26, NCR-91-31, NCR-92-02, NCR-92-06, NCR-92-19, NCR-92-26, NCR-92-33, NCR-92-36, and NCR-92-38.

Monitoring and assistance with the transition of the Southern Great Basin Seismic Network from BGRA to UNRSL continued.

A prerequisite review and TPP input for Study 8.3.1.17.4.3 was coordinated.

Implementation support and instruction for studies 8.3.1.4.2.1.2, 8.3.1.17.4.1, and 8.3.1.8.5.2 was provided in Menlo Park, CA.

A review of GSP FY92 studies was conducted to determine if QMP-3.10 verification activities were necessary or if waivers were appropriate. Six waivers were requested and approved.

Audit preparation began for the upcoming DOE Audit 93-01. Numerous TDIFs were prepared and reports reviewed for the GSP. ACRSs were initiated for several studies.

C. Menges was assisted with trench wall mapping at the NTS from September 11, 1991 through September 14, 1992. Changes in flagging coloration were logged on the trench wall map. Previously measured contact points were verified and corrected on the maps as necessary. Fault plane strike and dips were measured and recorded. Preliminary trench wall maps were completed for trenches 14c and 14d.

The response for USGS-NCR-92-38 (purchase of equipment without MOA authorization) has been prepared. As part of the closeout verification of NCR-91-31 (QA Balance, Inc.) an Isotope Geology analytical balance showing an out-of-tolerance follow-up calibration is being investigated.

ACRSs (QMP-3.15) were prepared and submitted for SCP activities under Study Plans 8.3.1.4.2.2 (acts. 3 and 5), 8.3.1.5.1.3 (acts. 1, 2, and 3), and 8.3.1.17.4.3 (acts. 3, 4, and 5). The activities involved were not covered previously under AP-5.28 QA Grading Reports.

Procurement records packages were prepared and submitted to the LRC for two BGRA equipment calibration procurements, PO#s 150048-92 and 150050-92.

M&I - Hydrology Program Management and Administration OG3192H1

Summary Account Manager - D. Gillies

ACTIVITIES AND ACCOMPLISHMENTS

All 58 USGS and LBL summary-account schedules were statused as of the end of August using schedule-status, progress, and variance information provided by each summary-account manager. Several summary-account-level variances were reduced by terminating activities that were replanned in FY93 as part of the Mission Plan 2001 initiative.

Hydrology-program management staff contributed to several discussions with USGS project-control and TPO staff regarding the strategy and methodology for simplifying USGS PACS schedules for FY93/94. The establishment of level-of-effort summary accounts within each P&S account was discussed also. Both of these measures, if implemented, have the potential for ensuring that any future schedule variances will be more realistic and defensible.

Hydrology-program management staff assisted the USGS TPO with preparation of a document that outlines to DOE-YMP the rationale, budget, and workscope for a YMP site-characterization program that is balanced with respect to both surface-based and ESF studies. The program is designed to address critical site-suitability issues as early as possible, with emphasis on collecting site data to attain closure on possible site-disqualifying and qualifying conditions on a priority basis. While still scientifically defensible, total budget for the revised USGS program is about 20 percent lower than that of the Mission Plan 2001 program.

M&I QA Implementation, Hydrology OG3192H2

Summary Account Manager - W. Causseaux

ACTIVITIES AND ACCOMPLISHMENTS

Technical Procedure Status

HIP is currently processing 36 Hydrologic Procedures and Scientific Notebook Plans.

Eight approved Technical Procedure packages were submitted to the QA office.

S. Boucher reviewed the draft of HP-246, R0 for "QA completeness" prior to its submittal to the QA office for review.

J. Woolverton, with major contributions by Dr. Herbert Haas from the Radiocarbon Laboratory at Southern Methodist University, prepared a preliminary draft of a Technical Procedure to collect CO₂ samples for carbon isotope and CO₂ analysis.

G. Abend reviewed major comments produced during the review cycle of HP-243, R0 entitled "Method for measuring the volume and particle density of rock and soil samples using the micromeritics accupyc 1330 pycnometer".

Quality Management Procedures

S. Boucher performed an informal review of the new draft of AP-5.1Q.

Open Items Status

S. Boucher wrote the accepted disposition to NCR-92-37 and initiated NCR 92-39.

M. Pabst assisted the UZ section hydrochemistry staff, and associated vendors, to prepare responses for the following NCRs - 1. NCR-92-33 - documents that Certified Balance Services, Inc., documents calibration calculations using a "count" point system without an explanation of what the "count" point represents on the certificates. 2. NCR-92-34 - documents the failure to provide gas analysis records (work-sheets) in accordance with purchase orders, and a failure of the vendor to deep up to date on NIST traceability for weight set certifications.

Open Items Status (CONTINUED)

3. NCR-92-35 - documents a failure by Scott Specialty Gases, Inc., to only process purchase orders for "approved" gas standards and a failure of UZ hydrochemistry project to fully understand QMP-4.01 requirement.

G. Abend compiled and submitted a list of procurements affected by deficiency document CAR-YM-92-060 to the YMP-USGS QA office. The CAR documents a failure to include post installation test requirements in procurement documents.

G. Abend and J. Woolverton coordinated efforts with M. Mustard (YMP-USGS QA office) to determine the best approach to resolve USGS-NCR-92-30, which documents a failure to process a publication without the required reviews and approvals.

J. Woolverton, E. Weeks, and M. Chornack continued technical assessments of UZ 6s surface flow data to determine whether the data can be qualified for use in site characterization, in an attempt to resolve a portion of USGS-CAR-92-04.

G. Abend continued actions required to resolve AFR USGS-9204-04. The deficiency relates to a failure to submit data in accordance with AP-5.1Q. Abend's work includes assistance in compiling and submitting the data to the PDA and documenting the actions using TDIFs.

M. Pabst assisted the YMP-USGS software QA Specialist in compiling records and magnetic media for the software program "Hytec", as part of the resolution for USGS-CAR-91-09.

G. Severson and J. Woolverton provided additional information and investigative actions related to processing of other publications under activity 8.3.1.2.2.4.1 (Intact Fracture Testing) without required reviews and approvals as requested by the YMP-USGS QA office for USGS-NCR-92-32. A determination was made that USGS-NCR-92-32 documents a single occurrence of reports processed without required reviews and approvals under activity 8.3.1.2.2.4.1.

J. Woolverton and M. Pabst assisted Dr. C. Threlkeld (USGS Branch of Petroleum Geology's Organic Geochemistry laboratory manager) in preparing a response for AFR USGS-9209-01, which documents the lack of a laboratory QA manual as specified in the memorandum of agreement between HIP-YMPB, and the Organic Geochemistry laboratory.

W. Causseaux worked with B. Milam of Licor, Inc during September to assist the vendor in the resolution of document deficiencies identified in NCR-92-23.

Audit Status

A surveillance, YMP-SR-92-026, was conducted at the HRF by SAIC, Las Vegas. The surveillance addresses QA requirements as specified in document control administrative procedures.

General

S. Frans monitored completion of QA reading assignments for the HIP/YMPB project.

S. Frans initiated training matrix's to HIP supervisor's for GET, QMP-3.03, R3, and QMP-17.01, R5.

S. Frans prepared, and distributed Technical Procedure Guidelines to HIP/YMPB Principal Investigators.

General (CONTINUED)

S. Boucher reviewed a draft report by S. Keller for QA-compliance, and gave the results of the review to M. Ciesnik for investigation and resolution.

S. Boucher returned barometer no. 22353 to YSI for recalibration/ repair under warranty.

S. Boucher initiated a ACSR for software and model development being conducted under Activities 8.3.1.2.3.1.2 and 8.3.1.2.3.1.3. The ACSR was reviewed by C. Peters, and submitted to the GAC for review and approval.

M. Ciesnik responded to the Technical Controls Reviews of the YMP-USGS ACSR for activity 8.3.1.5.2.1.4b. Submitted the revised ACSR to the GAC.

J. Watson began work on two ACSRs, one for activity 8.3.1.2.1.4, and one for activity 8.3.1.5.2.2. The ACSR for activity 8.3.1.2.1.4 was given to Charlie Peters for review.

T. Oliver submitted calibration forms for activity 8.3.1.5.2.1.4.

M. Pabst prepared an ACSR in accordance with QMP-3.15, R0 for SCP activity 8.3.1.2.2.1.2 entitled "Characterization of runoff and streamflow". The grading QA package defines QA controls for a backup data collections system and alert system.

C. Peters and J. Woolverton attended the YMPB CCC meeting on September 3, 1992 to determine additional required actions to qualify the geochemical model Phreeqe, 1990, Rev. 4, in accordance with QMP-3.03, R3. At the meeting, a determination was made that the magnetic media for the software package as developed for the AMDAHL would be required to complete the SQA records package.

J. Watson held discussions with J. Czarnecki and J. Downey concerning the grading of activity 8.3.1.2.1.4 via an ACSR per QMP-3.15.

J. Watson met with J. Downey to obtain the necessary software documentation for the "Chloride" software. Documentation for the program is forthcoming.

J. Watson and S. Keller discussed the pertinence and connections between study plans and the required grading of activities. Both thought it unusual that there exists the same general "boiler plate" of QA criteria within each individual study plan, realizing that each study plan may have different QA criteria relevancy. Keller intends to discuss the issue with W. Causseaux.

M. Pabst and J. Ferarese met with Mr. Chris Sharp at Scott Specialty Gases to discuss USGS-NCR-92-34, which documents the failure to provide gas analysis records (worksheets) in accordance with purchase orders, and a failure of the vendor to keep up to date on NIST traceability for weight set certifications.

M. Pabst and W. Rodman (YMP-USGS QA Office) met with Mr. C. Hunsberger at Certified Balance Service (CBS) to discuss Calibration Forms and Calibration Certificates generated by his company. This will help resolve USGS-NCR-92-33, which documents problems with calibration certificates.

M. Pabst and J. Rousseau met with Dr. Al Balch (Colorado School of Mines) to discuss existing software QA documentation that supports vertical seismic profiling (VSP).

General (CONTINUED)

M. Chornack, R. Whitfield, W. Causseaux, and J. Woolverton met with L. Anna, E. Kwicklis, F. Thamir, G. Serverson, and C. Peters on September 1, 1992 to discuss preliminary plans to redraft all component activities for study 8.3.1.2.2.4 entitled "Characterization of percolation in the unsaturated zone exploratory studies facility."

J. Woolverton met with Dr. Herbert Haas, Southern Methodist University to attain information needed to prepare a technical procedure for field sampling methods to collect CO₂ for carbon isotopic analysis. Additionally, Jon previewed laboratory methods to convert CO₂ into benzene for C¹⁴ analysis, prior to the upcoming vendor qualification effort.

Records Management

S. Boucher assisted with the assembly of an earthquake-data package to be sent to YMPO and submitted a data package for OFR-92-137.

M. Ciesnik performed a review of Activity 8.3.1.2.1.3.2 for overall compliance with criteria 8 of the QA program. As part of this effort, all required TDIFs were submitted to the QAO for data generated to date.

M. Ciesnik submitted TDIFs for fracture orientation and geometry data for Activity 8.3.1.2.3.3.2.

J. Watson submitted a TDIF and accompanying data to the PDA. The data were the Branch of Geochemistry lab results for unconsolidated sediment samples collected October 17, 1991 to October 26, 1992, by E. Gutentag et al.

M. Pabst assisted the UZ hydrochemistry staff, the YMP-USGS software QA specialist, and the YMPB-USGS software configuration management system coordinator, in preparing and submitting surrogate records forms and magnetic media for the software program Hytec to the USGS LRC.

J. LaMonaca submitted five HIP report packages, two GSP report packages, and two abstract packages to the LRC.

Computer Operation & Data Management, Hydrology OG3192H3

Summary Account Manager - C. Washington

ACTIVITIES AND ACCOMPLISHMENTS

Novell System

The DaVinci E-mail upgrade package has been received and will be installed the week of October 5. The upgrade will provide a spell checker, conversation searching, allows users to attach any number of files of every type - spreadsheets, graphics, documents, etc. and other features.

The disk sub-system has not been received, but reconfiguring the Novell Server is still planned for October.

Unix System

The replacement SUN disk drive was received and installed. This enabled us to continue migrating users from the Prime to the SUN.

ARC 6.1 has been installed on the SUN, and the digitizer located in room H-2330 has been connected to the SUN.

Prime

In preparation for DIS-II, 2 of our older 600MB drives will be taken offline during the week of October 5, 1992. The users who reside on these disks will be given a limited amount of storage on the Prime in order to run prime exclusive programs. The majority of their data files will reside on the SUN.

Area 25 (HRF & FOC)

The Computer Operations Unit (COU) delivered, assembled, tested and verified connections of 16 PCs at the HRF. We also setup the PCs to be routed by SAIC-LV. SAIC-LV is currently having problems routing the PCs, but have assured us it will be accomplished.

The COU met with SAIC-LV to solve the problems of networking the FOC. To accomplish this task in the near future, the COU will provide the concentrators and ethernet cards to network the building. SAIC-LV will furnish and maintain the connection to their routers. SAIC-LV and the COU will coordinate and perform this task in November.

USGS Las Vegas Office

SAIC-LV has agreed to wire the Las Vegas offices to a central location and provide a backbone tap to the same. The COU will provide the concentrator, ethernet cards and connect the PCs. This has been scheduled for November.

Miscellaneous

C. Washington attended the Information Resources Management Council Meeting and Training for the Long-Range Planning Interim Call for Fiscal Year 1995-1999.

Scientific Reports and Project Documents, Hydrology OG3192H4

Summary Account Manager - T. Brady

ACTIVITIES AND ACCOMPLISHMENTS

Scientific Reports Processing

HIP is currently processing 93 YMP-HIP scientific publications, 65 YMP-GSP scientific publications, 12 YMP-LBL scientific publications, and 30 abstracts.

HIP review of the following abstracts and reports was completed by T. Brady:

"Hydrology related to underground nuclear explosions" by W. Dudley Jr.

"A regional relationship between effective moisture, lake chemistry, and ostracodes" by A. Smith, and R. Forester.

"Wisconsinan and Sangamonian climate interpreted from fossil ostracodes and vegetation in south-central Illinois", by B. Curry, R. Forester, Hong Zhu, and R. Baker.

"Characterizing Yucca Mountain, Nevada, by geophysical methods", by H. Oliver, and W. Mooney.

"Rapid determination of moisture retention curves using a chilled-mirror psychrometer", by L.E. Flint, M. Nash, and A. Flint.

"Revised preliminary potentiometric surface map, Yucca Mountain and vicinity, Nevada", by E. Ervin, R. Luckey, and D. Burkhardt.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

"Seismic cross-borehole imaging of the near-surface using tomography and prestack migration in elastic physical models", by A. Balch, H. Chang, G. Hofland, K. Ranzinger, and W. Schneider.

"Development of three-dimensional hydrogeologic framework model for the Death Valley Region, southern Nevada and California, USA", by C. Faunt, F. D'Agnesse, and A. Turner.

"Numerical investigation of steady liquid water flow in a variably saturated fracture network", by E. Kwicklis, and R. Healy.

"Proposed algorithm for determining delta intercept of a thermocouple psychrometer curve", by M. Kurzmack.

"Tectonic characterization of potential high-level nuclear waste repository at Yucca Mountain, Nevada", by J. Whitney, and D. O'Leary.

"Application of radiogenic isotopes to paleohydrologic study", by J. Stuckless, and Z. Peterman.

"Assessment of geophysical logs from borehole USW G-2, with recommendations for future logging at Yucca Mountain, Nevada", by P. Nelson, and U. Schimschal.

"Implementation and use of an automated projection moire experimental set", by J. Cardenas-Garcia, S. Zheng, and F. Shen.

Study Plan Status

W. Causseaux met with M. Chornack, R. Whitfield and other UZ investigators to coordinate the preparation of extensive changes to Study Plan 8.3.1.2.2.4 to accommodate design changes in the ESF.

Technical Data Base Management. Hydrology 0G3192H5

Summary Account Manager - N. Stuthmann

ACTIVITIES AND ACCOMPLISHMENTS

Routine jobs were performed throughout the month, including the retrieval of the QW data from the WRD National Water Laboratory, entering the data into the HIP NWIS data base and the cleanup of the Satellite Transmission of data (SATIN) maintenance logs and directories. Backup of the NWIS data base was performed and the backup tape sent to the LRC for storage in the fire proof vault.

All members of the DMU attended the Colorado Ingress Users Association (CIUA) meeting in conjunction with the Rocky Mountain Computer Conference and Exposition.

D. Burkhardt continued in the GIS activities correcting errors in the Lathrop well, Big Dune and Bare Mountain surficial geology maps. He has also started in the use of the new Worm Drive for storage of GIS maps to move the maps from internal storage on the SUN computer.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

B. Kerans, B. Oatfield and N. Stuthmann met with J. Shornick, Reston, to discuss the details in the NWIS-II design. Shornick went over the many items in the reference tables used in the design of the relational data base. As a result of the 3-day meeting, it now seems that with proper definition, the NWIS-II data base will handle all constituents collected or computed by HIP and GSP. The first edition of the data base is scheduled for April 1, 1993.

B. Oatfield is now working on the definition of the HIP collected constituents in preparation for the use of NWIS-II data base. The information on the definition of these constituents is based on the Entity Relationship diagrams for NWIS-II which were discussed during the meeting with Shornick. B. Kerans and Oatfield are continuing in the study of NWIS-II to better understand the data model and to perform a good fit of the data into the new data base.

B. Kerans is working with J. Briggs, Reston, to get the necessary documentation for the updated version of NWIS-I. This is needed for the software QA review for the processing of water level records and storage of quality of water data.

WBS 1.2.3.2 Geology

Principal Investigator - J. Stuckless

OBJECTIVE

To conduct geologic investigations to evaluate the suitability of the surface and subsurface environment for siting a nuclear waste repository.

WBS 1.2.3.2.2 Rock Characteristics

OBJECTIVE

To describe present and expected rock characteristics of the Yucca Mountain site and to develop a three-dimensional model of rock characteristics. (SCP Section 8.3.1.4)

WBS 1.2.3.2.2.1 Geologic Framework of the Yucca Mountain Site

OBJECTIVE

To conduct field studies, including surface and subsurface geophysical surveys and geologic mapping on the surface and in the exploratory shaft facility to characterize the geologic framework of the Yucca Mountain site. (SCP Investigation 8.3.1.4.2)

WBS 1.2.3.2.2.1.1 Vertical and Lateral Distribution of Stratigraphic Units within the Site Area

Principal Investigator - R. Spengler

OBJECTIVE

To determine the vertical and lateral variability and emplacement history of stratigraphic units and lithostratigraphic subunits within the Yucca Mountain site area. (SCP Study 8.3.1.4.2.1)

SCP 8.3.1.4.2.1.1 Surface and subsurface stratigraphic studies of the host rock and surrounding units

0G3221A2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU002A Geochemical isotopic sampling and analysis, phase 1

Z. Peterman prepared a preliminary (unpublished) extended abstract entitled *Trace-element variability in altered and unaltered tuffs at Yucca Mountain, Nevada* for submission to the American Nuclear Society for consideration at the International High-Level Nuclear Waste Management Conference. Authors are Peterman and R. Spengler, F. Singer and R. Dickerson.

Z. Peterman designed a series of leaching experiments on Topopah Springs high-silica rhyolite whole-rock samples from UE25A#1. Both leachates and residues will be analyzed for Sr contents and isotopic compositions in order to better define multi-component mixing between primary Sr incorporated in phenocrysts and tuff matrix versus secondary Sr presumably added along with minor carbonate. S. Mahan initiated quantitative leaching of six whole-rock samples analyzed previously without prior removal of acid-soluble Sr. Initial results indicate that whole-rock samples contain a small to substantial amount of Sr that is soluble in weak HCl. The relationships between primary and secondary Sr need to be characterized in order to understand the minor variations observed in Sr isotopic composition in the Topopah Springs unit, as well as to characterize the source of disseminated carbonate in the repository horizon.

K. Futa continued analysis of whole-rock tuff samples taken from drill core JF-3. These analyses will be added the Sr data base and used to investigate geochemical variations caused by water/rock interactions between volcanic units and ground water.

3GG0U11A Synthesize existing borehole data

R. Dickerson completed cross sections from the Scott and Bonk map (1984) and created nine new cross sections for the 3-D modeling.

J. Nelson and R. Dickerson continued to compile a digitized data base for input to the LYNX Geoscience Modeling System (GMS). The LYNX software develops multiple stacked cross sections using the subsurface data. At present the completed portion of the digitized data base includes borehole lithology (from the surface to the base of the Bullfrog Member) for holes within the designated site area (this area is bounded by the Solitario Canyon Fault and the Bow Ridge Fault, on the west and east, respectively, the Yucca Wash Fault on the north, and a east-west line intersecting USW G-3 on the south); downhole survey data; an assumed water table elevation of 2395 feet (730 meters) throughout the site; and topographic data. Data still in the process of being transferred from a non-digitized to digitized format include fence sections (based both on those of Scott and Bonk (1984) and additional sections through selected boreholes), and a structural (fault) data file. To this end, a KURTA digitizing board was obtained. This programmable board provides more direct support of the LYNX workstation and is simplifying entry of these sections into the data base.

3GGU003A Review samples from prototype (YM) hole, UZ holes

Significant core has been recovered, and logging operations began in September. D. Buesch examined the UZ-16 core to the 550 ft depth and compiled an initial log. This depth appears to be near the middle of the non-lithophysal zone. At the top of the Topopah Spring Member (189 ft depth) is pumiceous, vitric tuff with an orange coloration decreasing downward that may indicate a weathering horizon. The core records penetration of the non- to densely-welded cap rock and two non-lithophysal zones with an intervening well developed lithophysal zone. Buesch will continue to prepare the initial log and develop detailed log(s) as core is acquired.

Variances

3GGU002A Geochemical isotopic sampling and analysis, phase 1

This activity is being continued pending resolution of reporting protocols. Similar work activity was planned under 3GGU021A (Geochemical isotopic sampling/analysis G-5, UZ, WT), but G-5 has been delayed until FY94. As on-going analytical work on continuing projects, there is no long- or short-term impact related to continuation of 3GGU002A. We are reporting this work under 3GGU002A.

Work Performed but not in Direct Support of the Scheduled Tasks

D. Buesch submitted a manuscript entitled "Development of a 3-D lithostratigraphic and confidence model for Yucca Mountain, Nevada," (D.C. Buesch, J.E. Nelson, R.P. Dickerson, and R.W. Spengler) to the American Nuclear Society for the Third Annual International High-Level Waste Management Conference in Las Vegas 4/26/93 to 4/30/93.

C. Hunter represented the rock characteristics section in efforts to prioritize drill targets along the proposed north ramp alignment and to address measures to limit drilling costs by reducing coring where appropriate.

SCP 8.3.1.4.2.1.2 Surface-based geophysical surveys 0G3221B2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU220 QA documentation of software

Thirteen software products (of 38) are being processed through the software quality assurance system. Three are essential to process gravity data to the point of calculating a Bouguer gravity anomaly. Although operational in nearly the present form, and accepted in the scientific community since 1978, one is a complex program which will be time-consuming to validate in a formal sense. Others are useful to model gravity and magnetic anomalies and to correct approximate Bouguer gravity anomalies for the effect of isostasy. The remaining 25 operational products will be utilized at other stages of data display and interpretation.

In addition to preparing documentation and SQA forms, D. Plouff is confirming that the programs operate as intended in the UNIX environment. Plouff is using software acquired under the YMP program to pinpoint lines in FORTRAN programs that could be vulnerable in converting to various computing platforms.

3GGU222 Submit status of regional geophysical for review

Submission of the proposed USGS bulletin, entitled "Status of regional geophysical studies at Yucca Mountain and vicinity, Nevada and California," (H. Oliver et al.) was delayed; the revised manuscript is expected to be submitted for Branch approval by October 28, 1992.

3GGF223 Study plan approval

The study plan has been approved by DOE Headquarters and has passed the review period at NRC, which concluded in mid-September. No notice has been received of problems from NRC.

3GGU251 Complete local gravity map of Yucca Wash

This activity has not been started as there is only one station in Yucca Wash for which data gathering is complete. After the September field work and reduction of data, compilation of the gravity map is expected to begin in mid-October. Note discussion below about September work (3GGU250, Collect and reduce grav/mag in Yucca Wash).

Technical Activities

3GGU250 Collect and reduce mag/grav in Yucca Wash

Four of the five E-W detailed gravity and magnetic profiles across the Midway Valley area were obtained and have been reduced to help locate the surface of the buried Paintbrush and/or other faults on the east side of Yucca Mountain. The data were presented to a 20-member NRC investigative team. The fifth profile in Midway Valley, five E-W lines, and one N-S line in Yucca Wash to the north of Midway Valley were obtained by R. Sikora, V. Langenheim, R. Allen, and S. Snyder.

Planning and Operations

3GTQ005J Write seismic contract

This task is 100% complete. C. Hunter continued work with USGS Contracts to resolve questions from potential bidders. The bid acceptance period closed September 8, 1992, and bids were transmitted to T. Brocher for technical evaluation by Brocher, W. Mooney and M. Moses. Planning efforts are underway to direct pre-activity test-interference, soil radioactivity, and environmental surveys and to respond to Air Force concerns about impacts in northern Yucca Wash. Moses assisted in staking shothole locations along the seismic traverse.

Variances

3GGU220 QA documentation

QA documentation of gravity and magnetic field measurements, data processing and computer modeling is much more extensive than originally envisioned. This effort is ongoing, and impacts are expected to be minimal.

3GGU222 Submit status of regional geophysical for review

Small delays have resulted due to development of American Nuclear Society (ANS) summaries and presentations to NRC. Complete manuscripts are scheduled to go to Branch review by October 20, 1992.

3GGU250 Collect and reduce mag/grav in Yucca Wash

Field activities have been completed with acquisition of profiles across Yucca Wash. Reduction of data is underway and will feed to 3GGU251 (Complete local gravity map of Yucca Wash). No significant impact is expected.

3GGU251 Complete local gravity map of Yucca Wash

Necessary field work is completed. Reduction of data is underway, and map compilation will begin about October 15, 1992. No impact is anticipated.

3GGU252 Write report on Yucca Wash

Field work is completed and the reduction of data is underway. The map compilation will begin in mid-October with report to follow. No impact is anticipated.

Work Performed but not in Direct Support of the Scheduled Tasks

The following summaries were submitted to the American Nuclear Society for consideration for presentation at their High Level Radioactive Waste Management (HLRWM) meeting in April 1993:

Oliver, H.W., and Fox, K.F., Structure of Crater Flat and Yucca Mountain, southeastern Nevada, as inferred from gravity data.

Ponce, D.A., Geophysical investigations of concealed faults near Yucca Mountain, southwest Nevada.

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

Langenheim, V.E., Magnetic investigations of buried volcanic centers near Yucca Mountain, Nevada.

Hunter, W.C., Spengler, R.W., and Brocher, T.M., Seismic reflection profiling: essential geophysical data for Yucca Mountain, Nevada.

In addition, the following extended abstract was approved by the Director for presentation at the 1992 Fall AGU Meetings:

Oliver, H.W., 1992, Characterizing Yucca Mountain, Nevada, by geophysical methods (extended abstract), Director approval received September 8, 1992.

SCP 8.3.1.4.2.1.3 Borehole geophysical surveys 0G3221C2

Summary Account Manager - P. Nelson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU392 Compute algorithms to density and resistivity logs

3GGU393 Compute porosity and water saturation from logs

P. Nelson and colleagues developed and tested an algorithm to compute air-filled and water-filled porosity in the unsaturated zone, using the density and dielectric logs. Linear response functions are used to relate the component (mineral and water) responses to the log response. The interdependent pair of equations can be solved directly for air-filled and water-filled porosities. Resolution appears to be adequate. A test on the G-2 data produced very reasonable porosity logs. The paper entitled "Estimation of water-filled and air-filled porosity in the unsaturated zone, Yucca Mountain, Nevada" (P. Nelson et al.), submitted to the 1993 International High Level Radioactive Waste Management Conference, describes this work.

Quality Assurance

3GGU364 Write procedure for magnetometer logging

Technical procedures for operating the magnetic susceptibility tool (GPP-15) and for magnetometer logging (GPP-17) were revised in response to comments by USGS-QA and returned to the QA office to begin the process of technical review.

WBS 1.2.3.2.2.1.2 Structural Features within the Site Area

Principal Investigator - R. Spengler

OBJECTIVE

To determine the frequency, distribution, characteristics, and relative chronology of structural features within the Yucca Mountain site area. (SCP Study 8.3.1.4.2.2)

SCP 8.3.1.4.2.2.1 Geologic mapping of zonal features in the Paintbrush Tuff 0G3221G2

Summary Account Manager - C. Hunter

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF182A Analysis of samples

K. Futa continued Sr isotopic analysis on a series of whole-rock tuff samples from the Raven Canyon geochemical reference section. Samples consisted of unaltered welded and non-welded units collected in outcrop. Results from these units will be compared to compositions of the same units collected from drill core beneath Yucca Mountain to help assess the chemical variations induced by water/rock interactions occurring beneath the paleo water table.

3GGF131A Field check southern and western Yucca Mountain mapping

The abstract entitled "Tectonic framework of Crater Flat Basin, adjacent to Yucca Mountain, Nevada: a preliminary report" (C. Fridrich, 1992) was accepted for presentation at the Geological Society of America (GSA) National Meeting in Cincinnati, Ohio, October 26 to October 29, 1992. DOE/YMPO reviewed and approved the report in August 1992.

3GGF125 Geologic Mapping of Northeast Corner of Site Area

D. Buesch accompanied R. Dickerson in the field for two days to map part of the Paintbrush Canyon Fault and to compile field photographs for the stratigraphic analysis study of the tuffaceous rocks of the Calico Hills Formation. Dickerson completed mapping of Calico Hills tuffaceous rocks in upper Black Glass Canyon and upper Paintbrush Canyon in September. Mapping along the Paintbrush fault in the extreme north end of Paintbrush Canyon (several kilometers north of Yucca Wash) identified similarities to the Ghost Dance fault farther south.

The Paintbrush fault appears to be a zone of multiple faults with observable off-sets, local pull-apart structures, and graben development along synthetic/sympathetic faults. Dickerson noted well-developed slickensides and indications of several episodes of both oblique and strike/slip movement. Mapping efforts continued through September; quantification of fault offset is a primary target of the mapping.

3GGF101 Review, revise outcrop sections of Tpt

D. Buesch continued the compilation of outcrop and structural section data (Topopah Springs units) in September with the field checking expected to begin in October.

3GGF185A Write report on exposed fault zones

A. Braun prepared and submitted a preliminary report tentatively entitled "Structural mapping of a portion of the Ghost Dance Fault, Yucca Mountain, Nevada" to R. Spengler for additions; it is currently in technical review. L. Martin and R. Linden continued mapping the additional areas north of the original block. Braun, Martin and Spengler met on site to discuss geologic details of the mapping activity. Findings will be incorporated into the final report. Mapping completed to date suggests the value of additional detailed mapping along the Ghost Dance fault as the fractured zone is wider than previously recognized. The enlarged final report will contain interpretations as well as the acquired data.

3GGF160 Revise technical procedure on analysis of volcanic rocks

D. Buesch revised the technical procedure by separating it into three procedures, Petrographic Analysis of Volcanic Rocks; Scanning Electron Microscope (SEM) and Electron Microprobe (EMP) Analysis of Volcanic Rocks; and Whole Rock Geochemical Analysis of Volcanic Rocks. Buesch submitted the Petrographic Analysis of Volcanic Rocks technical procedure to the USGS QA implementation group for initial review.

Work Performed but not in Direct Support of the Scheduled Tasks

D. Buesch attended two workshops sponsored by the International Association of Volcanology and Chemistry of the Earth's Interior and affiliated with the international Geological Congress (IGC) held in Japan. Buesch is a member of the Commission on Explosive Volcanism (CEV) and the Commission of Volcanic Sedimentation. Buesch participated in the working sessions of these groups and presented a talk entitled "Transport processes in pyroclastic flows" at CEV. As an invited participant, Buesch presented a lecture at Kobe University, Japan, entitled "Use of petrofabric analysis to infer boundary-layer processes in pyroclastic flows and other sediment-fluid flows." Buesch was in Japan or on travel for two weeks. (Note: this work was not supported by YMP funds but does have definite relation to Buesch's YMPB duties.

R. Spengler made trips to Las Vegas and to the site to present results of rock characteristics field activities and accomplishments, particularly new knowledge of the Ghost Dance fault, to TPO, NRC, and NWTRB audiences.

C. Hunter participated in the GAC meeting. The committee began review of several submittals from HIP participants during the meeting. Additional work clarified procedures and formats to be used in the GAC process.

SCP 8.3.1.4.2.2.2 Surface-fracture network studies OG3221H2

Summary Account Manager - M. Fahy

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF100 Map & analyze fractures in Tiva Canyon Member

Traceline data are being collected as part of the reassignment and will be moved into this activity. Three tracelines (approximately 100 ft N-S) and two tracelines (approximately 40 ft E-W) have been collected and analyzed. Core from NRG-1 has been logged for fractures; analysis will be part of the report.

3GGF080 Clear pavement at Fran Ridge

This task was completed September 30, 1992.

Quality Assurance

3GGF100M Map Tiva Canyon for review

Discussion is ongoing regarding review and procedures for the designation of the map as official data. The map is tied to the 3GGF10AA deadline and the USGS QA CAR board restrictions for review.

Variances

All of the variiances are due to the reassignment of the PI. Physical presence away from the support staff precludes any meaningful delegation of analysis or data collection.

3GGF100 Map & analyze fractures in Tiva Canyon Member

3GGF150A Develop Tiva Fracture Model Phase I

3GGF10AA Preliminary fracture map and report (TIVA)

Anticipated finish is the first week in December 1992.

3GGF151A Collect vertical continuity data Prow Pass Solitario

Anticipated finish is the last week in November 1992.

Variances (CONTINUED)

3GGF140A Map fractures in Tiva Canyon - phase 2

3GGF155A Analysis of Prow Pass/Solitario Data

Anticipated finish is mid-December 1992.

3GGF100A Field work Calico Hills, Crater Flats - phase 1

Anticipated finish is January 1993.

3GGF130A Map and analyze fractures Fran Ridge ESF pits area

No start due to reassignment of PI. Anticipated start October 30, 1992.

SCP 8.3.1.4.2.2.3 Borehole evaluation of faults and fractures OG3221J2

Summary Account Manager - J. Wright

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGU004F Review vendor's techniques; acquisition

J. Wright received data packs from the last two vendors, BPB and Schlumberger, originally contacted in July 1992. A draft of the review report was submitted in September for technical review.

3GGU006F Edit, review existing data; data login

J. Wright continued review of the existing data on G-2 and transferred directional data into the EXCEL format. The television fracture data are ready for entry into DIPS and STATPAK. Wright is in the process of cross-checking television, televiwer and core fracture data and will acquire original televiwer interpretations from Menlo Park for edit and review before entering data into DIPS and STATPAK.

Quality Assurance

J. Wright submitted a Quality Assurance Grading Acceptance Report for SCP Activity 8.3.1.4.2.2.3, Borehole Evaluation of Faults and Fractures. This submittal is in preparation for work on core from UZ-16 in a substitution for the undrilled G-5 now scheduled for FY94.

Variances

3GGU004F Review vendor's techniques; acquisition

J. Wright received data packs from the last two vendors originally contacted in July. A draft of the Review Report was submitted in September for technical review. No long- or short-term impact is anticipated from this delay.

3GGU006F Edit, review existing data; data login

J. Wright has requested original televiwer log interpretive sheet to cross-check data prior to entry into records center. No long- or short-term impact is anticipated from this delay.

SCP 8.3.1.4.2.2.4 Geologic mapping of the exploratory shaft and drifts OG3221J2

Summary Account Manager - S. Beason

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF006B Excavate test pit

S. Beason and J. Narvaiz provided field oversight for deepening of the Fran Ridge pit, which was completed September 11, 1992. The deepening took place in two drill/blast rounds. Both rounds fired successfully with many half-casts visible around the perimeter of the pit. The pit was deepened to a total depth of 20 feet and 14 feet nominal diameter. The walls of the pit were scaled for safety and thoroughly cleaned using an air/water blowpipe.

The pit was excavated in the middle non-lithophysal subunit of the Topopah Spring Member of the Paintbrush Tuff (identified by Scott and Bonk, 1984, as orange-brick non-lithophysal, tob). The pit was the site of Throckmorton and Verbeek's fracture collection station Tob_1.

Clearing of the pavement surrounding the Fran Ridge pits is complete. Two crews of laborers cleaned the pavement using air/water blowpipes to remove colluvium from the bedrock surface. Backhoes have been used to remove the larger blocks and to scrape accumulated debris produced by the blowpipes.

3GGF008B Conduct control pt. configuration test

This work was re-scheduled to begin September 30, 1992. This item involves setting photogrammetry control points around the perimeter of the pit and then photographing them in stereo from the prototype shaft mapping platform. To do this work the platform must be suspended from a crane and lowered into the pit.

Variances

3GGF008B Conduct control pt. configuration test

REECo did not have slings available for the crane as planned for September 17, 1992. Completion is expected by the end of October with no substantial impact.

SCP 8.3.1.4.2.2.5 Seismic tomography/vertical seismic profiling 0B3221A2

Summary Account Manager - E. Majer

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGF030B Validate interpretational codes ANI90 and BEAM87

Validation activities using borehole data from the C-complex holes continued. ANI90 and BEAM87 were tested by modeling the cross-well data from the C-holes. Fracture anisotropy and fracture density were modeled with ANI90.

3GGF035M Report: Progress VSP

Modeling of the VSP for the C-hole and P-1 localities was completed. The results indicate that the optimal spacing for detection of vertical fractures is a multiazimuth-multicomponent survey at 1/4- and 1/2-hole-depth offsets. Spacing of the receivers should be at most ten meters and if possible five meters.

Variances

3GGF031B Update ESF planning documents

Start of this activity is tied to DOE finalizing the ESF structural design. No impact is expected given the timeframe and scale of the ESF construction project. This activity will be rescheduled after finalization of ESF design.

WBS 1.2.3.2.3 Erosion

OBJECTIVE

To identify the site-specific geomorphic parameters and data that are needed to satisfy the design and performance issues and to ensure that the 200-meter disqualifying condition is not exceeded. (SCP Section 8.3.1.6)

WBS 1.2.3.2.3.1 Present Location and Rates of Surface Erosion

Principal Investigator - J. Whitney

OBJECTIVE

To identify the erosional processes in the Yucca Mountain area during the Quaternary; quantify the rates of the different processes and assess their relative importance; and identify the specific locations of past erosion. (SCP Investigation 8.3.1.6.1)

SCP 8.3.1.6.1.1.1 Development of geomorphic map of Yucca Mountain 0G3231A2

Summary Account Manager - J. Coe

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GER002A Write report on erosion rate for existing data

Technical chapters for the DOE topical report on erosion were completed this month. Time and effort for this activity had to be transferred from work planned in 8.3.1.17.4.6. Minor revisions to the manuscript are anticipated in early FY93.

Variances

3GER001A Scoping study - Photogrammetric analysis

Planned finish date pushed back because personnel was needed for study of Paintbrush Canyon fault at Busted Butte (Study 8.3.1.17.4.6.2, activity 3GPF09A). Work is continuing and is anticipated to be finished October 30, 1992. No impact to the schedule is expected.

WBS 1.2.3.2.5 Postclosure Tectonics

OBJECTIVE

To supply data on the probability and effects of tectonic initiating events that may alter existing conditions at Yucca Mountain and adversely affect repository performance. (SCP Section 8.3.1.8)

WBS 1.2.3.2.5.3 Changes in Hydrology Due to Tectonic Events

OBJECTIVE

To assess or analyze the possibility that tectonic events could cause changes in existing hydrologic conditions at the Yucca Mountain site. (SCP Investigation 8.3.1.8.3)

WBS 1.2.3.2.5.3.2 Effect of Tectonic Processes and Events on Changes in Water-Table Elevation

Principal Investigator - J. Whitney

OBJECTIVE

To analyze and assess the probability that tectonic initiating events could result in significant changes in the elevation of the water table or potentiometric surface, changes in the hydraulic gradient, the creation of discharge points in the controlled area, or the creation of perched aquifers in the controlled area. (SCP Study 8.3.1.8.3.2)

SCP 8.3.1.8.3.2.5 Effects of faulting on water-table elevation 0G3253L2

Summary Account Manager - C. Fridrich

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTW020 Compile existing information - water table elevation

This month's progress closes out schedule activity 3GTW020, which was a scoping activity for investigations 8.3.1.8.2, 8.3.1.8.3, and 8.3.1.8.4. These investigations, in sum, are an evaluation of changes in the engineered and natural barrier (hydrologic and geochemical) systems resulting from future tectonic (seismic and volcanic) processes and events. To date, the USGS has not been assigned responsibility for these investigations formally by DOE, but has requested that DOE make a decision in this regard. If that responsibility is assigned, the USGS will write the study plan(s) for these three closely related investigations in fiscal year 1993.

3GTW021 Interpretive report large hydraulic gradient YM

As part of a follow up of completed milestone 3GTW021M: Report on large hydraulic gradient, revision of the report following USGS review was completed this month. The report will now be submitted for DOE management review and publication in the Journal of Hydrology. The revised report is titled "A hydrogeologic analysis of the saturated-zone ground-water system under Yucca Mountain, Nevada" by C.J. Fridrich, W.W. Dudley, Jr., and J.S. Stuckless.

Work Performed but not in Direct Support of the Scheduled Tasks

C. Fridrich attended an NWTRB meeting and field trip on the progress in the volcanic risk assessment program. Fridrich made a presentation on the field trip on the results of an ongoing mapping study of the tectonic framework of Crater Flat Basin, and implications for structural controls on basaltic volcanism in this basin. Fridrich also reviewed two study plans: 8.3.1.8.5.2 Characterization of igneous features, and 8.3.1.15.2.2 Characterization of site ambient thermal conditions.

WBS 1.2.3.2.5.5 Information Required by the Analysis and Assessment Investigations of the Tectonics Program

OBJECTIVE

To collect field data called for by analysis and assessment activities in other tectonics investigations to support analyses of volcanic, igneous intrusion, and folding processes. (SCP Investigation 8.3.1.8.5)

WBS 1.2.3.2.5.5.2 Characterization of Igneous Intrusive Features

Principal Investigator - J. Sass

OBJECTIVE

To gather data concerning the presence of thermal anomalies in the area and data on the geochemical and physical effects of intrusions on the surrounding rock. (SCP Study 8.3.1.8.5.2)

SCP 8.3.1.8.5.2.3 Heat flow at Yucca Mountain and evaluation of regional ambient heat flow and local heat flow anomalies 0G3255B2

Summary Account Manager - J. Sass

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GAT006 Revise study plan

An internal USGS review of the study plan was completed by C. Fridrich. Review comments were responded to and several diagrams were modified.

3GAT011 Collect field measurements

Temperature logging was conducted in several holes that penetrate Tertiary volcanic rocks adjacent to faults on Yucca Mountain to determine the possible thermal effects of the June earthquake. Reduction of the logging data was conducted.

3GAT006M Study plan submitted to DOE

The study plan was submitted to DOE on Sept 30, 1992.

WBS 1.2.3.2.6 Surface Characteristics

OBJECTIVE

To collect information on surface characteristics to determine location and design of repository surface facilities. (SCP Section 8.3.1.14)

WBS 1.2.3.2.6.2 Soil and Rock Properties of Potential Locations of Surface Facilities

OBJECTIVE

To characterize the soil and rock at and near the surface to provide design issues with the necessary geotechnical information to help locate the surface facilities, conduct foundation design analyses, evaluate soil-structure interactions, and evaluate potentially unstable slopes; and provide design issues with hydraulic-related soil information for evaluating erosion potential and infiltration-runoff characteristics. (SCP Investigation 8.3.1.14.2)

WBS 1.2.3.2.6.2.2 Surface Facilities Laboratory Tests and Material Property Measurements

Principal Investigator - M. McKeown

OBJECTIVE

To conduct laboratory tests and material property measurements on representative samples of soil and rock. (SCP Study 8.3.1.14.2.2)

SCP 8.3.1.14.2.2 Laboratory test and material property measurements OG3262A2

Summary Account Manager - M. McKeown

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSRO05 Field exploration-mapping, drilling, excavation

Drill hole NRG-1 core is at the USBR laboratory in Denver. Geophysical logging of the hole is scheduled for completion in November 1992. The check shot equipment was tested at the site in September. Data from density and caliper logs and check shot data will be used to determine dynamic moduli for the rock and alluvium. NRG-1 pavement was cleared and detail line surveys were run to provide the fracture information requested by Raytheon Services Nevada (RSN).

3GSR005 Field exploration-mapping, drilling, excavation (CONTINUED)

Technical procedures for density and caliper logs, and for check shots, were completed through draft status. Technical review and approval are required prior to issuance; those efforts are underway.

3GSR007 Design data submittal of north ramp

Rock and soil geotechnical data requested by RSN are being submitted as acquired. Logs and laboratory test data for representative soil materials were submitted.

3GSR006 Materials testing: soil/rock-phys/mech properties

Rock testing of core from NRG-1 is underway to provide data needed by RSN to complete design work and verification. Work is being done according to the USGS QA program after revision of procedures.

USBR participants met with USGS representatives to discuss adjustments to NRG and SRG drilling plans in response to DOE/M&O requests.

3GSR009 Final report on physical properties lab north ramp

3GSR011 Final report mechanical properties lab north ramp

3GSR013 Final report physical properties field North ramp

3GSR015 Final report mechanical properties field North ramp

3GSR017 Final report geophysical North ramp

Final reports on field and laboratory testing of mechanical, physical, and geophysical properties essentially are on hold until QA transition questions have been resolved and necessary adjustments are made to USBR procedures. Draft reports are complete.

Quality Assurance

It was determined, as a result of audit USGS-92-05 and other meetings attended by USBR, that resolution of YMP-USGS CAR 92-07 requires USBR to work directly to the YMP-USGS QA Program. Quality-affecting field work requires YMP-USGS authorization to proceed. YMP-USGS procedures for reports must be used. Requirements for data submittal remain unchanged. Submittals to the GAC were made to confirm that appropriate controls are in place. Those documents are in review.

Planning and Operations

Job package 92-8 for the second phase of geotechnical investigations was completed by the Project. The package contains test pits along road alignments and at potential locations for structures, and percolation testing for leach field design. The test pits for road alignments were completed and draft logs prepared. An in-place density test will be performed at the pump booster station location in October.

Variances

The failure to complete the Test Planning Package in a reasonable length of time required revising the start date of field exploration from November 1991 to March 1992. The resultant slippage of dependent activities meant a reduction in time to perform the work by at least 50 percent. This has resulted in a reduction of submitted data by at least 50 percent and a continuing effort to get data to the designers for Title II design.

3GSR006 Materials testing: soil/rock-phys/mech properties

The failure to complete drill hole NRG-1 on schedule has resulted in no rock testing data submitted until this month for Title II design. At least a month will be required to perform all required testing. Laboratory testing is underway.

Variations (CONTINUED)

3GSR009 Final report on physical properties lab north ramp

Final reports on field and laboratory testing of mechanical, physical, and geophysical properties essentially are on hold until QA transition questions have been resolved and necessary adjustments are made to USBR procedures. Draft reports are complete. Adjustments to USBR procedures are underway with high priority. Impacts should be minimal.

WBS 1.2.3.2.8 Preclosure Tectonics

OBJECTIVE

To develop an understanding of and to characterize the tectonic events and processes that could impact proposed repository structures, systems, or components considered to be important to safety through the operational phase and that could affect the design and operation of certain structures, systems, and components required for exercising the retrieval option. (SCP Section 8.3.1.17)

WBS 1.2.3.2.8.4 Preclosure Tectonics Data Collection and Analysis

OBJECTIVE

To provide data and analyses required by other investigations including the assessments of fault displacement and vibratory ground motion that could affect repository design or performance. (SCP Investigation 8.3.1.17.4)

WBS 1.2.3.2.8.4.1 Historical and Current Seismicity

Principal Investigator - K. Shedlock

OBJECTIVE

To compile information on reported and instrumentally recorded earthquakes that characterize the earthquake potential near Yucca Mountain and to attempt to purge explosion and triggered earthquakes related to weapons testing from existing catalogs of instrumentally determined earthquakes. (SCP Study 8.3.1.17.4.1)

SCP 8.3.1.17.4.1.2 Monitor current seismicity OG3284HB

Summary Account Manager - K. Shedlock

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GSM157A Continue to test lab/field data

Significant effort went into the transfer of seismic equipment from BGRA to YMPB. Develocorder equipment was dismantled, picked up by UNRSL and transported to Reno, Nevada.

3GSM160A Monitor 1992 seismicity

The existing SGBSN continued to record aftershocks of the Little Skull Mountain earthquake. Seismicity rates remain elevated with most "excess" seismicity occurring in the vicinity of Little Skull Mountain. SGBSN staff was able to keep up with the routine processing of incoming data but was unable to process any backlogged tapes. Monitoring activities by BGRA terminated on the close of business September 30, 1992 at which time the phone-line telemetry was discontinued, all field operations ceased, and BGRA presence at Test Cell C was terminated.

3GSM164A Reduce data - Little Skull Mountain earthquake

USGS-BGRA personnel continued processing aftershock data from the Little Skull Mountain earthquake June 29, 1992.

Technical Activities (CONTINUED)

3GSM155A Test reception SGBSN data

All data reception tests were completed this month. New telemetry node and 6 stations hardware are operational.

WBS 1.2.3.2.8.4.2 Location and Recency of Faulting Near Prospective Surface Facilities

Principal Investigator - J. Whitney

OBJECTIVE

To identify appropriate trench locations to investigate the possible occurrence of late Quaternary surface faulting in the vicinity of planned critical surface facilities; and using surface and trench mapping, locate sites without evidence of significant late Quaternary faulting. (SCP Study 8.3.1.17.4.2)

SCP 8.3.1.17.4.2.1 Identify appropriate trench locations in Midway Valley OG3284IB

Summary Account Manager - F. Swan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP002 Surficial mapping in Midway Valley

Field work is complete. Map review, writing unit descriptions, and preparing the map for publication will continue.

3GFP001 Excavate and log soil pits

12 out of 25 soil pits have been logged and described. Preparations were made for the NWTRB review of two soil pits 9/17 and 18.

Variances

All 25 soil pits may not be logged completely by the planned finish date because other trenching activities will take a higher priority. Plans for construction of a pad for the service facilities will require that other trench logs be finished in November. Remaining soil pits will be logged as time becomes available. No impact to the overall schedule is anticipated.

SCP 8.3.1.17.4.2.2 Conduct exploratory trenching in Midway Valley OG3284JB

Summary Account Manager - F. Swan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFP007 Excavate and log trench through proposed ESF

Field logs for trench NWV T5-a were completed and data from multiple logging sheets were compiled. Preliminary stratigraphic relationships were determined in trench NWV T6 and appropriate horizons were nailed. Preparations were made for the NWTRB review of trench work and preliminary conclusions were presented during that review on September 17 and 18.

3GFP009 Clean and log trench 17

Field logs were completed around the fault structures exposed in the trench. Preparations were made for the NWTRB review of trench work and preliminary conclusions were presented during that review on September 17 and 18.

Quality Assurance

3GFP007 Excavate and log trench through proposed ESF

A quality assurance surveillance of trench logging activities was conducted this month. Work was found to be performed in accordance with QA procedures.

WBS 1.2.3.2.8.4.3 Quaternary Faulting within 100 km of Yucca Mountain

Principal Investigator - J. Whitney

OBJECTIVE

To identify Quaternary faults within 100 km of Yucca Mountain and to characterize those faults capable of future earthquakes with magnitude such that associated ground shaking could impact design or affect performance of the waste facility. (SCP Study 8.3.1.17.4.3)

SCP 8.3.1.17.4.3.2 Evaluate Quaternary faults within 100 km of Yucca Mountain OG3284K2

Summary Account Manager - L. Anderson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTQ006B Complete study plan

As a follow up to this activity, a marked-up text of the study plan (8.3.1.17.4.3) with proposed responses to reviewers comments was transmitted to DOE.

3GTQ008B Review and synthesize existing work/compile map

Work on this activity is complete. Data sheets were completed for 37 faults within the area of study.

3GTQ001B Draft technical procedure - aerial photo interpretation

Revision of draft technical procedure is on hold due to reorganization of USBR-USGS QA program.

3GTQ006M Report - Preliminary assessment of Quaternary tectonic faulting

The subject report entitled "Preliminary Assessment of Quaternary Faults within 100 km of Yucca Mountain" was completed.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 24 hours were spent on the following:

L. Anderson attended and helped lead DOE/OCRWM field trip to examine historical earthquakes of the northern Basin and Range of Nevada.

WBS 1.2.3.2.8.4.4 Quaternary Faulting within Northeast-Trending Fault Zones

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the potential for ground motion resulting from future movement on Quaternary left-lateral strike-slip faults located east and south of the site area. (SCP Study 8.3.1.17.4.4)

SCP 8.3.1.17.4.4.1 Evaluate the Rock Valley fault system OG3284O2

Summary Account Manager - D. O'Leary

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTN007 Compile/analyze map and satellite imagery

Continued analysis of high-altitude aerial photos, SLAR mosaics, and Landsat images in support of field work and subsequent preparation of interim report.

3GTN008 Conduct field work - three fault zones

Reconnaissance field work was completed on September 3, 1992. Exposed faults in all three fault zones were examined, but work was primarily concentrated along the Rock Valley fault zone where abundant evidence of Quaternary faulting and strike-slip displacement was observed.

3GTN009 Write interim report - field examination of fault zones

An interim report was completed. The report is based primarily on reconnaissance field work and image analysis, but includes extensive documentation of earlier work and evaluation of published analyses and interpretations. A list of references is included.

Work Performed but not in Direct Support of the Scheduled Tasks

Technical review of manuscript entitled, "Application of natural tracer isotopes to paleohydrologic studies", by Z. E. Peterman and J. S. Stuckless (August 19, 1992 version). est. 8 hours spent

WBS 1.2.3.2.8.4.5 Detachment Faults

Principal Investigator - J. Whitney

OBJECTIVE

To provide information pertaining to the distribution, displacement rate, and age of detachment faults proximal to Yucca Mountain; and determine whether they represent a significant earthquake source or conceal a significant earthquake source at depth. (SCP Study 8.3.1.17.4.5)

SCP 8.3.1.17.4.5.1 Evaluate the significance of the Miocene-Paleozoic contact in the Calico Hills area to detachment faulting within the site area OG3284S2

Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTD002B Conduct field work FY92 detachment faults

Progress on this activity is delayed until the study plan, which is in Phase I review at the NRC, receives NRC approval.

3GTD008B Write report and Map on the Calico Hills

Continued writing and revising report entitled Geology and Hydrothermal Alteration at the Calico Hills, Nevada. Continued review of the geologic map produced under scheduled activity 3GTD007B.

SCP 8.3.1.17.4.5.2 Evaluate postulated detachment faults in the Beatty-Bare Mountain area OG3284T2

Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Planning and Operations

3GTD011B Thermobarometry study of lower plate rocks

A SNP was prepared so that investigators can begin the thermobarometry study as soon as the study plan receives NRC approval. The SNP was submitted for USGS review this month. QA review and approval of the notebook plan is anticipated early in FY93.

WBS 1.2.3.2.8.4.6 Quaternary Faulting within the Site Area

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the age and recurrence interval of Quaternary faulting and to analyze the probability of future faulting; to determine which faults moved during the Quaternary; and to assess fault probability on the basis of rates of faulting during the Quaternary. (SCP Study 8.3.1.17.4.6)

SCP 8.3.1.17.4.6.1 Evaluate Quaternary geology and potential Quaternary faults at Yucca Mountain

OG3284C2

Summary Account Manager - J. Whitney

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPF08A Complete field mapping strip map of YM quaternary faults

Very little progress occurred this month due to the unavailability of project staff. Some of the field work compiled by K. Fox on 1:12,000 scale photographs was compiled on the 1:12,000 scale orthophoto overlays.

SCP 8.3.1.17.4.6.2 Evaluate age and recurrence of movement on suspected and known Quaternary faults

OG3284D2

Summary Account Manager - C. Menges

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GPF17A Re-log TR-8 Solitario Canyon fault

Safety inspectors examined re-excavated trenches TR-8 and TR-8A. Inspectors approved the trenches for work and trench logging and mapping have commenced.

3GPF09A Study Paintbrush Canyon fault on west side of Busted Butte

Hired an additional field geologist to assist and expedite field activities (mainly trench logging and field mapping). Continued preliminary inspection and identification of soil units and fault structures exposed in stream canyons on the west side of Busted Butte. Key soil contacts and structures were flagged for a NWTRB review of mapping activities. Targets were installed and surveyed in preparation for photogrammetric mapping of canyon walls.

J. Paces examined and sampled carbonate-rich materials from soils and fault-related veins-exposed by recent pneumatic stripping of gully walls on Busted Butte, with J. Whitney and others. Eight samples were collected from horizons showing critical cross-cutting relationships with the Paintbrush Canyon fault. It is hoped that geochronological information from these samples will bracket the latest movement along the fault in this area, and place constraints on earthquake recurrence intervals and rates of displacement.

Study of the Bow Ridge Fault at Exile Hill.

J. Paces examined and sampled carbonate-rich materials from soils and fault-related veins in Trenches 14c and 14d that were logged in detail by C. Menges. Geochronological information from the nine samples collected from the two trenches is expected to constrain recurrence intervals and displacement rates associated with the Bow Ridge fault.

Planning and Operations

3GPF15A Hire staff shallow seismic reflection study

Continued preliminary discussions with geophysicists on use of TEM equipment for electromagnetic surveys, including QA requirements for survey work.

Variances

3GPF17A Relog TR-8 Solitario Canyon fault

Work in mapping and reporting on TR-8 on Solitario Canyon fault was delayed about one month while securing environmental and safety clearances. Mapping is now in progress and a preliminary report should be ready by Nov. 1992, with no adverse effects to the program.

3GPF15A Hire staff shallow seismic reflection study

Staff hiring and work on geophysical surveys has been slowed due to inquiries regarding use of electromagnetic surveys. Effective use of such equipment would sharply reduce personnel and cost requirements. Consultations on equipment availability and QA requirements are routinely made with USGS Branch of Geophysics.

3GPF11A Complete report trench logs Windy Wash fault

No progress is anticipated until FY93. No adverse effects to the schedule are anticipated.

Work Performed but not in Direct Support of the Scheduled Tasks

Six days were spent in completion of trench excavation on stagecoach Road fault (trenches SCR-T1 SCR-T2, SCR-T3), which are included in FY93 PAC's scheduling.

Four days were spent performing additional logging at trenches 14C, 14D, on the Bow Ridge fault which have been included in Midway valley activity (8.3.1.17.4.2).

WBS 1.2.3.2.8.4.12 Tectonic Models and Synthesis

Principal Investigator - J. Whitney

OBJECTIVE

To synthesize data relevant to tectonics; and to develop a model or range of models that establishes the causal relationship between application of tectonic forces and formation of structures observed at Yucca Mountain and vicinity; link observed rates of formation of those structures with regional rates of crustal strain; forecast changes in tectonic setting and the manner in which those changes will affect both the regional crustal strain rate and tectonic stability in the Yucca Mountain region; and estimate the effect of those changes on rate and nature of crustal strain at Yucca Mountain and vicinity and the future rate of tectonic processes at Yucca Mountain. (SCP Study 8.3.1.17.4.12)

SCP 8.3.1.17.4.12.1 Evaluate tectonic processes and tectonic stability at the site 0G3284A1

Summary Account Manager - W. Hamilton

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GTE07JA Integration of tectonic data

W. Hamilton compiled all available tectonic information and produced a summary report for FY92 entitled "Tectonic Modelling in the Yucca Mountain Region". The report summarizes structural features of the Yucca Mountain region and compares them to structural features in the southwestern Mojave Desert where the Landers earthquake (June 28, 1992) produced significant surface disruptions.

Variations

3GTE06JM Enhanced thematic mapper imagery of Yucca Mountain

The thematic mapper imagery was ordered and is currently being processed at JPL. Anticipated delivery is early FY93. No adverse effects the baseline schedule are expected.

3GTE01KM Study plan submitted for review

The draft study plan received an informal review and was returned to USGS for further revision. Revision of the study plan will commence early in FY93. No adverse effects the baseline schedule are expected.

WBS 1.2.3.3 Hydrology

Principal Investigator - D. Appel

OBJECTIVE

To conduct hydrologic investigations to evaluate the suitability of the surface and subsurface environment for siting a nuclear waste repository.

WBS 1.2.3.3.1 Geohydrology

OBJECTIVE

To provide information about geohydrologic characteristics, processes, and conditions, both favorable and potentially adverse, to support resolution of the performance and design issues through the development of a credible geohydrologic model of Yucca Mountain and vicinity. (SCP Section 8.3.1.2)

WBS 1.2.3.3.1.1 Description of the Regional Hydrologic System

OBJECTIVE

To develop a conceptual model of the regional hydrologic system to assist in assessing the site's suitability to contain and isolate waste. (SCP Investigation 8.3.1.2.1)

WBS 1.2.3.3.1.1.1 Precipitation and Meteorological Monitoring for Regional Hydrology

Principal Investigator - A. Flint

OBJECTIVE

To characterize the area surrounding Yucca Mountain in terms of precipitation and other meteorological data and their relationship to surface runoff and infiltration; and to provide input into rainfall-runoff model development for the Fortymile Wash drainage basin. (SCP Study 8.3.1.2.1.1)

SCP 8.3.1.2.1.1.1 Precipitation and meteorological monitoring 0G3311E2

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GMM02A Monitor stations and tipping-bucket gauges FY92

All weather stations and tipping-bucket precipitation gauges are operating satisfactorily. All maintenance has been completed for the year. All weather station and tipping-bucket gauge data have been downloaded from the field sites.

3GMM03A Calibrate tipping-bucket rain gauges

No additional tipping-bucket rain gauge calibrations were required during the month. This activity is complete.

3GMM05A Acquire regional meteorological data-FY92

Regional precipitation, temperature, and some evaporation data were obtained for the month of April for Nevada and May for California. We are working with the Western Region Climate Center (WRCC) to obtain digital historic records for numerous sites in southern Nevada and southern California. Statistical analyses are also available from WRCC for each site. It is planned to incorporate these statistical products into our study of regional precipitation.

3GMM07A Monitor collection gauge network-FY92

The collection gauge network, although prepared for precipitation, measured none in September. This was a very dry summer in the Southwest.

3GMM20A Deploy 8-inch collection rain gauge network

The 8-inch collection gauge network is complete. There are 10 gauges deployed. Each has oil in it to prevent precipitation evaporation. There are 7 additional gauges which may be used to complement the proposed tipping-bucket network.

3GMM23A Collect NTS lightning data-FY92

The collection and archiving of FY92 lightning strike data were completed.

3GMM034 Analysis of regional data-FY91

A preliminary analysis of regional precipitation data was completed.

3GMM070 Collect GOES data-FY92

Collection and archival of GOES data were completed for FY92.

3GMM100 Monitor daily weather patterns-FY92

Work on collecting and archiving synoptic weather data was completed for FY92. This work will continue into FY93. September was a very dry month with no precipitation recorded at Yucca Mountain. The western U.S. continued under a dome of high pressure which brought above-normal temperatures and below-normal precipitation.

Quality Assurance

3GMM067 Implementation of all QA requirements

All QA requirements completed.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 20 hours were spent on the following:

Supported tours at the HRF. (8 hrs.)

Monitored drill rig activities at N-31 and N-32. (12 hrs.)

WBS 1.2.3.3.1.1.2 Runoff and Streamflow

Principal Investigator - D. Beck

OBJECTIVE

To collect basic data on surface-water runoff at, and peripheral to, Yucca Mountain and its hydrologic flow system; to use the streamflow data to describe the runoff characteristics of the area and assess the response of runoff to precipitation; to assess the potential for flood hazards and related fluvial-debris hazards to the Yucca Mountain Project; and to provide basic data and interpretations of surface-water runoff to investigations that evaluate the amounts and processes of infiltration and ground-water recharge at Yucca Mountain and surrounding areas. (SCP Study 8.3.1.2.1.2)

SCP 8.3.1.2.1.2.1 Surface-water runoff monitoring OG3311F2

Summary Account Manager - T. Kane

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRS002A.0G3311F2 Collect Fy 92 Runoff and Streamflow Data.

The month of September was dry, with no precipitation recorded on the test site, or throughout the regional network.

P. Cooley worked on Surface-water analysis.

T. Kane, PI, and P. Cooley ran levels at Eagle Mountain.

P. Cooley and J. Armino ran a field trip to area 18 on NTS to collect surface water data.

PI worked on adjustments to the fluid gage recorder.

P. Cooley worked on QA record documentation and tracking for FOI'S, AP'S, HP'S, QMP'S and related reading assignments for Yucca Mountain Project.

PI worked on Surface Water Analysis for 92 WY.

PI and P. Cooley ran a field trip to NTS to remove 92 WY surface water data. Activity complete September 30, 1992.

3GRS016A 0G3311F2 Complete installation of 2 Amargosa gages

Pagany Wash gage is in place. Instrumentation will take place in the next two weeks. Permits were received (through DOE) to install a streamflow gage on the Amargosa river at Stateline.

3GRS022A 0G3311F2 Complete FY83/85 data and prepare report.

Report undergoing final review.

Variances

3GRS016A 0G3311F2 Complete installation of 2 Amargosa gages.

Impact - instrumentation of Pagany Wash delayed. PI required additional time in responding to NRC comments and a Regional Surface Water Review. Schedule delay two weeks.[P]

3GRS022A 0G3311F2 Complete FY83/85 data and prepare report.

Impact - District chief requires a review to be done by section chief before final approval. Schedule delay estimate one month.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 98 hours were spent on the following:

PI worked on monthly PACS. (8 hrs)

P. Cooley involved with Surface and Ground Water training. (40 hrs)

P. Cooley in preparation for Regional Surface Water review. (26 hrs)

PI underwent Regional Surface Water review. (24 hrs)

SCP 8.3.1.2.1.2.2 Transport of debris by severe runoff 0G3311G2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

0G3311G2 Aerial reconnaissance of severe runoff features

D. Grasso received 1990 and 1991 stereo aerial photographs of debris flow sites at Potosi Mountain and Copper Canyon, Nevada. The photos were computer digitized, georeferenced, and color enhanced to better distinguish between various pre- and post-flow landscape attributes. Preliminary mapping of debris flow surges at Copper Canyon was conducted. Three-dimensional computer images of these areas will be prepared to show the sizes of the debris flows, and to better discern processes of debris transport by severe runoff.

P. Glancy co-authored a report entitled, "Volumetric Analysis of Debris Eroded Off a Hillslope Near Yucca Mountain, Nevada, During a Convective Storm." The first draft of this report is complete and was submitted for colleague review through the HIP reports unit.

D. Grasso talked with J. Coe about his interpretive report on debris flow processes and volumetric computations at Jakes Ridge—the site of an extensive debris flow in 1984 near Yucca Mountain and Fortymile and Yucca Washes (see title, above). D. Grasso was asked to be a technical reviewer of this publication manuscript.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 3 hours were spent on the following:

D. Grasso participated in a project review by P. Scott, USGS, for this study.

WBS 1.2.3.3.1.1.3 Regional Ground-Water Flow System

Principal Investigator - J. Czarnecki

OBJECTIVE

To define the potentiometric distribution hydraulic properties, and recharge and discharge for the regional ground-water flow system to determine the magnitude and direction of ground-water flow. (SCP Study 8.3.1.2.1.3)

SCP 8.3.1.2.1.3.2 Regional potentiometric level distribution and hydrogeologic framework studies

0G3311B2

Summary Account Manager - J. Czarnecki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG053 Locate additional piezometers in the Amargosa

J. Czarnecki and G. Buchanan conducted hydrochemical sampling in a well located on the west side of Franklin Lake playa. After sampling, the well was plugged per agreement with the California State Lands commission. A report on that activity was also prepared.

3GRG054 Prepare report on existing regional water level data

M. Ciesnik continued responses to technical-review comments on a draft Open-File Report entitled "Ground-water data from wells in Nye and Inyo Counties, Nevada-California."

3GRG010 Analyze regional water levels

See 3GRG053.

3GRG003 Measure water levels in Amargosa Desert

Several wells were measured in the southern part of the Amargosa Desert.

3GRG009 Analyze hydrostratigraphy and structure

S. Keller submitted a report entitled "Lithologic and Geophysical Logs from U.S. Borax & Chemical Corporation Exploration Boreholes, Amargosa Desert, Nevada-California" for pre-technical-review screening by T. Brady. Additional data is forthcoming from the mining company for inclusion in the report.

Quality Assurance

3GRG009 Analyze hydrostratigraphy and structure

M. Ciesnik began reviewing QA issues pertinent to the report submitted by S. Keller entitled "Lithologic and Geophysical Logs from U.S. Borax & Chemical Corporation Exploration Boreholes, Amargosa Desert, Nevada-California".

Planning and Operations

3GRG053 Locate additional piezometers in the Amargosa

J. Czarnecki continued discussion of possible participation in renewed drilling of oil-test holes in the Amargosa Desert with an operator who has requested permits to access sites relinquished by another oil company. The operator indicated that a decision to pursue drilling would be made by October 15, 1992.

3GRG007 Prototype equipment testing for small diameter wells

Additional testing of a small-diameter pump jack was done in a well on the west side of Franklin Lake playa. An 8,000-lb capacity winch was used to lower 411' of 1 1/4" steel tubing and sucker rod down 2" diameter casing. The observation well was pumped to dryness in about 1 hour at a rate of about 5 gpm. Equipment installation and removal from the well went very smoothly.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 60 hours were spent on the following:

J. Czarnecki prepared chain of custody forms for water samples from well NFL-1 and forwarded them and the samples to W. Steinkampf, Z. Peterman, and E. Gutentag (USGS).

A review of SCP activity 8.3.1.2.1.3.2 was made by M. Ciesnik for overall compliance with criteria 8 of the QA Program. As a part of this effort all required TDIFs were submitted to the USGS QA office for extant data generated by this activity.

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

Project publications on various aspects of characterization of the regional ground-water flow system were sent to W. Osterkamp for citation in a report on indirect estimation of recharge in Fortymile Wash.

J. Czarnecki performed technical reviews of USGS Study Plans 8.3.1.5.2.2. (Characterization of site ambient thermal conditions) and 8.3.1.8.5.2 (Characterization of intrusive igneous features).

J. Czarnecki attended a technical presentation by Z. Peterman on results of water sampling and analyses for isotopes of strontium in the vicinity of Yucca Mountain.

J. Czarnecki presented descriptions of activities related to Saturated Zone Studies at a public open house of the Hydrologic Research Facility, September 26, 1992. About 80 persons came through the exhibits related to the Saturated Zone Studies.

J. Czarnecki performed a colleague technical review of a report entitled "Multi-faceted approach to interpreting relations between fractures and movement of ground water and implications for assessing hydrologic properties of tuffaceous rocks at a potential high-level nuclear waste repository site, Yucca Mountain, Nye County, Nevada" by A. Geldon.

SCP 8.3.1.2.1.3.3 Fortymile Wash recharge study OG3311C2

Summary Account Manager - C. Savard

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG003B Complete report on channel loss

Completed a draft report describing work done in the Middle East combining channel geometry techniques and modeling. A report on application of the techniques to the Yucca Mountain area is being drafted.

3GRG028 Collect FY92 moisture data

Read rain wedges at UE-25 UZN#92 and UE-29 UZN#91. Neutron logged UE-25 UZN #92 and UE-29 UZN #91. Made depth to water measurements in UE-29 UZN #91, UE-29 a#1, and UE-29 a#2.

Prepared neutron logging cables by labeling the cables with depth markers and then protecting the cables with shrink tubing. This activity is complete.

3GRG025 Construct ponding/infiltration sites

Determined a 4 hole layout to monitor infiltration from a large ring with neutron measurements. One hole will be in the center of the ring. The other three holes will be outside the ring at varying distances. The locations will be downstream, along the flow cross section, and upstream at equal angles from the other two outside holes.

3GRG101A Perform prototype infiltration test

Conducted a field test of water delivery system for rapid delivery of water to the infiltration tank with energy dissipation so sediments in the bottom of the tank would be minimally disturbed. Conducted a field test of an electronic system to track and record water level in the infiltration tank. This activity was to develop procedures at the large infiltration tank sites with neutron logging support. Existing neutron holes in Fortymile Wash are needed to monitor natural infiltration, and therefore can not be used for infiltration testing.

3GRG101A Perform prototype infiltration test (CONTINUED)

Since new holes are not scheduled to be drilled until 1996-97 this activity can not be finished as envisioned for several years. Further refinement of the infiltration test procedure will be accomplished with small ring infiltration testing to be performed in FY93.

Planning and Operations

3GRG001B Complete criteria letter ponding sites
Continued to draft criteria letter.

3GRG006B Complete criteria letter FM & FMN holes
Continued to draft criteria letters.

3GRG010B Continue to site FMN & FM holes
Determined approximate locations of the proposed FMN & FM holes. Final locations will need to be determined after site inspections. This activity is complete.

Variations

3GRG001B Complete criteria letter ponding sites
Preliminary locations for ponding sites have been sited. The infiltration test procedure has not been finalized and the extent of other DOE contractors involvement is not decided. Infiltration tests at the ponding sites will not be run until neutron logging holes are completed (1996-97). Additional time is required to complete the draft criteria letters. No impact on major deliverables is expected.

3GRG003B Complete report on channel loss
Work is progressing on the reports. The first report draft has been completed and technical reviewers are being sought. These deliverables will be delayed, but this will cause no delay in the final report in 1999.

3GRG006B Complete criteria letter FM & FMN holes
Additional time is needed to complete the draft criteria letters. Hole locations need to be sited and the sampling schedule during drilling defined. No impact on major deliverables is expected. Note that holes are not scheduled to be drilled until 1996-97.

3GRG106A Analyze imagery of Fortymile Wash
Time has not been available for the project participants to get together with the personnel with the imaging equipment. No impact on major deliverables is expected.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 60 hours were spent on the following:

Submitted to the American Geophysical Union for the 1992 Fall Meeting the abstract 'Runoff, Infiltration, and Recharge near Yucca Mountain, Nevada, 1992'. The abstract describes hydrologic data collected in Fortymile Wash documenting localized recharge to the ground-water system. Prepared slide material for presentation of the data at the AGU meeting and other informal USGS technical data exchange meetings.

Reviewed depth to water measurements in UE-29 a#1, UE-29 a#2, and UE-29 UZN #91. These data will be used in interpreting current conditions in Fortymile Canyon and are targeted for publication at some later date.

SCP 8.3.1.2.1.3.4 Evapotranspiration studies OG3311D2

Summary Account Manager - J. Czarnecki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRG209A Obtain permits for piezometer construction

Permit application will not occur because field activities were reprioritized. The chloride profiling method will be attempted and results evaluated to determine the extent of ground-water discharge.

3GRG206A Analyze Franklin Lake hydrochemical data

Water samples were obtained from well NFL-1 on the west side of Franklin Lake playa. Field parameters were obtained and samples submitted for lab analyses.

Planning and Operations

3GRG030: Select wt/et sites

Several sites in the northern part of Franklin Lake playa have been identified as likely sites for deployment of piezometer nests and Bowen ratio sites. This activity is complete.

Variations

3GRG201A Perform prototype tests on ET measuring technique

Equipment was received for a Bowen-ratio measuring station from Campbell Scientific. Because of the delay in receipt of this equipment, test deployment of the station is expected to occur between late October and mid-November.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 2 hours were spent on the following:

Copies of published reports entitled "A Hint of Recharge at Franklin Lake Playa, Inyo County, California" and "Does Localized Recharge Occur at Franklin Lake Playa?" were sent to L. Kroitoru, M. Magaritz, D. Ronen, and J. Lamonaca.

J. Czarnecki reviewed an abstract entitled "Surface Energy Balances at Monsoon '90" by D.I. Stannard. The abstract is slated for AGU Fall 1992.

WBS 1.2.3.3.1.1.4 Regional Hydrologic System Synthesis and Modeling

Principal Investigator - J. Czarnecki

OBJECTIVE

To synthesize hydrologic, geologic, hydrochemical, and geophysical data into a model and make a qualitative analysis of how the system is functioning; and to represent quantitative observations of hydrologic data pertaining to the ground-water flow system in a comprehensive flow model. (SCP Study 8.3.1.2.1.4)

SCP 8.3.1.2.1.4.4 Regional three-dimensional hydrologic modeling 0G3311K2

Summary Account Manager - J. Downey

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GRM040 Interface GIS with Ground-water Models

F. D'Agnesi, K. Turner and C. Faunt met to review the applicability of using ERMA for 3-D modeling. They decided to move forward with model development on the system. This activity is complete.

Technical Activities (CONTINUED)

3GRM08A Begin Calibration of Numerical Model

F. D'Agnese began preliminary development of 3-D model grid for three degree area in ERMA.

This activity will continue through FY93 as Construct and Calibrate 3-D Model.

3GRM13A Develop Visualization Software

F. D'Agnese, C. Faunt, J. Downey, D. Perfect, and K. Turner attended an update on Dynamic Graphic's IVM software. Some of their new geologic techniques were reviewed. This software may prove helpful with visualization, provided better input techniques can be developed.

Planning and Operations

3GRM13A Develop Visualization Software

F. D'Agnese, C. Faunt and K. Turner met with J. Nelson (SAIC) and R. Spengler (GSP) to discuss coordination of regional hydrogeologic and site geologic models. The group decided to meet on a regular basis to review progress and troubleshoot any potential problems with software.

Work Performed but not in Direct Support of the Scheduled Tasks

C. Faunt, F. D'Agnese, K. Turner, J. Downey, D. Perfect (and J. Nelson- SAIC/GSP) attended the 2-day Geotech '92 conference at the Denver Tech. Center. Topics included several sessions devoted to 2-D and 3-D GIS applications. The group also met with Lynx Geosystems, Vancouver BC, to discuss upcoming work of both the Yucca Mountain geologic (block scale) model and the Death Valley hydrogeologic (regional scale) model construction.

An estimated 8 hours were spent on the following:

Paper by H. Claassen and J. Downey using program SNODIF was submitted to the manuscript section and is in final typing for submission to the Director's office for approval.

J. Downey completed review of a paper (Open-File) by E. Gutentag, et.al., Downey also completed review of a paper by Faunt and a paper from the AWRA journal.

J. Downey started evaluation of the CLRO series of software in support of the software QA program.

WBS 1.2.3.3.1.2 Unsaturated Zone Hydrology

OBJECTIVE

To develop a model of the unsaturated zone hydrologic system at Yucca Mountain that will assist in assessing the suitability of the site to contain and isolate waste. (SCP Investigation 8.3.1.2.2)

WBS 1.2.3.3.1.2.1 Unsaturated Zone Infiltration

Principal Investigator - A. Flint

OBJECTIVE

To determine the effective hydraulic conductivity, storage properties, and transport properties pertinent to unsaturated zone infiltration as functions of moisture content or potential; and to determine the present and to estimate the future spatial distribution of infiltration rate over the repository block at Yucca Mountain. (SCP Study 8.3.1.2.2.1)

SCP 8.3.1.2.2.1.1 Characterization of hydrologic properties of surficial materials 0G3312Z2

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI005A Install and check geophysical instruments

Geophysical instruments have been installed and checked in the geophysical logging van and are in working condition. Gamma-Gamma logging and Neutron logging were performed. Data were collected by two sources methods. All electronics and instrumentation in the logging van are operational.

3GUI007A Analyze spatial variability of soil physical properties

Two watersheds, Split Wash and Pagany Wash, were studied in detail. These washes were divided into several soil units based on their surficial geology and topographic setting. Hill slope hydrology may be the dominant factor in controlling the variability of soil properties.

3GUI011A Continue borehole tests in neutron hole

Borehole tests in the neutron holes have been completed. Additional monitoring and logging of boreholes will be carried out under the Mission 2001 PACS.

3GUI020A Prepare Open File Report outcrop samples

Analyses of seven outcrop transects has been done. Data collection has been completed and organized. The outline for the open file report is completed.

SCP 8.3.1.2.2.1.2 Evaluation of natural infiltration OG331212

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI311A Continue analysis of moisture profiles

The detailed analysis of moisture profiles along with mass balance calculations has indicated the need for an organized data base for ease of file management and manipulation, along with the need to easily apply the new field calibration equation to all neutron logs. The data base Paradox is being used for this purpose and all files and information regarding the neutron holes over the last 8 years is being input. As this project progresses all the files will be proofed for drift and errors, and will be ready for large scale statistical analysis.

3GUI303 Continue small scale deterministic model FY92

An extended abstract has been written to present the 2-D model in Pagany Wash showing the fluctuations in moisture profiles with annual climatic changes at the High Level Radioactive Waste Conference. Additional simulations were run to help in writing the abstract and an outline for the paper was written.

3GUI340 Procure tritium analysis

Samples are awaiting analysis in Denver.

3GUI358 Collection & analysis evaporation pan data

Automated evap pan is operational and data is being collected regularly. The second evap pan is not automated and is being measured by hand. This exercise will serve as a check for both methods. The second pan eventually will be moved to the mountain and set up as an automated system at the mouth of one of the washes, probably Split Wash (once there is a Bowen ratio station running there) or Pagany Wash.

Technical Activities (CONTINUED)

3GUI369 Initiate collection and analysis ET data

This activity is ongoing in conjunction with the small deterministic model which requires surface boundary layer ET estimates. Attempts are being made to boil the data down into an annual cycle which can be input into TOUGH in the uppermost layer to drive upward moisture loss and help in the mass balance calculations.

3GUI381 Log neutron access boreholes FY92

Neutron holes were logged again this month which completes the FY92 logging schedule. (T)

3GUI386 Continue drilling new neutron access holes

There were delays in starting the two boreholes in Split Wash, N-31 and N-32, due to environmental surveys and tracer permits. These two boreholes are meant to serve as analogs to the intensively analyzed boreholes N-54 and N-55 which were drilled in WT-2 Wash. They both begin in lower Tiva Canyon Hackly or upper Columnar and will both penetrate through the Topopah Spring caprock. N-31 is located in a channel and N-32 is on a ridge with little alluvial cover. This is the same topographic situation as in WT-2 Wash but is farther north and situated in the middle of the repository zone. These holes will help to assess the horizontal variability of the deep moisture profiles for help in analysis of the deep borehole hydrologic processes. N-31 is complete and N-32 has been started.

3GUI404 Installation of TDR network

Remaining instrumentation necessary to automate the system has been set up and tested for the beginning of the field calibration of the TDR system.

3GUI406 Initiate collection and analysis TDR data

Additional TDR probes need to be installed at the Jackass Flats site in order to get a complete set of measurements for the field calibration. Data collection will begin as soon as the field site is completely instrumented.

SCP 8.3.1.2.2.1.3 Evaluation of artificial infiltration 0G331222

Summary Account Manager - A. Flint

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUI606 Prototype infiltrometer field testing

A single and a double ring infiltrometer prototype system was developed for use on the various geohydrologic surfaces found throughout Yucca Mountain. A field calibration procedure was formulated and tested once in the field.

3GUI608 Develop sampling scheme/field infiltrometer study

Five sets of probes for the Time-domain reflectometry unit (TDR) were monitored under in-situ moisture conditions. Two sets of the probes were also monitored as 30 L of water infiltrated into an area around the probes. Gravimetric moisture samples were taken from the infiltration area to calibrate the TDR moisture reading with the actual mass and volumetric wetness. Plans for specific sampling schemes for the infiltrometer study sites were completed.

Technical Activities (CONTINUED)

3GUI616A Develop prototype ponding study

Various pre and post-infiltration event sampling schemes were evaluated for the prototype ponding study sites. It was decided that bulk soil and unconsolidated sediment samples will be taken prior to any application of water. Layout of field instrumentation, radio telemetry equipment, and other field equipment has been completed.

WBS 1.2.3.3.1.2.3 Percolation in the Unsaturated Zone - Surface Based Study

Principal Investigator - J. Rousseau

OBJECTIVE

To determine the present *in situ* hydrologic properties of the unsaturated zone hydrogeologic units and structural features; to determine the present vertical and lateral variation of percolation flux through the hydrogeologic units and structural features; to investigate the relationships between present flux and past climatic conditions; and to determine the effective hydraulic conductivity, storage properties, and transport properties as functions of moisture content or potential. (SCP Study 8.3.1.2.2.3)

SCP 8.3.1.2.2.3.1 Matrix hydrologic-properties testing OG3312U2

Summary Account Manager - D. Soeder

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP009A Construct and test low-flow permeameter

Construction of this equipment is proceeding. The layout work for the device has been completed and the coreholders have been installed on the instrument frame. Completion of the apparatus will take place in FY93.

3GUP014A Continue modeling imbibition

Evaluation of the relationships between water characteristic functions and permeability in the unsaturated zone continued on the model developed in cooperation with LEL.

3GUP019A Water retention pressure plate tests

This activity is complete. The technique has proven to be very difficult to apply accurately to the tight, densely welded tuffs of Yucca Mountain, and will probably only be utilized in the future on porous tuffs or unconsolidated soils material. Water retention measurements on welded tuff will likely be made using a SPOC technique or some other procedure.

3GUP023A Develop pore geometry technique

The image digitizer board ("frame-grabber") for the computer was received and installed along with the image analysis software. All of the equipment required for this technique now has been obtained. Analyses of thin sections using this technique will be carried out in FY93.

3GUP028AA Psychrometry on selected transect samples

A technical procedure for analyzing Quality-Affecting core samples in the CX-2 chilled-mirror psychrometer is still in review.

Technical Activities (CONTINUED)

3GUP029A Transect moisture characteristic curves

Modeling of sorption data obtained on transect samples from the CX-2 psychrometer is complete. Moisture characteristic curves were fitted to the data using van Genuchten and Brooks and Corey equations.

3GUP30AA Neutron core physical property measurements

The basic measurements called for in the HP-229 procedure were completed on all of the neutron-access borehole cores received at the HRF from the SMF as of September 30, 1992. The samples analyzed consist of USW-UZN-11, 15, 16, 17, 27, 36, 37, 38, 53, 54, 55, and 64. The only measurements remaining are the high-temperature drying on N-54 and N-55 at 800° C, and repeat porosity/density measurements on portions of the N-55 core from samples preserved in Lexan cylinders. These will be completed in FY93.

3GUP31AA Neutron core gas pycnometry measurements

The technical procedure was reviewed by USGS QA and returned for revision. Approval of this procedure will allow Quality-Affecting core samples to be analyzed in the pycnometer in FY93.

SCP 8.3.1.2.3.2a Surface-based boreholes studies 0G3312V2

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP003E Instrument and monitor HRF boreholes

Activity is complete. Monitoring of sensors in the HRF boreholes continued throughout the reporting period. Borehole facility was also used to service startup of the Integrated Data Acquisition System (IDAS). Boreholes will continue to be monitored throughout FY93.

3GUP021E Construct/test/evaluate multi-station gas sampling apparatus

Tests of this system were conducted using the primary standard two pressure humidity generator to provide a source of wet gas at a constant dewpoint temperature. These tests indicated that a stable flow of mixed gas (dry nitrogen plus wet source gas) could be established with the regulation, control, and measurement devices used in this apparatus. So far the system appears to be operating as originally conceived and designed. Software to operate this system is 95% complete. It will be tested again during the 2nd week of October. Accuracy evaluation will be conducted during the month of January, 1993.

In order to complete evaluation testing, the mass flow calibration system at the HRF must be fully operational. Manufacturer's representative is scheduled to check out and certify proper installation of this system during the first week of October, 1992.

3GUP053E Develop electrical diag/performance veri SPECS elec equip

Results of primary transfer standard resistor testing (ref. 3GUP059E) will be incorporated into preparation of appropriate electronic diagnostic verification specifications.

Quality Assurance

3GUP059E Complete proc therm/press/psycro/cal tech proced

All three technical procedures are in final draft review and will be submitted upon completion of tests using precision transfer standard resistors to verify performance of the DAS electronics used in calibrating these sensors. These tests are scheduled for the week of October 7, 1992. Completion of this activity will be delayed approximately 1 month, until the end of October 1992.

Planning and Operations

3GUP035E Prepare for instrumentation of UZ-16

Geophone cable mounts for instrumenting UZ-16 have been designed and prototypes built. Manufacturers are being canvassed for fabrication of 100 geophone cable mount assemblies. Testing of tremie pipes with different internal coating finishes was conducted. The object of testing was to identify a suitable tremie pipe for stemming UZ boreholes with calcium sulfite grout. Tests so far have indicated that rigid steel pipe, regardless of the type of internal coating, is not resistant to internal build-up of grout. Flexible pipe (i.e. PVC or equivalent) has performed better than rigid pipe, and is being looked at as an alternative to steel. A criteria letter addendum for instrumenting UZ-16 was submitted to the DOE project office. This criteria letter also identified NTS contractor support needs for conducting the VSP field surveys at UZ-16. All preparatory work for instrumentation of UZ-16 per this activity is complete.

3GUP042E Prepare procurement documents for UZ-9 bh instr.

Final procurement documents for materials and supplies needed for instrumenting UZ9 borehole (actually UZ-14) are in preparation and should be ready for processing by the end of October 1992. In addition, procurements will include sensors, electrical cable, teflon tubing, etc., for instrumenting four of the existing UZ boreholes (UZ-7, -13, -4, & -5). Activity is on schedule and should be completed by planned finish date.

Variances

3GUP021E Const/test/eval mult-station gas sampling appar.

Planned finish date has slipped approximately 4 months. Construction and testing phase of this activity is pretty much complete. The final evaluation phase requires an operational mass flow calibration system, which will not be ready until the end of October. Schedule slip should not impact the project goal to have a fully operational gas sampling apparatus by September 1993, in time for scheduled instrumentation of the first UZ monitoring borehole.

3GUP059E Complete proc therm/pres/psycro/cal tech proced

Planned finish date has slipped approximately 1 month due primarily to lack of staff and other higher priority commitments. Slip should not impact long term project goals.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 208 hours were spent on the following:

Prepared semi-annual progress report for Site Vertical Boreholes - Activity 8.3.1.2.3.2. (10 hrs)

Provided on-site staff for monitoring drilling activity at UZ-16. (168 hrs)

Prepared memorandum and proposal to the DOE project office requesting approval of a plan to accelerate instrumentation of the existing UZ boreholes (UZ-4, -5, -7, and -13) in FY93. (20 hrs)

Prepared procurement documents for acquisition of additional IDAS instrument shelters in FY93. (10 hrs)

SCP 8.3.1.2.3.2b Vertical seismic profiling 0G331232

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP045B Identify/evaluate seismic source tool

At least two seismic source tools that can be run in a dry borehole for cross-hole tomography applications at the UZ-16 (UZ-9, -9a, -9b) borehole site have been identified. OYO has provided detailed information on their orbital vibrator. Bolt Industries information on their wall locking vibrator is still outstanding. The dry hole seismic source tool will not be needed until UZ-9 has been drilled. Best estimate for completion of this borehole is sometime in early to mid FY94. Testing of the dry hole source tools will be conducted in conjunction with cross-hole tomography testing at the CSM experimental mine in Idaho Springs. Acquisition of the tool will be arranged via a service contract for cross-hole tests at UZ-16 borehole site.

3GUP025B VSP prototype field test and data analysis

Field activities to test cross-hole tomography techniques are under way at the CSM experimental mine in Idaho Springs. The Bergen Park site has been temporarily abandoned because of difficulties encountered in trying to maintain a water-filled column in the source borehole. Data collection will take approximately one month. Conventional processing of data should be complete by planned finish date. Weather could impact schedule; road access to the testing site is difficult. If weather holds out through the month of October, activity will remain on schedule. Plan is to conduct comparative analysis of dry-hole source tools at this site some time in the Spring of 1993.

3GUP019B Cont. VSP lab/physical & comp sim: 2-d method

All data for the 2-D physical model has been collected. Four wave image data sets have been analyzed. Report is approximately 30% complete. Activity in on schedule.

Quality Assurance

3GUP030B Dev/write VSP tech procedure: data acquisition

A draft technical procedure for VSP field data acquisition has been written. Procedure is at project level for internal review and should be finalized by planned finish date.

Work Performed but not in Direct Support of the Scheduled Tasks

Started process to bring all VSP software, (commercial and home grown) into compliance with QMP-3.03 - Software Quality assurance program. Anticipate completion of this work by the end of November, 1992. Intent is to insure that all software that will be used for VSP data analysis at UZ-16 will satisfy QMP-3.03 requirements. VSP field surveys are scheduled to be conducted during the summer of 1993.

SCP 8.3.1.2.2.3.2c Integrated Data Acquisition System OG331242

Summary Account Manager - J. Rousseau

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP013C Development and module testing software-2

This activity is complete. Modifications to sensor reader were completed and monitoring of the HRF boreholes was successfully transferred from the local PC based DAS to the IDAS on September 13.

3GUP032C Construct prototype IDAS instr't shelter (IIS)

Construction of the prototype IIS is complete. Manufacturer is scheduled to ship unit to NTS on October 10, 1992. Work on the shelter foundation located adjacent to the HRF was started.

Technical Activities (CONTINUED)

3GUP051C Evaluate IDAS prototype-2, data from HRF-BH's

Data from the HRF boreholes collected by IDAS (see 3GUP013C) is being evaluated. Software to transfer HRF data via landline through the IDAS archiving computer is being written. Activity should be complete by planned finish date. Denver data base software is being developed to extract information from the IDAS data base.

3GUP050C Transfer Denver data, test data from HRF-BH's

Activity started with successful implementation of IDAS at HRF boreholes. Denver data transfer software is scheduled to be on-line during the week of October 13. Denver data base software is currently being developed to extract information from the IDAS data base. Activity should be completed by planned finish date.

3GUP023C Development and module testing software-4

Start of this activity is scheduled to begin during the first week of December. Activity has been delayed due to problems encountered with HRF conversion from local DAS to IDAS in June, 1992.

3GUP033C Evaluation of prototype IIS

Testing of the prototype IIS is scheduled to begin on October 1. Testing will run for approximately 10 days and should be completed before the manufacturer delivers the IIS to the NTS. Follow-on testing at the NTS includes testing of the electronic keyed entry system and the UPS. Activity should be completed by the planned finish date.

3GUP036C Installation and test microwave communication

Testing of the 10 MHz telemetry system was started. Field trials will begin the week of October 13. Activity was started ahead of schedule and should be completed by the end of October, 1992. (see also 3GUP035C)

Planning and Operations

3GUP035C Procure/deliver microwave datacom

FCC license for operating the IDAS telemetry network on a 10 MHz bandwidth is still pending approval. REECo telecommunications group has acquired 4 modems and transmitters to operate in this frequency band and has bench tested these units. Field tests are scheduled for the 2nd week of October. If field trials are successful, then these units will be purchased by REECo for the USGS. Capital equipment funds have been transferred to REECo to acquire the four units. This activity should be completed by the planned finish date.

Variations

3GUP023C Development and module testing software-4

The start of this activity has been delayed approximately 2.5 months. Delay was due primarily to difficulties encountered with initial efforts in June, 1992 to bring the IDAS on line to monitor the HRF boreholes. IDAS staff efforts were subsequently redirected to correct software deficiencies. The IDAS was successfully brought on-line. Delay should not impact project goal of instrumenting the first UZ monitoring borehole in September 1993.

3GUP033C Evaluation of prototype IIS

Activity will start approximately 2 weeks ahead of schedule.

3GUP036C Installation and test microwave communication

Activity started approximately 1.5 months ahead of schedule and will probably be completed 2 months ahead of schedule.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUP003 Complete construction of first support trailer

The support trailer cable hoist boom was completed. The boom stands 26 feet in height and will support the packer assembly as it is lowered and raised in the boreholes.

3GUP005D Purchase parts/assembly of 12" packer system #1

All required parts have been purchased and received. Construction technicians have completed the hose routing in the packer assembly.

3GUP010 Complete eng drawings/assembly/test instr, packer

Final drawings for support trailer tube and support trailer cable alignment system were inspected and signed off.

Quality Assurance

3GUP015D Tech. procedure/pressure transducer calibration

The technical procedure for Air-K pressure transducer calibration has been completed and submitted to QA.

Planning and Operations

3GUP014D Expand hyd research facility calibration lab

All equipment required for expansion of the HRF calibration lab to calibrate Air-K instruments has been purchased and delivered with the exception of two bell provers. The purchasing office has solicited suppliers and will release a purchase order early in October. This final purchase will complete the activity.

Variations

3GUP003 Complete construction of 1st support trailer

The construction of the first support trailer by USBR is delayed because the required staff has been assigned periodically to work on projects of higher USBR priority.

3GUP004 Complete QA for 8", 12" packers and trailers

The QA requirements under the control of USBR are delayed because the staff required to complete the goals has not been assigned.

3GUP005 Purchase parts/assembly of 12" packer system #1

The assembly of the first 12" packer system by USBR is delayed because the required staff has been assigned periodically to work on projects of higher USBR priority.

3GUP010 Complete eng. drawings/assembly/test instr. packer

Completion, assembly, and testing of USBR constructed instruments and packer have been delayed because the required staff has been assigned periodically to work on projects of higher USBR priority.

3GUP014D Expand hyd research facility calibration lab

Expansion of the calibration laboratory is complete except for delivery of 2 bell provers. Solicitations for a supplier have been issued and a purchase order will be issued in early October. Delivery of the bell provers will close out this activity.

Variances (CONTINUED)

3GUP008D Purchase parts & assembly of support trailer #2

Construction of the second support trailer by USBR is delayed because the required staff has been assigned periodically to work on projects of higher USBR priority.

WBS 1.2.3.3.1.2.4 Percolation in the Unsaturated Zone - ESF Study

Principal Investigator - M. Chornack

OBJECTIVE

To conduct hydrologic tests in the ESF to supplement and complement the surface-based hydrologic information needed to characterize the Yucca Mountain site; to provide phenomenological information for analyzing fluid flow and the potential for radionuclide transport through unsaturated fractured tuff; and to provide information about water flow through unsaturated fractured tuffs. (SCP Study 8.3.1.2.2.4)

SCP 8.3.1.2.2.4.1a Prototype testing of intact fractures OG3312N2

Summary Account Manager - G. Severson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS007A Write technical procedure; moire calibration

An X-Y positioner shall be used to calibrate the equipment set-up as it is currently configured. However, a traceable, standard reference material (SRM) will be ultimately be used for the USGS applications. A SRM will give the equipment more flexibility for possible field applications. The technical procedure will not be completed until the SRM is made and used in the laboratory.

3GUS004A Write Open File Report; Intact fracture sampling

Some progress was made on this draft.

3GUS001A Select analog site for fracture sampling

The "north test pit" (test pit #1) at Fran Ridge, Yucca Mountain was deepened. This site was inspected for possible sampling sites. There are areas in the test pit which could yield cores suitable for testing. When the mapping work is complete, the bottom of the test pit will be mucked out entirely, and possibly some surfaces of the test pit disturbed to enhance evaluation of sampling sites.

Quality Assurance

3GUS023J Journal paper, moire bench-mark and calibration

The paper titled, "Projection Moire as a Tool for the Automated Determinations of Surface Topography," was published (Nov/Dec 1991) in the Proceedings of the 1991 International Symposium on Optical Applied Science and Engineering. A disposition for NCR (92-32) was drafted and submitted to the USGS QA program on 11 August. The USGS-QA Office requested a memo in September to reiterate what was written in the NCR disposition, apparently for emphasis. This memo should enable the paper to continue processing.

Variations

3GUS006A Continued moire projection: method development

Work continues to progress using image digitization and processing to look at moire fringes. Work on bringing the USGS video camera, imaging board and software, and the high resolution monitor into the moire projection system continues. Additional updates to the imaging software were installed and worked with in September. Unfortunately, not all the diskettes for the upgrades (those for custom programming were not included) were shipped.

3GUS012J Complete journal paper-Moire Automation

A final draft incorporating the technical review comments and the format comments from Applied Optics for the paper titled, "Implementation and Use of an Automated Projection Moire Experimental Set-Up" was submitted to the HIP Reports Section in August for processing and is still being processed.

3GUS013J Complete journal paper; FFT Moire

A draft of this paper written by Dr. Cardenas will be submitted to the HIP Reports Section for technical review in late October 1992.

3GUS014J Complete journal paper: Stereo viewing moire

This draft was delayed, but will be submitted to the USGS-HIP Reports Section for technical review in early October 1992 before the FFT journal paper draft is submitted.

3GUS004J Document computer software; Moire QA

No progress on this effort. Most of the time in the laboratory concerned upgrading the software for the high resolution equipment and becoming familiar with the new software for the imaging hardware.

3GUS014A Complete design fabricate low-pressure vessel

Final drawings for machine work are complete with the exception of some changes in the choice of fittings. Estimates from possible vendors/machine shops will be evaluated in October.

3GUS008J Prepare axial core/vessel; air permeabilities

Further progress dependent on fabrication of low-pressure vessel.

3GUS010A Continued development: axial fracture

Laboratory or field work was not started in FY92. However, the proposed drill rig, a Diamec 260, was inspected at the subdock at Yucca Mountain, NV. There are two drills available that were transferred from the Hanford site. Both appear to be in very good condition with the exception of a "red tag" indicating a bolt needs replacing. The manuals and literature apparently did not accompany them when they were shipped to the NTS four years ago. However, Christensen Mining Products in Salt Lake City, UT is sending operating manuals and literature.

3GUS003J Evaluate alternative axial fracture coring

Some progress. See description under activity 3GUS010A.

3GUS001J Complete design, confining vessel: axial core

Drafts of the sketches for the low-pressure vessel are almost complete. Some of the materials for the vessel have been ordered and the final drawings for the exact location of the penetrations are complete with the exception of some changes to the fittings used. The completed drawings for the low-pressure vessel are a prerequisite for the confining cell design.

Variances (CONTINUED)

3GUS006J Prepare Final Report Projection Moire

A draft of this report is scheduled to be submitted to the USGS-HIP Reports Section for technical review in December 1992.

3GUS015A Begin unconfined tests gaseous phase

This work is dependent on the completion of activity 3GUS014A.

3GUS016J Complete design, radial fracture test vessel

This activity will begin when the low-pressure vessel design is complete and the vessel is being fabricated.

3GUS015J Complete journal paper; Detailed moire

This paper is presently scheduled to be submitted to the USGS-HIP Reports Section the end of October 1992. This paper will be written prior to the final report, activity 3GUS006J.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 20.5 hours were spent on the following:

Revised and re-submitted ACSR per USGS-QMP-3.15,R0 (four times during September 1992) for the intact fracture test to the USGS-HIP GAC representative (4 hours).

Attended training, "Working in the USGS/WRD and YMPB, 22-23 September (10 hours).

Reviewed text of technical procedure, Intact Fracture Sampling, Radial Sampling, USGS-HP-250, R0, prior to technical review (2.5 hours).

Started draft of section regarding Intact Fracture Test in the ESF for revised Study Plan for UZ Percolation Studies, WBS no. 1.2.3.3.1.2.4 (4 hours).

Staff supporting the Prototype Intact Fracture Test, SCP Activity 8.3.1.2.2.4.1a continued to assist the Prototype Percolation Test, SCP Activity 8.3.1.2.2.4.2a during FY92. M. Brodie contributed approximately 0.5 FTEs of the 0.75 FTEs he worked during FY92 and S. Anderton approximately 0.75 FTEs.

SCP 8.3.1.2.2.4.2a Prototype infiltration (percolation) testing OG331202

Summary Account Manager - F. Thamir

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUS026B Prepare data report of large block ponding test

Data is being collected, indexed, backed-up, processed, and archived on computer disks. The data include water potentials, electrical resistance, and Time-Domain Reflectometry (TDR) to estimate water saturation within the block. The report preparation has been delayed.

3GUS014B Conduct ponding test on large block, final stage

Activity started on May 11, 1992. A positive water pressure of +12 cm of water is applied to the top of the block. The water flow rate was around 100 cubic cm of water per day, and gradually decreased to zero. Twelve thermocouple psychrometers were replaced with newly calibrated ones to confirm water potential values in the major fracture which indicated conditions close to 100% water saturation. The water potential values from the new instruments were close to the values from the original instruments.

3GUS014B Conduct ponding test on large block, final stage (CONTINUED)

During the replacement process, some salt crystal growth was noticed in the holes that intersected the major fracture in the block. A chemical analysis of these crystals will be made next month. The psychrometers that indicate saturated conditions will be replaced with tensiometers. A vacuum will be applied to the block to try to initiate water flow into it.

3GUS004B Write psychrometry technical procedure

No progress during this month. Further work on this activity will be delayed since more effort will be required for activity 3GUS014B.

Variations

3GUS014B Conduct ponding test on large block, final stage

The finish date is tentatively delayed till 30-Nov-92. This is required to resolve the cause for water not flowing through the block, even at small positive water pressure. This is important because if the same conditions occur in the field, then the ESF test with the current design will not produce the data that was intended to be gathered, i.e. water flow rates through fractured welded tuff blocks at different water pressures and saturations. A talk entitled "Laboratory Study of Water Infiltration into a Block of Welded Tuff" was prepared and presented at the USGS Unsaturated-Zone Interest Group meeting. Experimental procedure and some preliminary results of this test were presented. Some participants suggested further experiments to try to identify the cause for flow cessation. The suggestions will be implemented next month. A summary with the same above mentioned title was presented to the 1993 International High-Level Radioactive Waste Management Conference which will be held in Las Vegas, Nevada between April 26 - 30, 1993.

3GUS035B Measure rock sample hydrologic properties

Originally this set of measurements was scheduled to be made at the matrix hydrologic properties laboratory in Nevada. However, the laboratory staff were not able to make the measurements because they are currently building a system that is capable of measuring small permeabilities (in the nanodarcy range which is the range for the samples to be measured). This delay will not affect the overall finish date since the completion of this activity is linked with the large block ponding experiment which is taking longer than expected.

3GUS034B Prepare data report of hydrologic properties

This activity is linked to the above mentioned activity (3GUS035B). This variance will not cause a delay in the schedule for the same reasons given in the above activity.

3GUS004B Write psychrometry technical procedure

The finish date will be delayed since extra effort will be required for activity 3GUS014B as indicated above. A preliminary finish date is set to 01-Nov-92.

3GUS029B Prepare data report of imbibition experiments

The finish date will be delayed since extra effort will be required for activity 3GUS014B as indicated above. A preliminary finish date is set to 31-Dec-92.

3GUS101B Conduct imbibition experiments on small samples

The finish date will be delayed since extra effort will be required for activity 3GUS014B as indicated above. A preliminary finish date is set to 30-Nov-92.

3GUS026B Prepare data report of large block ponding test

The finish date will be delayed since extra effort will be required for activity 3GUS014B as indicated above. A preliminary finish date is set to 31-Jan-93.

WBS 1.2.3.3.1.2.6 Gaseous-Phase Movement in the Unsaturated Zone

Principal Investigator - M. Chornack

OBJECTIVE

To describe the pre-waste-emplacment gas-flow field; to identify structural controls on fluid flow; to determine conductive and dispersive properties of the unsaturated zone for gas flow; and to model the transport of water and tracers in the gas phase. (SCP Study 8.3.1.2.2.6)

SCP 8.3.1.2.2.6.1 Gaseous-phase circulation study 0G3312W2

Summary Account Manager - M. Chornack

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GGP06A Tabulate and analyze data

Deficiencies in the gaseous-phase circulation study were discovered during an internal USGS audit conducted in January 1992. As a result of the audit, YMP-USGS-CAR-92-04 was issued on this study. All data collection and analysis activities are suspended pending resolution of the items listed in the corrective action report.

3GGP17A Continue progress report air flow and gas chemistry

Due to CAR, YMP-USGS-CAR-92-04, work is temporarily suspended.

3GGP002A Collect UZ borehole data

The removal of the USGS mobile laboratory, gas-sampling tubing, and field support trailer from the UZ6 and UZ6s locations eliminated the possibility of conducting any borehole data at these locations. The removal of the field equipment was done in response to a DOE request in connection with the conduct of tours at this location. The collection of data from additional UZ boreholes is dependent upon the UZ drilling program.

P17A Open file report

The following reports were written for the "Flow and transport through unsaturated zone fractured rock--related to high level radioactive waste disposal" sponsored by the NRC and held at the University of Arizona: "Does the wind blow through Yucca Mountain" by E. Weeks and "The carbon dioxide and carbon isotopes of gases from borehole UZ6 at Yucca Mountain" by D. Thorstenson. Publication of these reports has been delayed following resolution of YMP-USGS-CAR-92-04. These reports document recent findings related to gaseous-phase circulation studies conducted at Yucca Mountain.

Quality Assurance

3GGP10A Backlogged data

Continued to address the issues outlined in the USGS-YMP audit. Backlogged data is being examined to determine what data can be qualified. A plan of action to qualify the hotwire anemometer data is being formulated in accordance with the resolution to YMP-USGS-CAR-92-04. A portion of the hotwire anemometer data may be qualified and additional flow data will be collected.

WBS 1.2.3.3.1.2.7 Unsaturated Zone Hydrochemistry

Principal Investigator - I. Yang

OBJECTIVE

To understand the gas transport mechanism, direction, flux, and travel time within the unsaturated zone; to design and implement methods for extracting pore fluids from the tuff; to provide independent evidence of flow direction, flux, and travel time of water in the unsaturated zone; to determine the extent of the water-rock interaction; and to model geochemical evolution of ground-water in the unsaturated zone. (SCP Study 8.3.1.2.2.7)

SCP 8.3.1.2.2.7.1 Gaseous-phase chemical investigations 0G3312X2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH010 Fabricate UZ-16 multi packer string (USBR)

Several design changes were made. These included the addition of heat tape to prevent condensation, and a redesign of the packer bladder attachment system. A winch and boom system for mounting on a flatbed truck to insert and remove packers was also designed and underwent engineering reviews. End caps on each segment of packers have been machined to feed the tubing, cables, wiring, etc., and are being assembled for further leak testing.

3GUH012 Perform leak & pressure tests on UZ 16 packers*

The packers with glands were built and leak tested in a smooth walled 12 1/8" pipe to 30 psi for 72 hours. No leaks occurred.

3GUH025B Outfit mobile lab with GC, IC, degassing rack

The mobile lab will be outfitted with the gas chromatograph and ion chromatograph when they arrive and are performance tested in the UZ hydrochemistry lab.

3GUH067B Analyze UZ1 gas samples 1992

UZ-1 gas samples were all analyzed and data received for 1992. Analyses are complete.

3GUH068B Tabulate data for UZ1 gas samples

Data on UZ-1 gas samples collected in 1992 is being entered into the computer files as it arrives. This task is complete.

An extended summary on "Carbon-Isotopic Data from Test Hole USW UZ-1, Yucca Mountain, Nevada," by In Che Yang, C.A. Peters and D.C. Thorstenson was prepared and sent to the International High Level Radioactive Waste Management Conference in Las Vegas, Nevada.

3GUH069B Conduct training for employees on tech procedure

Four technical procedures entitled, "Injection of a Tracer Gas used for Determining Atmospheric Contamination in a Dry-drilled Borehole", "Method for analyzing the concentration of halocarbon gases with an ITI Leakmeter 120", "Method for Removing Trace and Drilling Air from Unsaturated Zone Boreholes", and "Method for Analysis of CO₂ and/or CH₄ Gas Sample Concentrations by Gas Chromatography using Summit Interests SIP 1000" were written, reviewed, and approved.

3GUH028B Develop Technical Procedure for Straddle Packer

The technical procedure titled "Installation and Operation of PVC Straddle Packer String in Unsaturated Zone Boreholes for Gas and Water Vapor Sampling" was drafted.

Quality Assurance

Technical procedures were distributed to UZ hydrochemistry project members for reading.

Planning and Operations

3GUH070B Procure lab chem, labware, and field apparatus

Copper tubing, which will be used in plumbing the new gas chromatograph (GC), was received.

Two tanks of nitrogen gas were procured to be used in support of various operations of the UZ hydrochemistry lab.

3GUH037B Procure GC and DAS

The Chrompac Model CP 9000 gas chromatograph and data acquisition system are still with REECo procurement. REECo procurement reports that the requisitions are advancing through the system, but cannot at this time give an approximate date as to when to expect their arrival. Mobil lab construction is continuing, but the contract company has asked for a time extension on delivery until November 25.

Variances

H21M Straddle packer evaluation

3GUH010 Fabricate UZ-16 multipacker string

3GUH012 Perform leak and pressure tests on UZ-16 packers

Cause: The USBR personnel assigned to this work were also working on the c-hole packers for saturated zone. They were concentrating on the C-hole packers.

Impact: Our need for UZ-16 packers will be in March of 1992. Therefore, no impact.

Corrective Action: None required.

3GUH025B Outfit mobil lab with GC, IC and degassing rack

Cause: The contractor cannot deliver the product on time, and asked for a two month delay.

Impact: UZ-16 borehole will not be completed until March, 1992. Therefore, no impact.

Corrective Action: None required.

Variances (CONTINUED)

3GUH044B Prepare WRI/OFR on UZ1 data 1984-1991

Cause: The employee working on this report is currently working on the Core Sealing report which will be presented at the 1992 International High Level Radioactive Waste Management Conference.

Impact: None.

Corrective Action: Some of the data will be presented by I.C. Yang at the 1993 High Level Radioactive Waste Management Conference.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Ferarese attended an audit of Scott Specialty Gases at the request of the QA office. Scott Specialty Gases supplies us with standard gases used in calibration of gas chromatographs. (8 hours)

J. Ferarese worked with the QA specialists on NCR 92-33. (8 hours)

P. Striffler removed UZ-1 gas sampling lines from the shelter at UZ1. Construction of the pad for UZ-14 requires removal of the gas sampling shelter. Secured UZ-1 gas sampling lines. (2 hours)

P. Striffler participated in a public information tour at the UZ hydrochemistry lab on the NTS. (8 hours)

P. Striffler consulted with REECo electrician concerning output potential of new Powr-Gard generator. Continued setup of generator for use at UZ-16 for packer studies and gas sampling. (2 hours)

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

K. Schofield conducted tracer gas injection and monitoring at UZ-16. The volume flow of drilling air is measured and calculated and the appropriate concentrations of tracer gas added to the drilling air by adjusting the mass flow controller. The concentration of trace gas is maintained at approximately 1.5 ppm. Four sample ports are used to collect air samples, one on the downhole drilling line and three on the uphole drilling line. The concentrations of trace gas in the drilling air samples are analyzed using the gas chromatograph. (90 hours)

SCP 8.3.1.2.2.7.2 Aqueous-phase chemical investigations OG3312Y2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUH012A Prep. OFR-sp, dtps, proto and site UZ hydrochem

J. Ferarese has completed sections of the report which include the Purpose and Scope, Objectives of Study, General Site Description, Rationale for Hydrochemical Study, Descriptions of Gas-Phase and Aqueous-Phase investigations and Interpretation of Hydrochemical Tests. Other members of the project are writing other sections.

3GUH07AA Procure lab chem. labware & field apparatus

Modified vacuum distillation system, including pressure gages to be used for core distillations. The apparatus will be made by a glass blower.

Planning and Operations

3GUH018A Procure ion chromatograph and DAS

Dionex Model DX-100 Ion Chromatograph and data acquisition system is still with REECo procurement. REECo procurement reports that the requisitions are advancing through the system, but cannot at this time give an approximate date on which to deliver the instruments.

3GUH07AA Procure lab chem. labware & field apparatus

Procured glassware and vacuum gages for the distillation system.

Prepared requisition for calibration of electronic thermometrics.

3GUH015A Procure "Seamist" fracture-water collector*

The cost of "Seamist" exceeds the allocated fund of \$20,000. for the UZ-hydrochemistry project. Therefore it will be feasible to procure one set by combining funds from the UZ hydrochemistry project and the air permeability test project in FY93 and share the equipment.

3GUH001A Test H₂O collection method from fractures

As mentioned above, no "Seamist" has been procured; therefore, no test can be conducted. Also, there was no fracture water encountered in UZ-16 borehole drilling.

Variances

3GUH012A Prepare OFR-sp, dtps, proto & site UZ hydrochem

Cause: Too many reports and technical procedures which have higher priority are in progress.

Impact: None, the report is for the purpose of credits of time spent in DOE documents.

Corrective Action: None

Variances (CONTINUED)

3GUT018A Procure Ion Chromatograph and DAS

Cause: Delay in procurement by REECo

Impact: None because Mobil lab will not be available until November 25, 1992.

Corrective Action: None required.

3GUH001A Test H₂O collection method from fractures.

Cause: Not enough funds were available for "Seamist" procurement.

Impact: None, UZ-16 drilling will not be finished until March, 1993.

Corrective Action: None required.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Ferarese replumbed the in-house Ion Chromatograph after problems were encountered with the suppressor operation. (8 hours)

Several water vapor samples and rinse water samples were prepared and analyzed for tritium on the in-house liquid scintillation counter. These samples are from a cooling room in which we expect to store UZ-16 core samples. This room must be free of tritium contamination prior to the introduction of samples. (4 hours)

K. Schofield cleaned the walk-in refrigerator room (White room) in preparation for storing UZ-16 cores. All of the contaminated G-tunnel core and rubble was removed and a water vapor sample was collected using a pump and a cold trap. The water vapor was analyzed for tritium which measured 72,000 T.U. The White Room has been washed and aired out using a fan several times. The third water vapor sample taken measured 5,000 T.U. The tritium levels must be brought down to approximately 30 T.U. before the room can be used to store UZ-16 cores. (30 hours)

K. Schofield performed distillations on UZN-55 cores for tritium concentration check. Distilled 8 cores for tritium, O18/16 and D/H analysis. (48 hours)

P. Striffler prepared a summary report on core sealing from unsaturated-zone boreholes for presentation at International High Level Radioactive Waste Management Conference. (16 hours)

P. Striffler resolved UZ16 core interval discrepancies in preparation for core shuttle to Denver from the SMF. (10 hours)

P. Striffler conducted public outreach program tour of UZ hydrochemistry lab at the NTS. (8 hours)

P. Striffler wrote technical procedure related to core sealing during collection at UZ borehole sites. Procedure is now in review. (16 hours)

J. Knutson assembled documentation and prepared Acquired Data TDIF #GS920408312272.002; Developed Data TDIF# GS920908312272.010 for "Preliminary Isotopic Data on Unsaturated-Zone Flows at Yucca Mountain, Nevada"; and Developed Data TDIF #GS920908312272.011 for "Flow and Transport Through Unsaturated Rock -- Data from Two Test Holes, Yucca Mountain, Nevada". (40 hours)

J. Knutson assembled documentation and prepared Acquired Data TDIF #GS920212331210.001 and Developed TDIF # GS920908312272.009 for "A Preliminary Study of Pore Water Extracted from Tuff by One-Dimensional Compression. (20 hours)

WBS 1.2.3.3.1.2.8 Fluid Flow in Unsaturated Zone Fractured Rock

Principal Investigator - L. Anna

LBL Principal Investigator - G. Bodvarsson

OBJECTIVE

To develop and validate conceptual and numerical models describing gas flow and liquid water and solute movement in unsaturated, fractured rock at the laboratory and sub-REV scales. (SCP Study 8.3.1.2.2.8)

SCP 8.3.1.2.2.8.1 Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock 0G3312T2

Summary Account Manager - L. Anna/E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF015 Document variable aperture model VSFRAC

Documentation is ongoing to verify governing mathematical equations so that the model accurately describes the physical processes at Yucca Mountain. Sensitivity techniques were used to check the algorithm being incorporated in the model.

3GUF0021 Revise scoping calculations of percolation test

Incorporating and recalculating new data. Percolation test data is now being assembled and analyzed to conduct scoping calculations.

3GUF0051 Scoping and bounding calculations-FY92

Delayed for further review of new data and new calculations from the percolation test. The percolation activity has been completed. Procedures are being started to analyze the collected data. Continued work on developing liquid water flux rates from water saturation and water potential profiles using collected data from boreholes UZ 4 & 5.

Planning and Operations

3GUF001 Resolve study plan comments (DOE & NRC)

Study plan comments have been resolved. Activity complete.

Variances

3GUF0001 Develop graded QA package

Meeting to develop graded QA package was postponed until October because QMP 3.15, the new procedure for implementing QA grading, is being reviewed by the staff of this project.

3GUF0021 Revise scoping calculations of percolation test

Percolation test is taking much longer than expected; original expectations of percolation performance have changed. Three new theories are being investigated to explain longer than expected water infiltration.

1. plugging of porosity from dust in the gravel pack,
2. precipitation of minerals in fracture and pore spaces, and
3. development of pore clogging bacteria.

3GUF015 Document variable aperture model

Documentation is taking longer than expected because of unscheduled work taking precedence. The documentation is nearly complete. Trial runs have verified its validity, but all documentation is not yet complete.

Work Performed but not in Direct Support of the Scheduled Tasks

The report "Numerical Simulations of Liquid Water Flow in a Variable Saturated Fracture Network" was revised in response to technical reviews by G. Bodvarsson and K. Karasaki, LBL. The report will be submitted to a technical journal after the complete review process. Also, a technique is being examined to derive fracture porosity by comparing total porosity measured in the laboratory from laboratory derived acoustic velocity properties.

SCP 8.3.1.2.2.8.1 Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock OB3312T2

Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUF002L Complete dual-porosity code

The fracture/mixture interaction term has been replaced by an expression that is a continuously varying function of the pressure difference between the matrix blocks and adjacent fractures. The new interaction equation has been verified against numerical simulations using the TOUGH code. This concludes the task.

Unnumbered activity: Prepare journal article on sorptivity analysis

L. Flint of USGS sent additional data to R. Zimmerman on sorptivities and moisture retention curves of various welded and nonwelded tuffs from Yucca Mountain, for inclusion in the journal article on sorptivity analysis.

Quality Assurance

3GUF007L Continue software QA and all other QA requirements

Reading assignments were completed by various staff members.

3GUF010L Initiate verification of fracture permeability models

R. Zimmerman received fracture roughness data from P. Persoff of LBL, to use in verifying the permeability models developed at LBL by R. Zimmerman, S. Kumar and G. Bodvarsson.

Variances

Unnumbered activity: Prepare journal article on sorptivity analysis

This activity was not scheduled to begin until October 1992.

WBS 1.2.3.3.1.2.9 Site Unsaturated Zone Modeling and Synthesis

Principal Investigator - E. Kwicklis

LBL Principal Investigator - G. Bodvarsson

OBJECTIVE

To develop conceptual and numerical models for the site unsaturated zone hydrogeologic system; to apply the models to predict the system response to changing external and internal conditions; to evaluate the accuracy of the models using stochastic modeling, conventional statistical analyses, and sensitivity analyses; and to integrate data and analyses to synthesize a comprehensive qualitative and quantitative description of the site unsaturated-zone hydrogeologic system under present as well as probable, or possible, future conditions. (SCP Study 8.3.1.2.2.9)

SCP 8.3.1.2.2.9.1 Conceptualization of the unsaturated-zone hydrogeologic system OG3312C2

Summary Account Manager - E. Kwicklis

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM05A Construct 2-dimensional cross-sectional model using TOUGH

LBL modelers are continuing to incorporate current USGS geologic and hydrologic data from neutron boreholes in the construction and refinement of 2-cross sectional models. When the model has been completed, it will be used to conduct sensitivity analyses to test hypotheses concerning the hydrologic system and investigate grid effects on moisture flow.

3GUM06A Study plan revision and resolution of comments

Modelers from LBL and the USGS continued revising the study plan in response to DOE review comments. Responses to some comments required extensive review and analysis of existing data, as well as drafting of new figures and tables.

3GUM013A Sensitivity analysis using 2-dimensional cross-sectional model

For several cross-sections across Yucca Mountain, a two-dimensional mesh was extracted from the three-dimensional model in preparation for sensitivity analysis.

Quality Assurance

3GUM010A Graded QA and other QA requirements

Preliminary discussions with the UZ QA Specialist have indicated that it may not be necessary to grade modeling activities associated with this SCP Activity because the quality management procedure governing software already includes a scoping or development phase. These issues will be pursued further with the QA specialists.

Variances

3GUM05A Construct 2-dimensional cross-sectional model using TOUGH

This activity is behind schedule because the effort required to resolve the study plan review comments was much larger than anticipated.

3GUM06A Study plan revision and resolution of comments

This activity is behind schedule because effort required to resolve the study plan review comments was much larger than anticipated.

3GUM04A Test decoupled TOUGH hydrologic simulator

This activity is behind schedule because effort required to resolve the study plan review comments was much larger than anticipated.

SCP 8.3.1.2.2.9.2 Selection, development, and testing of hydrologic-modeling computer codes 0B3312D2

Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM010 Review of unsaturated-flow codes

Additional material on unsaturated codes was collected and is being reviewed.

Quality Assurance

3GUM18A Grading of QA and other QA requirements

Updates of the QMP were put in place.

Reading assignments were completed by various staff members.

Planning and Operations

3GUM14A Study plan revision and resolution of comments

This work continued and is near completion with about 90% of the comments addressed.

SCP 8.3.1.2.2.9.3 Simulation of the hydrogeologic system 0B3312E2

Summary Account Manager - G. Bodvarsson

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUM07B Evaluate model grid effects

An input deck containing data for 17 sub-layers, as well as for the gridblocks representing the faults, was prepared using previously published data, as well as new USGS data. permeability and porosity ranges were defined for the sublayers. Each of the sublayers in the model was chosen in order to represent lithological zones with nearly uniform rock properties. These data, together with the geometrical input for one of the cross-sections previously chosen to test the model geometry, were used to test the influence of highly heterogeneous rock properties on the numerical results. This completes the task. Further simulations including the decoupling of gas and moisture-flow in the TOUGH2 computer code will be conducted under a new task during FY93.

Quality Assurance

3GUM14B Graded QA and other QA requirements

Updates of the QMP were put in place.

Reading assignments were completed by various staff members.

Planning and Operations

3GUM13B Study plan comment and revision

This work continued and is near completion with about 90% of the comments addressed.

WBS 1.2.3.3.1.2.10 Prototype Hydrologic Tests that Support Multiple Site Characterization Activities

Principal Investigator - M. Chornack

OBJECTIVE

To perform prototype hydrologic tests to minimize costly stand-by times; to develop QA procedures; to determine feasibility of the proposed tests; to train new personnel; to help increase likelihood of success of the tests; and to test new instruments, equipment, and procedures.

Prototype Tracer Testing 0G3312J2

Summary Account Manager - I. Yang

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT03DD Prepare WRI report on aqueous tracer tests

The paper still needs author, A. Lewis Russ's, response to review comments.

Technical Activities (CONTINUED)

3GUT13DD Conduct tracer gas sorption test on stem mtl's

Batch-type experiments of the adsorption of SF₆ onto dry stemming material were completed in the UZ hydrochemistry laboratory.

3GUT01DD Conduct tracer gas sorption tests on tuffs

Week-long, dry, batch-type experiments of the adsorption of SF₆ onto volcanic tuffs of the Pah Canyon Member, Topopah Spring Member (UZ 4 & 5), and the Bedded Tuff between the Pah Canyon and Topopah Spring Members were completed. Additional wet batch-type testing will be needed on the volcanic tuffs that show evidence of adsorption (Topopah Spring Member from UZ5 and the Bedded Tuff).

The position paper outlining UZ hydrochemistry needs for tracer gasses was rewritten to incorporate comments from C. Peters, D. Thorstenson, and E. Weeks. The paper is now being reviewed by A. Yang.

3GUT133D Develop technical procedures for monitoring gas tracer

Development of technical procedures cannot begin until the gas tracer monitoring system is on-line and functioning.

Quality Assurance

3GUT01DD Conduct tracer gas sorption tests on tuffs

A quality assurance meeting with G. Rattray, C. Peters, and M. Pabst was held to discuss the QA requirements of the prototype tracer testing. It was decided that this testing would best be served by "grading out" a number of QA requirements through an ACSR.

Planning and Operations

3GUT012D Test on-line gas tracer monitoring equipment

USGS representatives met with engineers from Caltrol and RSN at UZ-16 to pinpoint the location of the monitoring equipment on the drilling rig and air lines. Monitoring equipment is at the drill site and being installed with the exception of the pressure transducers. The transducers were returned to Caltrol because they do not have sufficient pressure tolerances for our needs and will be replaced by Caltrol as soon as possible.

Variances

3GUT03DD Prepare WRI report on aqueous tracer tests

Cause: Author, A. Lewis-Russ, is slow to respond to review comments.

Impact: None.

Corrective Action: A letter will be sent to her requesting her to respond to the reviews.

3GUT13DD Conduct tracer gas sorption test on stem mtl's

Cause: Difficulty in designing and setting up acceptable experiment equipment.

Impact: None. It is anticipated that the WRI report of these experiments will be completed before tracer gasses in UZ boreholes are needed, approximately March of 1993.

Corrective Action: None.

3GUT01DD Conduct tracer gas sorption tests on tuffs

Cause: See 3GUT13DD above.

Impact: See 3GUT13DD above.

Corrective Action: See 3GUT13DD above.

Variances (CONTINUED)

3GUT012D Test on-line gas tracer monitoring equipment

Cause: Pressure transducer does not have sufficient pressure tolerances.

Impact: None. Equipment will be replaced as soon as possible.

Corrective Action: None.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 16 hours were spent on the following:

G. Rattray modified graphs and prepared overheads for A. Yang. (2 hours)

G. Rattray met with J. Darnell to discuss testing of packer system for leaks. (2 hours)

G. Rattray attended USGS, WRD Orientation. (12 hours)

Prototype Dry Coring of Rubble 0G3312L2

Summary Account Manager - C. Peters

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT02EE Reduce data for effects of coring methods

Data reduction completed. Information will be included in WRI report (TO3M).

3GUT13FF Complete reduct. of data effect of core sealing

Data reduction completed. Information will be included in report (TO2MA).

3GUT016F Conduct tech procedures training on core sealing

Field training of SMF personnel to Scientific Notebook Plan HP 237T is complete. All UZ hydrochemistry personnel and SMF personnel will be trained to Hydrologic Procedure HP 252 in October.

3GUT14FF Prep WRI rpt: G-TUN: effects; blasting, coring on chem

Sections of report on coring and lab work have been completed. Interpretive sections, Conclusions, and Summary have still to be prepared.

3GUT02FF Prepare report for effects of core sealing.

A Summary Report "Investigating the effects of core sealing methods for the preservation of pore waters in core" was submitted for acceptance to the 1993 High Level Radioactive Waste Management Conference. This summary will be expanded and edited for inclusion in those proceedings if accepted.

3GUT07FF Develop technical procedure on rubble coring

Technical Procedure preparation has begun, and is complete through Section 4.5, but will not be finished because further rubble for coring will not be available.

TO4MA Technical procedures on core sealing

The procedure has been completed and is in review.

Quality Assurance

3GUT004F Develop technical procedures on core sealing

The Technical Procedure was written, prepared by SAIC, has undergone technical review, and the author is now responding to review comments.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GUT018G Procure/develop data acquisition software

The data acquisition system for the load frame in the USBR vibration laboratory was tested and is now operable. The system is now ready for pore-water extraction testing as soon as the load frame is calibrated. This task is complete.

3GUT020G Procure & construct additional high press 1-D cell

The pressing stops have been modified by the USBR machine shop so that the inner and outer corpus rings can be pressed together. Because this is a complicated process, the contract consultant used for the assembly of the first high-pressure cell was retained for this activity. The corpus rings were pressed together and the only work remaining for this task is to send the cell to contract shops for final grinding to assure proper tolerances for the piston and sleeve.

3GUT002G Cmpnt ext/analysis chem of PW, UZ4,5,6, and GT

This task is complete. All pore-water extraction data for UZ4, 5, 6, and GT cores has been plotted and reviewed for degree of saturation vs extent of success in water extraction and for chemical composition vs pressure. This data will form part of the basis for papers to be written next year.

3GUT027G Submit WRIR triaxial & 1-D methods review & appr

The draft WRIR titled "Pore-Water Extraction from Unsaturated Tuff by Triaxial and One-Dimensional Compression Methods, Nevada Test Site, Nevada" is in technical review. One reviewer has completed his work; the other, outside reviewer has promised the paper soon. As soon as the review is completed, the suggested modifications will be considered and incorporated into the paper, and submitted to USGS for further processing.

3GUT015G Prep WRIR pore-water chem vs press

As reported previously, this WRIR will be replaced by a journal paper. The journal paper summarizing the comparison of changes in pore-water chemistry versus pressure during one-dimensional compression is in first draft. The outline, introduction and literature review have been written.

Quality Assurance

3GUT023G Complete software requirements

In August an ACSR was prepared and submitted requesting that the data acquisition software be exempt from QA requirements. The data is collected and used only as an aid to running the test in the most efficient manner and is not used in any way as a part of the collected data on pore-water chemistry. This request is scheduled to be acted upon October 2, 1992.

3GUT028G Review & revise tech proc for high-press cell

The technical procedure for high-pressure one-dimensional compression (HP-249, R0) was sent for quality assurance review. Once the review is completed, necessary modifications to the procedure will be made and submitted for final signature approval. This task is expected to be completed in October as scheduled.

Variances

3GUT020G Procure & construct additional high press 1-D cell

Cause: The latest delay in this task is because of the incorrect dimensions of the original pressing stops (as reported in August 92) and difficulty in scheduling the contract consultant to supervise the pressing of the corpus rings.

Impact: One month delay in beginning production testing with two cells. The new completion date is estimated to be October 30, 1992.

Corrective Action: The corpus rings have been pressed together and progress is being made; therefore, further corrective action is unnecessary.

3GUT027G Submit WRIR triaxial & 1-D methods review & appr

Cause: Technical reviews by the USGS and one outside reviewer have taken two months longer than originally anticipated.

Impact: The review process of the paper has been set back an estimated two months.

Corrective Action: The author has contacted the outside reviewer. He has promised the review in the first week of October.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 56 hours were spent on the following:

Higgins arranged for SATEC to calibrate the SATEC and Houston Scientific load frames. Higgins and Burger worked with the SATEC technician during the calibration tests. The Houston Scientific load frame could not be calibrated because of an electronics malfunction in the voltage meter system that controls the load frame, which required 3 hours work to locate. (16 hours)

M. Beasley set up equipment in USBR laboratory for cutting and preparing five core samples for one-dimensional compression testing. The equipment had to be set up again because it had been disconnected and moved to another lab due to construction in the USBR building. (7 hours)

M. Beasley prepared an outline of steps for core preparation for one-dimensional compression testing that will be part of a technical procedure. (9 hours)

M. Beasley entered pore-water extraction and chemical data to computer files for record keeping. (24 hours)

WBS 1.2.3.3.1.3 Saturated Zone Hydrology

OBJECTIVE

To develop a model of the saturated zone hydrologic system of Yucca Mountain that will assist in assessing the suitability of the site to contain and isolate waste. (SCP Investigation 8.3.1.2.3)

WBS 1.2.3.3.1.3.1 Site Saturated Zone Ground-Water Flow System

Principal Investigator - M. Umari

OBJECTIVE

To determine the hydrogeologic nature of the Solitario Canyon fault in the saturated zone; to determine the time and spatial variation of the potentiometric surface; to determine the character, magnitude, and causes of water-level fluctuations; to estimate elastic and hydraulic properties; to determine transport properties of the saturated zone; to evaluate the relation between hydraulic properties and fracture characteristics; to characterize chemical and physical properties of the saturated zone that affect radionuclide retardation; and to conduct single-and-multiple well tracer tests using conservative and reactive tracers to determine hydrologic, chemical, and physical properties in the saturated zone. (SCP Study 8.3.1.2.3.1)

SCP 8.3.1.2.3.1.2 Site potentiometric-level evaluation 0G3313E2

Summary Account Manager - P. Tucci

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF005A Begin 1992 water-level data collection

Routine tasks completed this month:

Monitored 19 zones in 19 wells on a monthly basis. Well USW G-2 was added back into the network. Monitored 19 zones in 12 wells on an hourly basis. Continuous analog data obtained from 4 zones of 2 wells (included in count of hourly sites above). Obtained real-time data on 19 zones in 12 wells using satellite data-collection platforms (included in count of hourly sites above).

Evaluated status of network at end of each month and made recommendations for instruments that should be watched, calibrated, or replaced. Monitored real-time data on daily basis looking for water-level excursions.

Special tasks completed this month:

Calibrated transducers at the following wells: USW G-3, USW H-5 (upper & lower zones), USW H-3, USW H-1 (tubes 1-4), UE-25 WT#3, UE-25 p#1. Replaced transducers at H-5 and H-1. Several of the transducer calibrations were done in order to allow temperature logs to be obtained from wells p#1, G-3, H-1, H-5, G-4, and G-2. The logs were obtained for activity 8.3.1.15.2.2.1. Temperature logs were not obtained at H-5, however, due to a packer that became jammed in the hole while trying to remove it.

Water-levels in 4 zones in 2 wells continued to be monitored for responses to earthquakes and UNE's. Monitoring was switched from H-5 to p#1 (only one zone) in mid-September, due to a packer jammed in the well at H-5. Slight water-level fluctuations were observed for earthquakes in Nicaragua and Utah early in the month, as well as to 2 UNE's later in the month. A report on water-level responses to the June earthquakes was begun by G. O'Brien. Investigation of the water-level and fluid pressure responses in wells at Yucca Mountain to earthquakes on June 28-29 in southern California and Little Skull Mountain is continuing.

Work continues on investigating barometric, earth-tide, and seismically-induced water-level fluctuations. G. O'Brien continues to consult with D. Galloway (USGS, California District) on the methodology and analysis.

3GWF41AA Continue preparing 1989 water-level data report

Report "Water levels in continuously measured wells in the Yucca Mountain area, Nevada, 1989" by D. Lobmeyer and R. Luckey has been written and reviewed. All review comments have been addressed, and the report has been modified accordingly. The report is being retyped, and should be ready for DOE by October 10.

Technical Activities (CONTINUED)

3GWF18AA Continue study of accuracy and precision of water-level data

Work continued on the report "Precision and accuracy of water-level measurements taken in the Yucca Mountain area, Nevada, 1988-90" by M. Boucher. Report was forwarded to DOE, completing this activity.

3GWF027 Evaluate quality of 1991 transducer data

Data has been continuously evaluated through 1991 and plotted. This activity is complete.

3GWF004A Prepare report on water-level fluctuations at YM

Data on long-term and seasonal trends are not sufficient to warrant preparation of a separate report on the subject. The results of this investigation are reported in a section of the revised potentiometric-surface map, which has received technical review. See 3GWM06AA under SCP 8.3.1.-2.3.3.1. This activity is complete.

3GWF043A Begin 1990-91 water-level report

Work on the periodic water-level data part of the report included plotting hydrographs, compiling tables, and some statistical analysis and compilation.

Variances

3GWF41AA Continue preparing 1989 water-level data report

Primary author retired, and second author has had many other primary duties to perform in his role as section chief. An unusually large amount of verification review has been required for the report. The report should be complete by October 10, 1992.

Work Performed but not in Direct Support of the Scheduled Tasks

M. Boucher lent Quality Assurance (QA) support to various activities evaluating QA and organizing QA support for other groups of activities. (120 hrs)

A summary describing the earthquake-induced water-level fluctuations observed at Yucca Mt. was written by G.M. O'Brien and P. Tucci, and was submitted for presentation at the Waste Management '93 symposium, in Tucson in March. (24 hrs)

A great deal of time was spent by various project personnel on addressing the problem of the jammed packer at H-5. Unless it can be freed by project staff, a drill rig will probably have to be brought to the site to pull it free. (40 hrs)

P. Tucci, T. Campbell, and R. Valentin assisted in the temperature logging of several wells by calibrating and removing transducers from wells, and provided additional logistical support to the logging truck operator. (120 hrs.)

SCP 8.3.1.2.3.1.3 Analysis of single- and multiple-well hydraulic-stress tests 0G3313F2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF001D Finish Intraborehole Flow & Stress Test Report

This report has not been completed by the end of FY92 as was hoped, because the author (G. Patterson) was needed in other, more pressing, parts of the project. An agreement has been reached, however, that a draft of the report will be completed, to enter into the review process, within the first quarter of FY93 (by December 31, 1992). If G. Patterson determines that he, alone, cannot fulfill this deadline, he will enlist the assistance of A. Geldon.

3GWF006D Analyze Strain-related Pressure Response in Cased Holes

G. Patterson had discussions with D. Galloway on efforts to change the Director-approved, but non-published report, "Strain-Related Water-Level and Fluid-Pressure Responses in Selected Wells, Yucca Mountain", by D. Galloway, G. Patterson, and Gemmeil, from a USGS Survey Bulletin to a journal article.

Plans were discussed for the possible resumption of strain-related pressure monitoring activities at the c-hole complex. This would entail the purchase of wireline-type packers, and placing them in the c-holes using USGS-owned equipment. This work would have to be done prior to the start of the cross-hole hydraulic tests at the c-holes.

3GWF007D Case Uncased Holes, or Develop Methods for Uncased Holes

This work is needed for studying strain-related pressure changes in uncased boreholes. The saturated zone fractured rock hydrology project (SZFRHP) is primarily responsible for work at the c-hole complex, where all the wells are cased. The effort to develop methods for uncased holes is, therefore, discontinued at this time by the SZFRHP, but may be continued under another project that would have the need for it.

Quality Assurance

3GWF012D Continue Development of Software QA for Activity 8312-3.1.3 Programs

S. Boucher, lead quality assurance specialist for the saturated zone section, prepared the draft of an ACSR for all preliminary software development (and modeling) activities, carried out under Study Plan 831231, "Characterization of the Site Saturated-Zone Ground-Water Flow System". The ACSR report attempts to exempt these activities from USGS QA program controls, because they do not produce site characterization data. This activity is complete.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing OG3313G2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF004F Complete (Procurements for and) Construction of Third 3-Zone Packer String (and packer-string-related items)

Most of the work under this activity is being carried out by USBR.

The contract for procurement of more packers to complete construction of the third 3-zone packer string, and to have enough packers for upgrading the three 3-zone strings to three 5-zone strings in FY93, was awarded to Tam International.

3GWF004F Complete (Procurements for and) Construction of Third 3-Zone Packer String (and packer-string-related items) (CONTINUED)

Testing of the electric-motor driven ball valve, to be used in the transducer reference line, was performed. The ball valve was attached to an air-filled canister, to make it water tight, while the assembly of valve and canister are submerged in water. This test was performed under a water submergence pressure of 800 psi, once for a duration of four hours (with no detectable water leak into the canister), and another time for three days resulting in only a minute amount of leakage into one of three canisters. The source of the leak is being investigated despite the low likelihood of its causing any problems.

Parts of the pump "shroud" (which will encase the pump during operation), manufactured to our specifications by the Centerlift Co., were received. When assembled, the shroud stands 75 feet tall, and will have to be handled as one unit by the NTS contractor when lowered into the hole.

3GWF013F Develop Techniques to Analyze X-Hole Test Results

Using the USGS HST (Heat and Solute Transport) 3-D code, written by K. Kipp, USGS/WRD National Research Program, to develop a 3-dimensional porous-medium-equivalent model of the c-hole complex (the model can be used for cross-hole test design, item 3 below, in addition to analysis of the eventual cross-hole test results): M. Umari worked on compiling the program source code on the SUN work station. A few minor changes had to be made to accomplish this task.

Using the software package FracMan (by Golder Associates) to develop a 3-dimensional fracture-network model for the c-holes (the model can be used for cross-hole test design, item 3 below, in addition to analysis of the eventual cross-hole test results): P. Wallmann, of Golder Associates, conferred in Denver with E. Ervin and K. Karasaki (from LBL), on modifying the FracMan program to accept input of outcrop fracture mapping data obtained from the Yucca Mountain site. (M.J. Umari, and Art Geldon discussed the planned cross-hole tests with Wallmann). Ervin is doing this work in cooperation with the saturated zone fractured rock hydrology project (SZFRHP).

3GWF028F Continue Preliminary Numerical/Analytical Modeling to Assist in Cross-Hole Test Design

Both paragraphs above (under 3GWF013F above, Develop Techniques to Analyze X-Hole Test Results, on using the HST and FracMan programs) also support this activity, as indicated in the text of the paragraphs.

3GWF022F Continue Oversight of Field Simulation of Cross-hole Tests

This activity encompasses all work related to the U.S. site (Raymond Quarry, near Oakhurst, CA) of the DOE/AECL international project. It is intended that the hydraulic and tracer tests planned for the c-holes be prototyped at the Raymond site.

Two of the 6-inch holes at Raymond were enlarged to 10 inches to accommodate the multi-zone packer string being built for the c-holes complex, so it can be tested prior to being used at the c-holes. J. Earl and J. Gemmell went to the Raymond site to supervise this work.

3GWF025F Continue Development of Scientific Notebook for X-hole Tests with Prototype String

J. Earl prepared a draft for the SNP. The draft was reviewed and the changes resulting from these reviews will be incorporated into the draft. The SNP will then be entered into the formal technical and QA review process.

Technical Activities (CONTINUED)

3GWF019F Oversee LBL (Develop and) Analyze Seismic Profile for c-Holes

Results of analyzing the tomographic data obtained in June/July 1992, between UE-c#2 and UE-c#3, have not been received.

Quality Assurance

3GWF006F Prepare QA Drawings for Multi-Zone Packer String

On September 9, 1992, J. Gemmell met with J. Bowen of the USBR and prepared preliminary sketches of these drawings. J. Bowen will clean up these preliminary sketches, and submit them to the USBR drafting department for a review and estimate of time needed for them to complete the drafting of the final QA drawings. (The USBR is responsible for providing detailed QA drawings showing how the components of the multiple-zone packer system, that they are constructing for the SZFRHP, are assembled).

Work Performed but not in Direct Support of the Scheduled Tasks

Jim Gemmell wrote a criteria letter to request NTS contractor support during the upcoming cross-hole hydraulic tests at the c-hole complex. An appendix written by Gary Patterson, that details the steps planned for the tests, was attached to the criteria letter, to give the NTS contractors as much information as possible.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0B3313G2

Summary Account Manager - E. Majer

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF03C Develop cross-hole seismic profile

The cross-hole seismic data from C2 and C3 were sent to the PDA. This completes the task.

SCP 8.3.1.2.3.1.5 Testing of the C-hole sites with conservative tracers 0G3313H2

Summary Account Manager - M. Umari

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWF166A Train Project Members On Tracer Detection Methods

This activity will be deferred to a later date when the tracer tests start at the Raymond Quarry, near Oakhurst, CA (U.S. site of the DOE/AECL international project). Prior to these tests, K. Stetsenbach, UNLV, will train project members on field analysis techniques for determining tracer concentration in pumped water samples. The same techniques will be used in the tracer tests at the c-hole complex.

3GWF167A Continue Preliminary Modeling for Tracer Tests

Both bullets under 3GWF168A, Develop Techniques for Analysis of Tracer Test Results, also support this activity, as indicated in the text.

3GWF168A Develop Techniques for Analysis of Tracer Test Results

The following two bullets are repeats of bullets presented under the monthly report for Summary Account number 8.3.1.2.3.1.4, because the two computer modeling activities support accounts 8312314 and 8312315 (the present account) as well.

3GWF168A Develop Techniques for Analysis of Tracer Test Results (CONTINUED)

- Using the USGS HST (Heat and Solute Transport) 3-D code, written by K. Kipp, USGS/WRD National Research Program, to develop a 3-dimensional porous-medium-equivalent model of the c-hole complex (the model can be used for tracer test design, item 2 above, in addition to analysis of the eventual tracer test results): M. Umari worked on compiling the program source code on the SUN work station. A few minor changes had to be made to accomplish this task.
- Using the software package FracMan (by Golder Associates) to develop a 3-dimensional fracture-network model for the c-holes (the model can be used for tracer test design, item 2 above, in addition to analysis of the eventual tracer test results): P. Wallmann, of Golder Associates, conferred with E. Ervin and K. Karasaki on modifying the FracMan program to accept input of outcrop fracture mapping data obtained from the Yucca Mountain site. (M. Umari, and Art Geldon discussed the planned tracer tests with Wallmann). E. Ervin is doing this work in cooperation with the SZFRHP.

3GWF151A Construct Tracer Injection System

A requisition for the purchase of the downhole part of the tracer injection system was prepared in August. The equipment is being purchased from the Baker Tools Company. None of the items purchased has arrived yet.

WBS 1.2.3.3.1.3.2 Saturated Zone Hydrochemistry

Principal Investigator - W. Steinkampf

OBJECTIVE

To describe spatial variations in chemical composition of ground-water; to identify chemical and physical processes that influence ground-water chemistry; to use hydrochemical data to aid in the identification and/or quantification of ground-water travel times; flow paths; fluxes to, from, and within the saturated zone; and climatic conditions during past periods of recharge. (SCP Study 8.3.1.2.3.2)

SCP 8.3.1.2.3.2.1 Assessment of saturated-zone hydrochemical data availability and needs 0G3313J2

Summary Account Manager - W. Steinkampf

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWH024A - Develop ion chromatograph methods.

Extant general procedures provided by the equipment manufacturer have been tested and accepted for use. Requisite modifications must be developed to address the study need to discern low concentrations of individual analytes, such as Li, in a matrix with a relatively higher concentration of (an)other analyte(s) with similar chemical properties, such as Na. This work will be conducted in FY93.

3GWH023A Complete assessment of data (extant), phase I.

A student position was filled for data assessment through FY93. To date, over 3000 records of hydrochemical and/or isotopic data for the region containing Yucca Mountain and the NTS have been preliminarily compiled. Ongoing works includes site verification and sorting as to completeness of analyses. This completes phase I.

Quality Assurance

3GWH001 - Grade QA for sz hydrochemical study.

A study-level grading report prepared in FY92 is adequate for current and immediately planned work activities. Lower-level grading will be carried out in FY93.

Variances

3GWH011A Prepare scientific notebook, ion chromatograph

Preparation of the notebook began and completion of the initial draft is planned for the end of October 1992. No impact.

SCP 8.3.1.2.3.2.2 Hydrochemical characterization of water in the upper part of the saturated zone

OG3313K2

Summary Account Manager - W. Steinkampf

Technical Activities

3GWH014A Develop mobile laboratory

Efforts to forecast field analytical needs and attendant equipment needs are essentially at an end. Additional needs, if identified, and consideration of new or improved equipment and techniques, will be considered as appropriate during FY93. Purchase of the mobile lab is tentatively forecast for FY94.

3GWH006A Sample weapons program (ERTDB) GCP holes

Contact was established with R. Waddell (Geotrans) to obtain information regarding plans for site construction and testing. This contact will be maintained through the life of the ground-water characterization program.

3GWH001B Plan sample-collection methods developments

General conceptual methods have been identified for data and sample collection at and in the vicinity of Yucca Mountain. Revision and refinement of the methods will occur, as appropriate, when sample-collection equipment is purchased and preliminary equipment testing has begun. Formalization of the methods will begin in FY93.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 70 hours were spent on the following:

Participated in a meeting of the YMP Quality Integration Group during which OCRWM revisions to QIG input to the OCRWM QARD was examined, and appropriate revisions made.

Participated in a meeting and a teleconference of the YMP Geochemistry Integration Team.

Participated in meetings of the American Society of Mechanical Engineers Sub-committee on Nuclear Waste Management, the Work Group for High-level Waste, and the Nuclear Quality Assurance Main Committee in Orlando.

SCP 8.3.1.2.3.2.3 Regional hydrochemical characterization OG3313L2

Summary Account Manager - W. Steinkampf

Technical Activities

3GWH905 Select sample sites, phase 1.

Sites visited in late spring and summer 1992 comprise the preliminary set to be considered for sampling during the first quarter of FY93. Additional sites will be considered early in FY93.

WBS 1.2.3.3.1.3.3 Saturated Zone Hydrologic System Synthesis and Modeling

Principal Investigator - E. Ervin

LBL Principal Investigator - K. Karasaki

OBJECTIVE

To synthesize available data to develop a conceptual model; to make a qualitative analysis of how the system is functioning; to develop and evaluate porous-media and fracture-network methods for simulating ground-water flow and solute transport; and to estimate ground-water flow direction and magnitude for input to ground-water travel time calculations. (SCP Study 8.3.1.2.3.3)

SCP 8.3.1.2.3.3.1 Conceptualization of saturated zone flow models within the boundaries of the accessible environment 0G3313A2

Summary Account Manager - E. Ervin

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM003A Review (DOE final) study plan 8.3.1.2.3.3

Study plan 8.3.1.2.3.3 Site Saturated Zone Synthesis and Modeling went through final review by E. Ervin and T. Brady, was recompiled by SAIC and formally transmitted to the YMPO reviewers for their concurrence. Informal, verbal resolution of the DOE comments was reached by all reviewers with the authors of the study plan. There were 115 comments by seven reviewers—consisting of 71 minor comments and 44 major comments.

3GWM006 Synthesize hydraulic data at "H" wells

Work for this activity is considered complete. E. Ervin performed a review and compilation of aquifer tests for the "H" holes and had incorporated that information into a conceptual model of flow at Yucca Mountain.

3GWM09AA Evaluation of conceptual model and existing data

Work for this activity is considered complete. E. Ervin has evaluated existing data and conceptual models for the site area at Yucca Mountain (scale of tens of kilometers). She has incorporated this information into the potentiometric map report—3GW06M.

3GWM06AA Prepare report on potentiometric map

The report entitled: 'Revised preliminary potentiometric surface map, Yucca Mountain and vicinity, Nevada', by E. Ervin, R. Luckey, and D. Burkhardt is complete after being revised after USGS colleague review with B. Lewis and S. Robison. The report describes the revised potentiometric map of 1988 average water levels for the vicinity of Yucca Mountain (scale 1:24,000) and details time-trend analyses, corrections made for temperature and density changes in the water levels of the deep wells, and a conceptual model of the flow system at Yucca Mountain.

Variances

3GWM003A Review (DOE final) study plan 8.3.1.2.3.3.1

Delayed at DOE because of problems with a certain reviewer's contracts and the time required for reviewers to examine the author's responses to their comments.

3GWM004A Review (NRC) study plan 8.3.1.2.3.3.1

Delayed due to delay of 3GWM003A.

Variations (CONTINUED)

3GW06M Potentiometric Map Report

This report is in the USGS review process and is being expedited as much as possible; however, this milestone may be delayed one month because of the time required for colleague review.

SCP 8.3.1.2.3.3.2 Development of fracture network model 0G3313B2

Summary Account Manager - E. Ervin

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM011B Finish fracture mapping in the Crater Flat Tuff

This activity is complete with the field trip by M. Chornack, during which a line survey at Raven Canyon was completed.

3GWM017B Continue to assist LBL add outcrop data to model

With the approval of the paper entitled "Fracture Flow Model in the Saturated Zone at Yucca Mountain", by K. Karasaki, LBL, and E. Ervin, this activity is considered complete. The paper was prepared for a special issue of the *Radioactive Waste and the Nuclear Fuel Cycle* journal and outlines current fracture-collection efforts; use of the data in fracture modeling at the UE25c-Hole complex and the status of current fracture modeling at that multiple-well complex.

E. Ervin, K. Karasaki, LBL, and P. Wallmann, Golder and Associates, Seattle, Washington, met in Denver to discuss coordination of fracture modeling at the UE-25 c-hole complex and the use of the model FRACMAN.

Technical Activities (CONTINUED)

3GWM002 Develop conceptual model of fracture network phase I

Analysis of the fracture data from the Crater Flat Tuff for formulation of the conceptual model at the C-hole complex is continuing. A. Geldon has analyzed the new tv logs performed at the UE-25c-hole complex for fracture orientations. Geldon has provided this information to E. Ervin who plans to use the data in development of the fracture-network conceptual model.

Quality Assurance

3GWM015B Revise fracture mapping technical procedure

E. Ervin and M. Chornack have revised Hydrologic Procedure HP-246, R0 Mapping Fractures on Outcrops for Hydrologic Studies. The procedure was reviewed by E. Verbeek, USGS, Geologic Division and is currently in QA review.

3GW012M Submit fracture data to PDA

E. Ervin and M. Ciesnik prepared the forms to submit the Crater Flat Tuff fracture data to the PDA.

Planning and Operations

3GWM008B Coordinate LBL fracture-network modeling phase 2

E. Ervin and K. Karasaki, LBL, met to discuss the Crater Flat Tuff fracture data and ways in which to analyze the data for inclusion into LBL's fracture-network model. Statistical analysis of the data is being performed at LBL.

Variances

3GWM015B Revise fracture mapping technical procedure

Delayed two months because of prolonged illness of principal investigator and coordination efforts between HSP, GSP and BOR.

SCP 8.3.1.2.3.3.2 Development of fracture network model 0B3313C

Summary Account Manager - K. Karasaki

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWM06CA Complete rad-waste conference journal article

A paper titled "Fracture-Flow Modeling of the Saturated Zone at Yucca Mountain," by K. Karasaki and E. Ervin was sent to DOE.

3GWM02CA Write report on borehole fracture data bias

The report entitled "Techniques for Evaluating the Effects of Borehole Bias on Fracture Orientation Distributions Derived from Boreholes," by S. Martel and J. Peterson, Jr. is complete and is being reviewed within UC/LBL-ESD.

3GWM07CA Design code cross verification

The design of the LBL-LANL fracture flow and transport code cross-verification is complete. The initial main focus will be on the transient flow problems in fracture network.

3GWM004C Write draft TRINET users manual

A draft TRINET user's manual has been completed. It includes the theory, lists of input and output parameters, internal variables and subroutines.

3GWM05CA Incorporate outcrop data to network model 2

A journal article entitled "Using the Bootstrap, and Cross-Validation with Spatially Dependent Data," by A. Mauldon, K. Karasaki and P. Witherspoon was written and is being reviewed within UC/LBL-ESD.

An abstract entitled "Using the Bootstrap and the Jackknife with Spatially Dependent Hydrological Data," by A. Mauldon, K. Karasaki and P. Witherspoon was sent to AGU for presentation at the annual meeting.

Digitized fracture pavement data from UZ obtained by C. Barton and others are being compared to those obtained by E. Ervin and M. Chornack east of Little Skull Mountain.

A summary entitled "Flow and Transport in Hierarchical Fracture Systems," by K. Karasaki and E. Ervin was written and sent in for the 1993 International High-Level Radioactive Waste Management Meeting.

K. Karasaki met with E. Ervin and P. Wallman in Denver to discuss how to use the fracture data obtained by E. Ervin and M. Chornack.

3GGF035M Report: progress VSL

Modeling of the VSP for the C-hole or P-1 hole has been completed. The results indicate that the spacing for detection of vertical fractures is optimal with a multiazimuthal-multicomponent survey at 1/4 and 1/2 hole depth offsets. Spacing of the receivers should be no more than 10 meters, with the optimal spacing at 5 meters.

Technical Activities (CONTINUED)

3GGF030B Validate interpretational codes ANI90 & BEAM87

ANI90 and BEAM87 were tested by modeling the crosswell data from the C-holes. Fracture anisotropy and fracture density were modeled with ANI90.

Variances

3GWM02CA Write report on borehole fracture data bias

The report has been completed and is undergoing review within LBL. The estimated date of completion is October 31, 1992.

WBS 1.2.3.3.2 Preclosure Hydrology

OBJECTIVE

To examine hydrologic conditions, including flooding, availability of water supply, and characteristics within and above the repository horizon; and to determine whether engineering measures that require excessive cost, or technology beyond that which is reasonably available, will be needed during construction or operation of the repository. (SCP Section 8.3.1.16)

WBS 1.2.3.3.2.1 Flood Recurrence Intervals and Levels at Potential Locations of Surface Facilities

Principal Investigator - P. Glancy

OBJECTIVE

To assess the flood and debris hazards at and near the potential repository surface facilities locations to allow adequate design of facilities to prevent or reduce hazards to an acceptable level. (SCP Study 8.3.1.16.1.1)

SCP 8.3.1.16.1.1.1 Site flood and debris hazards studies 0G3321A2

Summary Account Manager - P. Glancy

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFR016 Analyze & evaluate FY91 flood data:

FY91 flood data analysis and evaluation are complete. Interpretation will be done later as part of a report on 1983-92 flooding.

3GFR002 Collect, analyze, evaluate FY92 flood data:

No known storms or floods occurred in September. The headwaters of Gray Creek, a tributary of Truckee River, and the presumed source of recent severe sediment problems to the Reno water supply, were reconnoitered by Glancy in an attempt to locate the source of debris transport. Results were negative. It is thought that the debris source is somewhere downstream.

Glancy received a report on September 30, 1992, from the National Park Service stating that a flood had occurred at Willow Beach on August 21, 1992, downstream from Hoover Dam. The damage to Park facilities in Jumbo Wash reportedly were serious. The Park Service collected precipitation data at eight gage sites that should help to characterize the storm. A site visit to collect these data will be conducted as soon as possible.

Technical Activities (CONTINUED)

3GFR018 Recon Yucca Mountain to assess debris hazards:

D. Grasso conducted an aerial reconnaissance of the mouth of Fortymile Wash to determine a method for deriving the flow paths of recent floods. This preliminary work showed that detailed maps could be prepared to accurately delineate the locations and paths of floodwater that may have recently flowed through the distributary stream network that extends from Fortymile Wash canyon to the Amargosa River.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 3 hours were spent on the following:

D. Grasso participated in a project review by P. Scott, USGS, for this study.

WBS 1.2.3.6 Climatology and Meteorology

OBJECTIVE

To collect and analyze climatic, paleoclimatic, future climatic, and Quaternary hydrologic data to evaluate the suitability of the site.

WBS 1.2.3.6.2 Climatology

OBJECTIVE

To characterize the present, paleo-regional, local climate, and hydrologic conditions at Yucca Mountain, and to determine the magnitude and likely effects that future changes in climate will have on repository performance.

WBS 1.2.3.6.2.1 Change in Climatic Conditions

OBJECTIVE

To provide a baseline for determining the changes in climate that potentially affect the waste isolation capabilities of the site. (SCP Investigation 8.3.1.5.1)

WBS 1.2.3.6.2.1.1 Modern Regional Climate

Principal Investigator - R. Forester

OBJECTIVE

To develop a synoptic characterization of the modern regional climate to provide a baseline and a background for the interpretation of climatic variation. (SCP Study 8.3.1.5.1.1)

SCP 8.3.1.5.1.1.1 Synoptic characterization of regional climate OG3621K2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Planning and Operations

3GCR005 Develop Study Plan

Draft of Study Plan is 95% complete.

Variances

3GCR007, 3GCR008, and 3GCR012: The subcontractor from the University of Utah designated to do the work in these activities was not able to provide any services this year. No dollars were spent. These activities were rescheduled to FY93.

WBS 1.2.3.6.2.1.2 Paleoclimate Study of Lake, Playa, and Marsh Deposits

Principal Investigator - R. Forester

OBJECTIVE

To establish the nature, timing duration, and amplitude of paleoclimate changes based on paleontologic, stratigraphic-sedimentologic, chemical, and mineralogic analyses of lacustrine sediments in or near southern Nevada; and provide a chronologic frame work for this paleoclimatic information. (SCP Study 8.3.1.5.1.2)

SCP 8.3.1.5.1.2.2 Analysis of stratigraphy-sedimentology of marsh, lacustrine, and playa deposits

OG3621B2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCLOO4B Sample outcrop sites

R. Forester received about 500 samples from Las Vegas Valley lake deposits of ostracodes collected by J. Quade to be used for characterizing the chemical and physical properties of the water in which they lived. These samples will also be used to help select sites for coring in FY93.

3GCLOO2B Conduct reconnaissance - Las Vegas Valley

Obtained permits for sampling on U.S. Fish and Wildlife Service and Bureau of Land Management administered lands.

3GCLOO2B Conduct reconnaissance - Las Vegas Valley (CONTINUED)

S. Lundstrom familiarized himself with the stratigraphy of the Indian Springs Valley marsh deposits described by Quade and identified sites for future sampling for ostracode studies. Sites to be sampled were photographed to document accurately sample locations, in compliance with QA requirements.

WBS 1.2.3.6.2.1.3 Climatic Implications of Terrestrial Paleocology

Principal Investigator - R. Forester

OBJECTIVE

To determine aspects of past vegetation change; and use vegetation records to provide quantitative estimates of changes in climatic variables for the southern Great Basin. (SCP Study 8.3.1.5.1.3)

SCP 8.3.1.5.1.3.1 Analysis of pack rat middens OG3621G2

Summary Account Manager - R. Forester

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH028M Faunal data. Modern Springs to PDA

This data are not complete because R. Forester was on assignment to the Geologic Division and was unable to identify the fauna.

3GQH007M Vegetation Map to PDA

Additional time was necessary to prepare vegetation map for use in this study. This is the first map that is being prepared in this form so problems crop up.

3GCT315M Work authorization 1.2.3.6.2.1.3

The grading report has been approved; therefore the work authorization element has been completed.

Planning and Operations

3GGL101 Hire and train staff

Completed August 31, 1992.

3GCT315M Work authorization 1.2.3.6.2.1.3

The grading report has been approved; therefore the work authorization element has been completed.

Variances

3GQH028	All these activities were delayed by the assignment of R. Forester to work with the Geologic Division under SIR Funds. Dr. Forester will complete his part of listed activities now that he is on YMP funding.
3GQH004	
3GQH004M	
3GQH005M	
3GQH008M	
3GQH009M	
3GQH028M	

3GQH007 Vegetation Map to PDA

F. D'Agnesse expects to complete this map by November 15, 1992.

3GQH02 Vegetation distribution mapping Amargosa Desert

A. Turner expects to finish this activity by November 2, 1992 and submit a map and associated report.

3GCL102, 3GCL103, and 3GCL104: The subcontractor from the University of Utah designated to do some of the work in these activities was not able to provide any services this year. A planned subcontract with the DRI was not put in place. No dollars have been spent. The activities were rescheduled for 1993.

WBS 1.2.3.6.2.1.4 Paleoenvironmental History of Yucca Mountain

Principal Investigator - J. Whitney

OBJECTIVE

To evaluate the paleoenvironmental record at Yucca Mountain and surroundings in light of inferred paleoclimate history of the southern Great Basin; to model soil properties in the Yucca Mountain region; to map surficial deposits; and to reconstruct the eolian history of the region. (SCP Study 8.3.1.5.1.4)

SCP 8.3.1.5.1.4.2 Surficial deposits mapping of Yucca Mountain area 0G362112

Summary Account Manager - E. Taylor

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GCH011A Create map surface dep-north third Yucca Mt.

S. Lundstrom completed initial photointerpretive mapping and field checking of Quad 26, continued photointerpretation and mapping of Quad 20, and began similar activities for Quad 27. Emphasis was on Fortymile Wash and on extending the mapping by Wesling et al (1991) in Midway Valley. During field checking, one especially valuable area was observed in which potentially chronologically useful eolianite material is overlain by the high terrace gravel of Fortymile Wash. This site will be sampled for isotopic analysis.

3CCH010A Field check work; collect material for isotope analyses.

Samples of stratigraphic units were collected for isotopic analyses.

3GCH004A Conduct isotope analyses sediments/rocks.

J. Paces examined and sampled carbonate-rich soil horizons from trench T-5a ("long trench") in Midway Valley with John Wesling and others. The prominent buried soil (Q3 of Wesling) was sampled at three localities over the length of the trench (~320 m) in order to assess the consistency of U-series dates of carbonate developed within a single soil profile that has been imposed on several different lithologic units and slope gradients. In addition, buried soils beneath the Q3 profile were sampled for geochronological correlation with soils that have been identified from older surfaces throughout the Yucca Mountain area. This work is performed in conjunction with SCP activity 8.3.1.17.4.2.2 Conduct Exploratory Trenching in Midway Valley, work item 3GFP007 Excavate and Log Trench Through Proposed ESF.

Work Performed but not in Direct Support of the Scheduled Tasks

Scott Lundstrom participated in a field trip in preparation for an NRC review of Midway Valley and Busted Butte tectonics work including Quaternary stratigraphy.

WBS 1.2.3.6.2.2 Effects of Future Climatic Conditions on Hydrologic Characteristics

OBJECTIVE

To determine the relations between climatic conditions and hydrologic characteristics in the vicinity of Yucca Mountain during and since the Quaternary; and to predict future hydrologic response to possible future climatic conditions. (SCP Investigation 8.3.1.5.2)

WBS 1.2.3.6.2.2.1 Quaternary Regional Hydrology

Principal Investigator - R. Luckey

OBJECTIVE

To investigate the hydraulic characteristics of paleoflood events and to compare them with modern flooding and related geomorphic processes; to determine past infiltration and percolation history at Yucca Mountain through isotopic and chemical analysis of water from the unsaturated zone; to determine past hydrologic conditions in the regional discharge area; to estimate the conditions and rates of infiltration and ground-water recharge during the Quaternary; and to determine the ages, distribution, origin, and paleohydrologic significance of calcite and opaline silica deposits along faults and fractures. (SCP Study 8.3.1.5.2.1)

SCP 8.3.1.5.2.1.1 Regional paleoflood evaluation OG3622A2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH008A Geomorphometric analysis of YM and vicinity

D. Grasso and Martinez completed preliminary mapping of the Amargosa River drainage basin boundary. These data will be input into a computer GIS and incorporated with other regional paleoflood data. Our goal is to develop a data base that can be used to evaluate precipitation and streamflow runoff relationships. Ultimately, these data will be used to quantify the differences between modern and past streamflow events.

Previous work on regional flood magnitude predictions in the Fortymile Wash area by Squires and Young ("Flood Potential of Fortymile Wash and Its Principal Southwestern Tributaries, Nevada Test Site, Southern Nevada") and the USBR ("Nevada Test Site Probable Maximum Flood Study," and "Nevada Test Site Flood Inundation Study") were evaluated. The regional approaches taken by these researchers to predict the volume of probable modern-day floods may be useful to this SCP study. These data will provide at least preliminary limits for estimating the magnitudes of paleoflood in the region.

~~D. Grasso and Martinez completed a climatic data base of monthly precipitation in southern Nevada and southeastern California for the period 1968-1992. These data will enable analysis and correlation of regional precipitation and streamflow runoff events. Preliminary analyses have shown that a particularly wet period in August, 1983, and that this events is regionally correlative with severe flooding on the Amargosa River. A flood of 10,600 cfs occurred on the Amargosa River in August, 1983, at Tecopa, California. The relationships between region-wide precipitation and runoff will help us to develop boundaries for the magnitude and frequency of past flood events.~~

D. Grasso continued preparation of a procedure for mapping the relative ages of alluvial surfaces in the vicinity of Yucca Mountain. The procedure uses Landsat multispectral analysis and information related to surface morphology, the degree of surface dissection, and other surface variations related to desert pavement, and soil and vegetation types. Data are being compiled for the different age surfaces in the region to refine this surface mapping procedures.

D. Grasso continued to search for, and prepare, Landsat TM imagery, aerial photographs, and digital map data needed for geomorphometric analysis of paleoflood features in the Yucca Mountain region. USGS personnel in Carson City, Nevada, have been helping to download Landsat TM and DEM data sets, but little work has been accomplished. We will continue to pursue converting these data to usable formats for this activity.

3GQH003A Reconnaissance Yuccan Mountain and vicinity for paleoflood evidence

D. Grasso studied Landsat satellite images and maps of the region surrounding the southwestern side of Yucca Mountain to assess the regional relationships of paleoflooding. This information was needed to better understand the paleo-flow paths of stream systems that may be related to the Amargosa River drainage and Fortymile Wash.

P. Glancy and J. Bell, Nevada Bureau of Mines and Geology (NBM&G), revisited three earthquake fault trenches dug along the foothills of the Sierra Nevada by NBM&G. Bell presented a summary of the stratigraphy and described the samples he had collected for C-14 dating. These stratigraphic dates should be very useful in developing a regional, late-Holocene flood and debris flow chronology for the area.

3GQH003A Reconnaissance Yuccan Mountain and vicinity for paleoflood evidence (CONTINUED)

D. Grasso, aided by T. Kane and C. Martinez, have begun preparation of a map and table showing the locations and dates of all known (historic) flood events in the Amargosa River drainage basin. These data, correlated with their respective precipitation events, will enable quantitative analysis of regional precipitation-runoff relationships. This numerical information is needed for the paleoflood evaluation.

D. Grasso conducted a regional reconnaissance of the White River Valley east of Yucca Mountain in early September. The recon focused on the ages for paleoflooding, and their possible linkages to regional climatic change during the late Quaternary.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 35 hours were spent on the following:

D. Grasso participated in a project review by Pete Scott, USGS, for this study.

D. Grasso attended the 1992 Friends of the Pleistocene Field Conferences led by Ken Pierce, USGS, Denver. The conference focused on evidence of the age and timing of late-Quaternary glaciation related to global climate change. Information presented was directly applicable to this study in that new evidence was presented that refines previous correlations between the terrestrial and marine climatic records.

SCP 8.3.1.5.2.1.3 Evaluation of past discharge areas OG3622B2

Summary Account Manager - E. Gutentag

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012 Analyze water by NWQL and GSP isotope staff

S. Mahan analyzed a water sample from Virgin Spring (collected by W. Steinkampf) for Sr isotopic composition. The resulting analysis is enriched in radiogenic Sr ($^{87}\text{Sr}/^{86}\text{Sr} = 0.72220$). This sample represents the only datum available from the Black Mountains section. The closest available water data are from Tecopa and Shoshone Springs in the Chicago/Greenwater Valley flow system containing $^{87}\text{Sr}/^{86}\text{Sr}$ values of 0.7146 and 0.7158.

S. Mahan analyzed the Sr isotopic composition of a second water sample collected recently from Nevares Spring in Death Valley. The resulting $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.71901 is analytically identical to the first water sample ($^{87}\text{Sr}/^{86}\text{Sr} = 0.71902$) collected during the previous year implying that the Sr budget of this flow system may be well buffered at this time scale.

S. Mahan continued to analyze Sr isotopic compositions from a series of water samples collected over a ~6 hour pumping interval from VH-1 in July, 1992. Data show scatter at a scale slightly greater than analytical uncertainty. Although $^{87}\text{Sr}/^{86}\text{Sr}$ in the timed sequence fluctuates, an overall trend of increasing $^{87}\text{Sr}/^{86}\text{Sr}$ with time is present from earlier- to later-collected samples. At present, both Sr and hydrologic data are insufficient to permit interpretation of observed variations. However, compositional variations suggest that water in the Tertiary aquifer can remain stratified with minimal diffusional or turbulent mixing. Pumping causes contributions from two or more isotopically-distinct sources which are tapped at various times to varying degrees. In order to further investigate compositional fluctuations in well water, B. Widmann plotted $\delta^{87}\text{Sr}$ vs. time for time-series samples for VH-1, JF-3, J12, J13, and Army Well #1. All time-series collections show intra-well fluctuations near the level of analytical uncertainty. The number of samples currently available is insufficient to characterize multicomponent mixing.

3GQH012 Analyze water by NWQL and GSP isotope staff (CONTINUED)

B. Widmann plotted all water sample locations in the YMPB/IGG Sr data base as of Sept. 1992 on the 1:250,000 base map from open-file report 90-355.

Z. Peterman prepared a preliminary (unpublished) extended abstract entitled *Isotopic evidence of complex ground water flow at Yucca Mountain, Nevada* for submission to the American Nuclear Society for consideration at the International High-Level Nuclear Waste Management Conference. Authors are Peterman and J.S. Stuckless.

K. Ludwig completed the FY92 MOA technical data requirements of determining high-precision uranium isotopic compositions and concentrations on ground waters from the Yucca Mountain vicinity. Forty-three water samples have been analyzed for $^{234}\text{U}/^{238}\text{U}$ ratios and U concentrations, and an additional 12 replicates were completed to demonstrate the precision of this method. Numerous standards were also completed during the course of the investigation. Results are summarized in an extended abstract submitted to the American Nuclear Society (see below). An important aspect of this research is the identification of a limited U isotopic compositional range for ground waters from the regional carbonate aquifer. This is in contrast to a much larger degree of variation found in waters from the Tertiary volcanic aquifer. These observations will have a significant impact on future studies directed at understanding communication between these two reservoirs.

K. Ludwig summarized results of U isotopic studies of natural waters in a preliminary (unpublished) extended abstract entitled *$^{234}\text{U}/^{238}\text{U}$ ratios as a ground water flow tracer, SW Nevada-SE California* submitted to the American Nuclear Society for presentation at the 1993 High-Level Radioactive Waste Management Conference. Authors are Ludwig, Z. Peterman, K. Simmons and E. Gutentag.

Z. Peterman completed revisions from technical reviewers on the first draft of a manuscript entitled *Application of Natural Tracer Isotopes to Paleohydrologic Studies* co-authored with J. Stuckless. The paper describes general techniques and theory of natural radioactive decay of Sr, U, Pb, Ca, and Nd isotopes in ground water systems with specific findings from studies at Yucca Mountain and elsewhere.

3GQH028 Analyze faunal samples modern springs FY92

R. Forester reports that 90 percent of the samples collected in FY92 have been processed and are awaiting species identification.

3GQH004 Study/analyze results from wet/dry playas

R. Forester reports that 85 percent of the samples collected in FY92 have been processed and are awaiting identification.

3GQH007 Vegetation mapping phase 1

Available TM data was put in GIS format where vegetation data and soil chemistry data will be added to produce vegetation classes and soil types. Vegetation density maps have been produced from the imagery. These density maps have been overlaid onto the land use maps and compared. The imagery is also being compared to the geology and structure maps.

Technical Activities (CONTINUED)

3GQH008 Collect faunal samples from past discharge sites - FY92

B. Marshall wrote and submitted a preliminary (unpublished) extended abstract for the 1993 High-Level Radioactive Waste Management Conference entitled *Strontium isotopic evidence for a higher water table at Yucca Mountain*. Authors are Marshall, Z.E. Peterman, and J.S. Stuckless.

J. Paces completed processing and preliminary alpha counting of two additional samples collected by E.M. Taylor from the Crater Flat deposit (CFD) and two samples from the Horse Tooth deposit (HTD). Preliminary results for one sample representing the lowest stratigraphic horizon available in the CFD indicate an age of about 150 ka and an initial $^{234}\text{U}/^{238}\text{U}$ of about 3.6. The other CFD sample is a carbonate-cemented gravel from the bottom of the nearby wash. It exhibits excess Th and hence is not dateable, however its uncorrected $^{234}\text{U}/^{238}\text{U}$ of 1.5 is much lower than other discharge carbonates implying that it may represent pedogenic carbonate from the colluvial slope underlying the spring deposits. Only one of the two HTD samples has U-Th systematics that yield geochronological information. Its Th-corrected age is 47 ka and its initial $^{234}\text{U}/^{238}\text{U}$ is 2.7. Both age and U isotopic composition of this sample are similar to results from the CFD implying that the two deposits were coeval at least in part.

J. Paces completed data reduction and summarized current U-series results from ground water discharge deposits at Crater Flat in a preliminary (unpublished) extended abstract entitled *U-series ages of Quaternary ground water discharge, Crater Flat, Nevada* submitted to the American Nuclear Society for presentation at the 1993 High-Level Radioactive Waste Management Conference. Authors are Paces, E.M. Taylor, and C.A. Bush.

3GQH002 Vegetation distribution mapping Amargosa Desert

Using plant transect data and vegetation species, importance indices were performed using standard plant ecology procedures. Hierarchical classification methods were performed on these indices and identified seven major vegetation communities which were subdivided into 16 sub-communities. Road survey data were correlated to these sub-communities and the resulting correlation data entered into the IDRISI GIS program to develop quantitative vegetation maps of each sub-community and finally quantitative vegetation communities maps at various probability levels. These results will be reported in a forthcoming publication.

3GQH009 Prepare faunal samples for analysis

K. Conrad reports that all samples collected for this activity have been processed.

3GQH011 Prepare report on methods of channel geometry

W. Osterkamp reports that much of the text is complete and the illustrations are being prepared.

3GQH000 Chemical analysis soil samples

The initial test set of chemical analyses was received and a TDIF was submitted.

3GQH004M Reports on wet/dry playas

Soil chemistry analytical data for wet/dry playa samples from early FY91 were received from the GD Branch of Geochemistry and the data were submitted in a August 19, 1992 TDIF.

Soil chemistry analytical data for wet/dry playa samples submitted to GD Branch of Geochemistry for playa samples collected October 17, 1991 were submitted by a TDIF September 28, 1992.

Technical Activities (CONTINUED)

3GQH005M Modern sprig data to PDA

Only the water chemistry data from the NWQL and the field sample locality sheets have been submitted to the PDA.

3GQH008M Faunal data discharge deposits to PDA

The GSP Isotope personnel will submit the SR 87/86 data to the PDA. R. Forester will supply a faunal list when available. The soil chemistry data have not yet been analyzed.

3GQH012M Water chemistry data to PDA

Water chemistry data for field trip 3-22-92 to 3-28-92 were analyzed by NWQL and water quality data sheets were submitted by a TDIF July 27, 1992.

3GQH007M Vegetation map to PDA

Additional time was necessary to prepare vegetation map for use in this study. This is the first map that is being prepared in this form so problems crop up.

Variances

3GQH007 Vegetation map to PDA

F. D'Agness expects to complete this map by November 15, 1992.

3GQH02 Vegetation distribution mapping Amargosa Desert

K. Turner expects to finish this activity by November 2, 1992 and submit a map and associated report.

SCP 8.3.1.5.2.1.4a Analog recharge sites 0G3622C2

Summary Account Manager - R. Lichty

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH012C Collect/reduce hydro data from remote sites FY92

The week of September 14 was devoted to the fall field trip. The weather and surface water records were pulled, water samples were collected, and maintenance was done on the equipment by T. Oliver and J. Ashby.

On a daily basis, T. Oliver checked the NWIS data base for DCP data and performed weekly data pulls from the LRGS to fill missing data.

T. Oliver entered the data from the September field trip into the NWIS data base.

P. McKinley discussed the September field trip with T. Oliver and reviewed the data recovered during the trip.

3GQH014C Test PRMS model

B. Lichty finished testing the PRMS model for both Kawich and Stewart creek watersheds. The testing demonstrated that the available data are adequate for developing accurate simulations of hydrologic water-budget components in these two diverse hydrologies (observed and simulated streamflow is an order of magnitude different in the respective basins.)

Technical Activities (CONTINUED)

3GQH018C Prepare data report on Kawich: FY91

P. McKinley completed the FY91 station analysis for Kawich discharge data; the data report for FY85/91, and submitted the report for review; and a training course on Probability and Statistics for Data Analysis. McKinley and T. Oliver met with M. Karlinger and A. Vecchia from the Branch of Regional Research about the regression procedure used to estimate missing data. McKinley met with K. Wilke of the USGS Colorado District about review of project data.

3GQH019C Prepare data report on Stewart: FY91

3GQH15CA Complete data report Kawich FY85/90

3GQH16CA Complete data report Stewart FY85/90

P. McKinley completed the data report for FY85/91 and submitted the report for review, and completed a training course on Probability and Statistics for Data Analysis.

P. McKinley and T. Oliver met with M. Karlinger and A. Vecchia from the Branch of Regional Research about the regression procedure used to estimate missing data. McKinley met with K. Wilke of the USGS Colorado District about review of project data.

3GQH21CA Development of HRU analog basins

T. Oliver estimated areas for each of the HRUs using a Altek digitizer. The results were give to B. Lichty.

B. Lichty configured Kawich and Stewart creek watersheds into HRUs on the basis of slope aspect, elevation, and vegetation type to facilitate the testing of PRMS.

Variances

3GQH018C Prepare data report on Kawich: FY91

3GQH019C Prepare data report on Stewart: FY91

3GQH15CA Complete data report Kawich FY85/90

3GQH16CA Complete data report Stewart FY85/90

These activities were not completed as scheduled. However, the data are presently being used in the PRMS model so no negative impact is anticipated.

SCP 8.3.1.5.2.1.4b Geochemistry of arid-zone infiltration OG3622E2

Summary Account Manager - A. Riggs

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH003C Soil and Moisture Chemical Sampling

The soil samples collected in August 1992 are being analyzed in NMIMT laboratories for soil moisture, stable water isotopes, soil water chemistry and soil carbonate isotopes. Activity completed for this fiscal year.

3GQH004D Install Watershed Monitoring Instrumentation

The V-notch weirs have been fabricated and are ready for installation.

3GQH010D Analyze/Interpret CI-36 Data by NMIMT

Ten CI-36 analyses were received from Rocesth this month. The results are being interpreted. Progress report: CL-36 Ages in Soil, 1992 (milestone 3GQ010M) was completed by New Mexico Institute of Mining and Technology and was received by the principal investigator.

Technical Activities (CONTINUED)

3GQH014D Long-Term/Meteorological Monitoring, FY92

The first round of long-term meteorological data has been recovered from the tower, and everything appears to be working except that the pyranometer goes out of range during bright sunlight - this will be corrected in early October. As far as it is known, long-term meteorological data collection has continued uninterrupted throughout September.

Quality Assurance

3GQH018D Calibrate Backup/Meteorological Instrumentation

The backup barometer has been calibrated and is ready for installation in early October.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 40 hours were spent on the following:

Put together a draft ACSR to exempt the field work from QA constraints.

Took delivery of a new PC and started coming up to speed on MS-DOS.

SCP 8.3.1.5.2.1.5 Studies of calcite and opaline silica vein deposits 0G3622D2

Summary Account Manager - J. Whelan

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GQH802A Install/calibrate new mass spectrometers.

The Finnigan MAT 252 mass spectrometer installation (after a lengthy return to Bremen for repair of damages incurred during shipping) is complete and training of Whelan and Moscati in its operation has begun. The "Trapping Box", an automated device for removing water and non-condensables from carbon dioxide, and a Gilson Autosampler, an automated device for the extraction and purification of samples of gas mixtures such as air or carbon dioxide and water, are ready to be installed. These instruments alone will enormously increase the laboratory's capacity to produce stable isotopic data from carbonates, water samples, and silicates and oxides. In addition, the existing Finnigan MAT 251 mass spectrometer has been retrofitted to be compatible with the latest versions of Finnigan's automation software and has been equipped with an automated "Kiel" carbonate extraction device. The latter instrumentation still requires extensive test operations to determine the proper correction factors but will permit the automated analysis of as many as forty-six carbonate samples a day. Furthermore, the Finnigan MAT 251 is now capable of analyzing extremely small samples (samples of carbon dioxide as small as 5 nanomoles have been analyzed) and analysis of 200 to 300 nanomole samples will be routine.

3GQH809A Analyze samples - trench 14 original exposure

J. Whelan and R. Moscati collected detailed samples from trench 14D, from the long trench east of Exile Hill, and from sand ramp calcretes and fault-filling calcretes at Busted Butte. Relationships between fault events and cross-cutting mineralization at these trenches and exposures has recently been mapped in detail by C. Menges and J. Whitney providing the opportunity to date faulting events and to determine the stable isotope systematics of age-constrained pedogenic calcrete samples. Moscati inventoried, and filled out sample description sheets (with annotated photodocumentation) for these samples.

J. Whelan visited and collected reconnaissance samples from the pavement exposure on the east side of Exile Hill. This pavement exposes the bedrock surface of the Tiva Canyon and provides a cross-sectional exposure on a near-vertical cut-face to a depth of approximately 12'.

3GQH809A Analyze samples - trench 14 original exposure (CONTINUED)

R. Moscati prepared a preliminary report on the potential of using cathodoluminescence for defining stratigraphically equivalent mineralization zones within calcite for stable isotope and geochronologic dating.

3GQH813A Evaluate total carbonate system - Yucca Mountain area

Fluid inclusion studies, in collaboration with E. Roedder (Harvard), have shown that drill holes USW G-1 and G-2 have inclusions suitable for study. Heating, freezing, and crushing studies are in progress. Preliminary results from ~5100' in USW G-2 support previous mineralogic studies that concluded temperatures were as much as 200 to 250°C during the moderate temperature diagenetic alteration event at ~10.5 ma.

J. Whelan described and sampled secondary calcite (where possible) from 51 samples of drill core from drill hole USW G-2.

J. Whelan examined the upper ~540' of UE25 UZ-16, the upper 1100' of USW VH-2, and all of USW VH-1; approximately 100 samples have been requested from these drill holes.

S. Mahan analyzed selected trace and minor element contents of 11 carbonate vein samples by x-ray fluorescence. Samples are from veins near or below the water table from several drill holes (G-1, G-2, G3/GU-3, and G-4). Several samples have anomalously high Fe and Mn contents suggesting the presence of ankerite and rhodochrosite in addition to calcite. The purpose of this work was to help elucidate the behavior of Pb in carbonate for the Pb isotopic studies of R. Zartman and L. Kwak.

B. Widmann prepared samples of Paleozoic limestone and dolomite outcrops collected by Jim Cole for XRF and Sr analysis. Samples are the first materials available from relatively inaccessible areas to the north of the NTS and Nellis Air Force Base including the Black Hills, Pintwater Range, and Indian Springs Valley.

R. Zartman completed the FY92 MOA technical data requirements of determining lead isotopes in carbonates as part of the attempt to understand the calcite origins and budget at Yucca Mountain. Twenty-four samples previously analyzed for Sr isotopic compositions were analyzed for U, Th, and Pb contents as well as Pb isotopic compositions. Three standards were analyzed during the course of the investigation, and all of the data are currently being prepared for submittal on TDIF's to the LRC. Results are summarized in an extended abstract submitted to the American Nuclear Society (see below). With regard to fracture-filling calcite, Pb isotopic compositions display a depth-dependent trend very similar to Sr isotopic results.

3GQH814A Prepare reports - drill hole calcite/silica

B. Marshall finished revising tables for his CASY manuscript entitled *Origin of Carbonate Deposits in the Yucca Mountain area: Results of Strontium-isotope Analyses at Trench 14 and Busted Butte*. This paper is now completely revised awaiting completion of TDIF for re-submittal to the publications group.

B. Marshall worked on a manuscript to be submitted to the Organization for Economic Co-operative and Development/Nuclear Energy Agency meeting in France entitled *Isotopic studies of cavity filling and fracture coating minerals as an aid to understanding paleohydrology, Yucca Mountain, Nevada, USA*. Authors are Marshall, J. Stuckless (presenter), Z. Peterman, and J. Whelan.

3GQH814A Prepare reports - drill hole calcite/silica (CONTINUED)

R. Zartman wrote a preliminary (unpublished) abstract entitled *Pb isotopic composition of carbonate rock and eolian dust from the vicinity of Yucca Mountain, Nevada* which was submitted to the American Nuclear Society for presentation at the 1993 High-Level Radioactive Waste Management Conference. Authors are Zartman and L. Kwak.

Other Technical Activities

B. Marshall and S. Mahan performed electronics tests to diagnose a hardware problem on the Finnigan MAT 262 solid source mass spectrometer. Tests indicated a faulty IC 49 chip on the digital board which was repaired by MAT engineer.

B. Marshall set up software run procedure for neodymium isotopic analysis. K. Futa assisted running a magazine of eleven neodymium standards. The results of the standard data indicate a higher than expected external precision on two of the measured ratios. These data indicate that a more complete analysis of neodymium run parameters is required in the near future.

B. Widmann performed further tests to determine the accuracy of the new satellite-based geographic positioning system instrument (Magellan NAV 1000) which will be used at Yucca Mountain for determining coordinates of sampling sites on the ground at the time of collection. ~~The unit gave coordinates that were accurate to within two seconds of latitude and longitude on all reading stations on the Denver Federal Center.~~ However, the unit failed to provide accurate elevation readings from satellite telemetry. Further testing in areas with greater relief is planned.

B. Widmann received in-house training for routine analysis of x-ray fluorescence spectrometry and cation exchange chemistry for Sr separation and purification.

J. Paces initiated calibration of a new bottle of mixed ^{236}U - ^{232}Th tracer solution (Spike #8) using NIST 950a Uranium and Harwell Uraninite as standards. U and Th are currently counting on the α -spectrometer. Once calibrated, this new bottle of spike will replace the one currently being used for α -counting analyses.

K. Futa performed a chemical separation of Sm from Nd on USGS rock standard BCR-1 in order to test the reliability of Nd isotopic analyses on the new Finnigan MAT 262 thermal ionization mass spectrometer.

3GQH814A Prepare reports for drill hole calcite/silica

See report for technical activity SCP 8.3.1.5.2.1.5 submitted by Isotope and Geochemistry Group dated October 1, 1992.

Quality Assurance

Raw $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in the IGG strontium data base have been cross-checked to original mass spectrometer output for correctness by three different personnel.

B. Marshall and S. Mahan attended the biannual NTS security video training and also renewed the NTS three year requirement for Desert Tortoise training video.

J. Paces attend NTS General Employee Training in Las Vegas on September 1, 1992.

Planning and Operations

Z. Peterman attended the NWTRB meeting (Las Vegas) and field trip on Volcanic Hazards at Yucca Mountain.

Z. Peterman, B. Marshall and J. Paces attended a GSP meeting to discuss climate program priorities in the near-future.

Variations

3GQH802A: (See also section II B.) During July the mass spectrometer of the Branch of Petroleum Geology had been utilized on a part-time basis to collect stable isotope data in support of this project. At the end of July, unanticipated power failure due to nearby road construction resulted in a cascading burnout of electronic components in this instrument that still had not been remedied (largely due to lack of funding) by the end of August. No stable isotope data was collected by Calcite/Opaline Silica project personnel during September, but prospects are good that data collection will begin during October utilizing the new instrumentation in Rye's lab.

3GQH804A, 3GQH805A, 3GQH807A, and 3GQH808A: Due to unplanned activities by principal investigator and delays in installation of mass spectrometer, these activities are to be replanned to FY93.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Whelan continued preparation of four TDIFs for publication of the CASY paper "Stable-isotope geochemistry of fault- and fracture-hosted calcite and ground-water carbonate, Yucca Mountain area".

R. Moscatti completed 2 reading assignments, GET training in Las Vegas, and attended 12 hours of YMP/WRD Orientation Training.

R. Moscatti determined the proper exposure conditions and light setup for microphotography of mineral specimens up to magnifications of ~12X.

An estimated 112 hours were spent on the following:

Z. Peterman prepared for (September 17, 1992) and presented (September 18, 1992) an in-house seminar on the utility of radiogenic isotopic tracers in ground water systems. The seminar was given to USGS staff in YMPB/HIP. B. Marshall, S. Mahan, K. Futa, B. Widmann and J. Paces were in attendance. (18 hrs)

S. Mahan prepared and analyzed a variety of water samples (collected by Z. Peterman) for Sr contents (by XRF) and isotopic compositions (by mass spectrometry) from boreholes in Sweden. This work is part of a joint DOE/USGS/SKB project studying radioactive waste isolation in crystalline rock. Typical $^{87}\text{Sr}/^{86}\text{Sr}$ values for borehole waters range from 0.716 to 0.718. Two samples contain $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of 0.707, much closer to the Sr isotopic composition of modern Baltic Sea water (0.7093). Drilling fluid (Uranine) was also analyzed and yielded a $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.718. The similarity of isotopic compositions of borehole water and Uranine underscores the need to identify residual drilling fluids contamination in borehole waters. (24 hrs)

S. Mahan prepared four water samples from Pyramid Lake, NV as part of a cooperative NRP/Regional WRD study with L. Benson. This project has yielded valuable analog Sr applications for the Yucca Mountain area. Previous data show that modern water samples containing low $^{87}\text{Sr}/^{86}\text{Sr}$ values are not in isotopic equilibrium with tufa samples containing much higher $^{87}\text{Sr}/^{86}\text{Sr}$. Therefore, tufas must have been precipitated from different waters that have not yet been sampled. (6 hrs)

Work Performed but not in Direct Support of the Scheduled Tasks (CONTINUED)

S. Mahan prepared sixteen water samples collected by L. Spangler (Utah district WRD office) from the Aneth oil field, Paradox Basin, Utah for Sr isotopic analysis. This project represents an analog study to determine the utility of Sr isotopes for determining the extent of mixing within ground water systems. Samples include host aquifer water, injection water and oil field brines. (16 hrs)

S. Mahan analyzed Sr isotopic compositions of 14 surface water samples collected from the vicinity of the Canadian underground laboratory as part of the AECL/DOE joint study. Resulting $^{87}\text{Sr}/^{86}\text{Sr}$ ratios range from 0.719 to 0.724 with one sample yielding a ratio as high as 0.734. B. Widmann compiled spreadsheets for AECL waters and Swedish borehole waters. (24 hrs)

K. Futa reviewed a National Science Foundation proposal for geochemical and isotopic work proposed on the Andean and Patagonian volcanic rocks in South America. (6 hrs)

J. Paces provided an internal review of a manuscript entitled *Application of natural tracer isotopes to paleohydrologic studies* by Z.E. Peterman and J.S. Stuckless. (10 hrs)

Z. Peterman reviewed one manuscript and one extended abstract for C. Faunt and others. (8 hrs)

WBS 1.2.3.6.2.2.2 Future Regional Hydrology due to Climate Changes

Principal Investigator - J. Downey

OBJECTIVE

To characterize the impacts of potential future climate changes on the regional and site surface-water system, the site unsaturated zone hydrology, and the regional and site saturated zone hydrology. (SCP Study 8.3.1.5.2.2)

SCP 8.3.1.5.2.2.1 Analysis of future surface hydrology due to climate changes OG3622F2

Summary Account Manager - D. Grasso

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFH202A Evaluate surface-water models - arid environment

Grasso continued to evaluate surface water models supported by the USGS. Work included an evaluation of the availability of precipitation and streamflow data, and possible sources of high-quality data relate to landscape morphology, vegetation and soil types, and the infiltration capacities of surficial sediments. Methods for estimating the needed modeling parameters were also looked at in the event that some of the required data are unavailable.

Work Performed but not in Direct Support of the Scheduled Tasks

An estimated 3 hours were spent on the following:

D. Grasso participated in a project review by P. Scott, USGS, for this study.

SCP 8.3.1.5.2.2.3 Synthesis of effects of possible future recharge due to climate changes on hydrologic characteristics of the Yucca Mountain saturated zone OG3622G2

Summary Account Manager - J. Downey

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GFH003C Conduct Literature Search for GIS and Future/Quaternary Ground Water.

C. Faunt continued literature search and reviewed reports on directional statistics, three-dimensional modeling and hydrochemical models.

J. Downey continued literature review on regional ground water flow systems, GIS Applications and Geohydrology of arid lands along with reports on Environmental problems of arid lands.

F. D'Agnese continued literature search and reviewed reports on remote sensing, principle components analysis, and multiple regression statistics.

3GFH023C Develop Recharge/Discharge Estimates

F. D'Agnese continued working with J. Downey on developing a precipitation-runoff technique based on Bagley and others (1964).

F. D'Agnese and K. Turner contacted M. Whiting (SCS) to acquire soils survey data for state of California. The data will be delivered by early November. (Since SCS is behind schedule on data base development of soil survey data, recharge and discharge calculations are delayed.)

F. D'Agnese continued preliminary vegetation mapping study (using ERMA). Supervised training and classification will continue through October. Vegetation density maps and land use maps were produced. These are being compared to existing maps.

J. Downey and F. D'Agnese continued development methods of calculating recharge and ET losses for the regional 3-D model. The development of data sets required for ET studies is being started.

K. Turner continued work on vegetation analysis in the Amargosa which is being conducted in conjunction with Past Discharge (to complete work begun by L. DeMarco). The corrected and updated DeMarco data sets were processed and the manuscript was further developed in rough draft form:- appendices, tables, and illustrations (including vegetation classification dendograms) were developed. GIS methods were used to develop initial vegetation maps.

3GFH021C Construct 3-D Hydrogeologic Framework Model

C. Faunt continued correlating faults on 2D cross-sections so that correct attribution may be assigned in the computer.

C. Faunt began using the recently developed user code in EP/SECT (cross-section modelling software). This code is used to attribute both faults and cross-sections.

3GFH005C Analyze Hydrogeologic Framework

The paper on structural analysis is completed. Final maps and figures are being prepared. A rough draft is being reviewed by F. D'Agnese, J. Downey and K. Turner. Gutentag completed a preliminary review. These comments are being incorporated into the manuscript.

K. Turner advised C. Faunt on selection of statistical methods to analyze the fault strike data.

C. Faunt and F. D'Agnese continued work on paper describing the development of the Hydrogeologic Map of the Death Valley Region. Correlation charts were drafted and the text is being completed.

Technical Activities (CONTINUED)

3GFH030C Construct Schema for GSIS

C. Faunt and D. Perfect continued compiling water chemistry information concerning the regional area from existing USGS files and reports.

K. Malmgren continued entering data into data base for the playa chemistries.

C. Faunt, D. Perfect, and J. Downey attended a briefing from Z. Peterman on the use of Strontium isotopes for ground-water flow analyses.

D. Perfect continued transferring township/range data to latitudes/longitudes.

S. Mahan (GSP) provided us with a copy of the Strontium isotope data to analyze briefly.

With the help of the computer section, the digitizer is now operational under ARC/INFO. A work flow has been devised for inputting map points and converting them to a desired projection (geographic, UTM, State Plane, ...).

F. D'Agnese continued terrain analysis for surface characterization (recharge, discharge, geomorphic, pedogenic, and hydrologic analysis). This included developing slope and aspect map development and reclassification of terrain model.

F. D'Agnese continued working with B. Meier (Intergraph) to develop a 2.5 dimensional terrain model of the study area to be used in visualization of the 3-dimensional model and YMP tour demonstrations.

J. Downey and C. Faunt continued preliminary development of code to translate ARC data into an ASCII format that would be readable by Intergraph's ASCII Loader software.

J. Downey continued up-dating the chloride model of H. Claassen and for the QA group.

3GFH026C Software QA Documentation

J. Downey and J. Watson met on a regular basis concerning application of QA to the 3-D modeling effort.

J. Downey and J. Watson spend time on software QA for H. Claassen's chloride program CLROPC attempting to see if it necessary to develop any operational manuals.

3GFH027C Est. Data Transfer Procedures

C. Faunt, F. D'Agnese, K. Turner, and J. Downey continued work on three open-file reports of GSIS data sets. The reports are undergoing final reviews and edits.

J. Downey continued work on some old reports for K. Kolm, CSM, in order to get them ready for USGS Review.

Planning and Operations

3GFH021C Construct 3-D Hydrogeologic Framework Model

F. D'Agnesse, C. Faunt and K. Turner met with J. Nelson (SAIC) and Rick Spengier (GSP) to discuss coordination of regional hydrogeologic and site geologic models. The group discussed the need to meet on a regular basis to review progress and troubleshoot any potential problems with software. The issue of Quality Assurance of these types of models was also discussed. Both groups appear to be approaching similar problems, although at different scales, in a similar manner.

Variations

Activity 3GFH021C (Construct 3-D Hydrogeologic Framework Model) was not completed during the month of September. Completion of this activity was delayed because of the extended period of time required by Intergraph to develop a user defined software code.

Activity 3GFH005C (Analyze Hydrologic Framework) was not completed during the month of September as investigators were diverted to other project tasks.

Activity 3GFH022C (Modify 3-D Hydrologic Framework) was not started during the month of September and will not begin until completion of 3GFH021C.

Work Performed but not in Direct Support of the Scheduled Tasks

J. Watson met with J. Downey and J. Czarnecki concerning QMP-3.15 for Czarnecki's and Downey's modeling work.

J. Watson and J. Downey continued QA work on Downey's "Chloride" software. The implementation of these issues awaits resolution by Downey and H. Claassen of other technical elements and specifics.

J. Watson met with D. Porter, D. Gockel, M. Ciesnik to discuss preliminary possible steps to be taken to initiate the grading process for J. Czarnecki and J. Downey's activities as well as became more familiar with the various requirements involved in the whole ACSR formulation and approval process.

1.2.5 REGULATORY AND INSTITUTIONAL

OBJECTIVE

To support the Department of Energy (DOE)/HQ in the development of the site-related aspects of compliance with Nuclear Regulatory commission agreements, requirements, and policies, environmental and permitting requirements, and related DOE orders, and the development of site-related regulatory documentation; to plan and conduct environmental field investigations and transportation studies related to environmental compliance, permitting and repository design; to plan and conduct socioeconomics studies to assess the regional socioeconomic action studies; to coordinate Project activities with the community and state and local governments; and to plan and implement a public communication plan.

WBS 1.2.5.1 Management and Integration

Principal Investigator - L. Hayes

OBJECTIVE

To manage and integrate the activities that support DOE/HQ that are performed within the regulatory and institutional WBS Elements.

ACTIVITIES AND ACCOMPLISHMENTS

OG3284D2: 4 days were spent in the preparation for a presentation to the NRC/ NWTRB field review members concerning activities in progress on Paintbrush Canyon and Bow ridge faults, and Midway Valley. In addition, much of the work on other activities cited above focused on preparations for this field trip.

D. Appel prepared instructions for compilation of the seventh YMP Site Characterization Progress Report (April-September 1992) and distributed them to hydrology program technical staff. Instruction package contained text from the sixth progress report, listing of technical bullets from monthly status reports for the period, and a list of reports published during the reporting period.

WBS 1.2.5.2 Licensing

OBJECTIVE

To support DOE by providing Project coordination and support of NRC interactions by providing input related to site aspects of proposed NRC regulation changes, and evaluate the impact of the regulation changes on the site activities, strategies, and plans; to support DOE/HQ in the development of site technical position papers by synthesizing site and site performance assessment technical information into Project positions; to develop draft position papers which support these positions; to perform technical evaluation of site data and related reports, technical reports, and conclusions, and draft position papers; to coordinate study plan review; to support the preparation of the semi-annual progress report for site investigations and assessments; and to coordinate and perform technical reviews of the site characterization program.

WBS 1.2.5.2.1 NRC Interaction Support

Principal Investigator - L. Hayes

OBJECTIVE

To support DOE interactions on the site program with NRC by providing information, coordination, and support within the Project.

ACTIVITIES AND ACCOMPLISHMENTS

PI responded to NRC comments and questions. Responses have been submitted to HIP for review.

J. Stuckless attended NRC interaction on tectonics including visits to Busted Butte, Midway Valley, Trench 14, and the Ghost Dance Fault.

WBS 1.2.5.2.2 Site Characterization Program

Principal Investigator - W. Dudley, Jr.

OBJECTIVE

To support the DOE in the completion of the Site Characterization Plan; to provide ongoing technical planning and support of site characterization activities; and to integrate results into site characterization activities and programs as appropriate, monitor each site program, and serve as the interface between the principal investigator and the DOE/HQ.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.5.2.5 Study Plan Coordination

Principal Investigator - L. Hayes

OBJECTIVE

To coordinate the preparation review and revision of SCP Study Plans.

ACTIVITIES AND ACCOMPLISHMENTS

YMP-USGS SP 8.3.1.2.2.4, R1 (ESF percolation) - Two meetings were held among HIP management, Unsaturated-Zone Section personnel, and SAIC-Golden personnel to initiate the revision of the study plan to reflect design changes in the ESF, and work on the revision subsequently commenced.

WBS 1.2.5.4 Environment

OBJECTIVE

To identify data requirements; to collect required environmental field data; and to prepare topical data reports.

WBS 1.2.5.4.8 Water Resources

Principal Investigator - R. La Camera

OBJECTIVE

To provide water resources environmental field activity planning documents, field data and analyses, and topical reports describing the results of field data analyses.

ACTIVITIES AND ACCOMPLISHMENTS

Technical Activities

3GWR0001 Ground-water level/springflow monitoring FY92

Ground-water levels were measured at twenty-six sites. This activity is complete.

3GWR010 Aquifer pump test JF-3

Processing and checking of data in computerized USGS data bases were completed. This activity is complete.

3GWR012 Instrument tracer well

Information required to obtain a BLM temporary-use permit at site AD-7 was prepared and mailed to SAIC.

3GWR014 Capital equipment procurement

The cable and reel portion of the hoist system was received from the vendor and was modified with an electric motor. The truck-mounted crane (to complete the hoist system) was ordered from the vendor.

Planning and Operations

3GWR0001 Ground-water level/springflow monitoring FY92

Plans for next month include measuring ground-water levels at all accessible sites in the monitoring network, and checking and filing the data collected.

3GWR010 Aquifer pump test JF-3

This specific activity is complete. Water-level and discharge data for wells JF-3 and J-12, prior to, during, and after pumping of well JF-3 has been entered into the USGS data base and checked for errors. Detailed compilation and analysis of data, including water-quality data for wells JF-3 and J-12, will comprise a separate PACS activity for FY93.

Planning and Operations (CONTINUED)

3GWR012 Instrument tracer well

Plans for next month include installation of shelter and equipment (pending receipt of temporary use permit).

Variances

3GWR0001 Ground-water level/springflow monitoring FY92

Water-level data were not collected at MV-1 or AD-6. MV-1 was not measured because it does not have an access tube to allow water-level measurements. The access problems at MV-1 have been previously discussed with DOE/YMP and alternative corrective actions presented. Water-level data was not collected at AD-6 at owners request because it is temporarily the owner's only production well, and the owner fears a water level measurement may affect the operation of the well. Nearby well AD-5 is currently measured to provide for monitoring in the area.

3GWR014 Capital equipment procurement

The cable and real portion of the hoist system has been received. The truck crane (which completes the hoist system) has been ordered from the vendor. The vendor has ordered the crane from their supplier, but does not expect delivery before October 15, 1992. The personal computer and printer have been ordered from the vendor, but no estimated time of delivery to the USGS has been provided. Alternative equipment is being utilized in the interim and there is no impact on other project activities.

Work Performed but not in Direct Support of the Scheduled Tasks

R. LaCamera prepared a memorandum to DOE regarding USGS concerns with the possible use of the UNLV water-chemistry laboratory by the USGS for routine water-quality analysis of samples collected for the water resources monitoring project.

R. LaCamera prepared a memorandum to DOE evaluating alternative methods of procuring water-level data for site MV-1 (Army Well 1) and provided estimated costs associated with each alternative.

R. LaCamera and C. Westenburg presented budget material at a DOE meeting on September 29. The material described a "baseline" level of work and funding for the water resources monitoring project. Attendees included W. Dixon and staff and C. Gertz and some of his staff.

On September 30, R. LaCamera and C. Westenburg, accompanied by the Nevada District surface-water specialist and Yucca Mountain section chief, met with the Ash meadows Wildlife Refuge Manager and visited three springs and one flowing well in Ash Meadows to discuss periodic- and continuous-discharge data collection.

1.2.9 PROJECT MANAGEMENT

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: project control, quality assurance, technical integration, and interaction with other OCRWM Program demands on Project management activities.

WBS 1.2.9.1 Management and Integration

OBJECTIVE

To provide overall management of the Yucca Mountain Project including: technical integration and interaction with other OCRWM Program elements.

WBS 1.2.9.1.1 Management

Principal Investigator - L. Hayes

OBJECTIVE

To provide overall management of the Yucca Mountain Project including budgeting and financial analysis, progress reporting, support to HQ management activities, training, and overall Project integration.

ACTIVITIES AND ACCOMPLISHMENTS

WBS 1.2.9.1.4 Records Management

Principal Investigator - L. Hayes

OBJECTIVE

To provide a Yucca Mountain Project Records Management System that will meet the requirements of: DOE-NNWSI, Quality Assurance Plan, DOE-NNWSI/88-9; DOE-OCRWM Records Management Policies and Requirements, DOE/RW-0194; and the Licensing Support System (LSS); and to establish and operate all local records centers.

ACTIVITIES AND ACCOMPLISHMENTS

All Records Inventory and Distribution Schedule (RIDS) records series have been entered into the computer data base.

Modifications to QMP-6.01, R5 were prepared for USBR transition purposes and for audit finding issues.

Action items for both Document Control and Records resulted from internal audit USGS-92-10. A letter and information sheet regarding the proper QA designation usage was distributed to identified record sources.

A facility with a two-hour vault has been located in Reno, Nevada, where the developer records (film) may be stored to meet Project requirements, yet be accessible to Dr. Brune for seismic work. Transportation of the film to the new facility has been arranged and will be completed after the facility becomes an approved vendor.

The following approved Technical Procedures were distributed:

USGS-HP-54, R1	Water-Flow Measurements Using 90 Degree V-Notch Weirs, Flumes, and Barrels
USGS-HP-100, R0	Stream Discharge Measurement Using a Type-AA Price Current Meter.
USGS-HP-166, R1	Stream Discharge Measurement Using a Pygmy Meter
USBR-5005-86, R1	Determining Unified Soil Classifications (Visual Method)

Twelve complete sets of USGS QMP manuals were issued to USBR personnel. These will replace the USBR QMPs during an ongoing transition which should be completed in January of 1993. A verification and inventory of documents held by USBR personnel was completed.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Other actions taken included requesting four controlled copies of Study Plans from the Project Office; issuing procedures to new copy holders; distributing replacement documents; sending out follow-up DTNs; sending information copies to various agencies/persons; contacting YMP Document Control, Las Vegas, about YMP-USGS participants concerns/problems with YMP controlled documents; and transmitting DTN record packages to the LRC.

The LRC received 279 criteria related "stand-alone" documents and 33 packages which were date stamped and QVC'd with 28 receiving a "correction request". Seventy-five "stand-alone" records and 105 record packages were entered into EasyRex.

Nine Criteria Related Packages were transmitted to the Central Records Facility (CRF), containing 2,063 pages comprised of 134 criteria related records and 27 criteria related packages. Three publication packages and three data packages also were transmitted to the CRF.

WBS 1.2.9.1.5 Training

Principal Investigator - L. Hayes

ACTIVITIES AND ACCOMPLISHMENTS

Various routine training functions were performed including providing YMP-USGS Orientation to newly assigned personnel; distributing individual reading assignments; scheduling DOE General Employee Training (GET) and distributing USGS User's Guide for the Nevada Test Site to trainees; providing information regarding participants' instruction assignment completion statuses; distributing first reminder notices to participants with overdue reading assignments and second reminder notices to their appropriate managers; processing and filing USGS and USBR training records; and submitting records packages to LRC.

Reading assignments were issued for the following Quality Management Procedure Modifications:

QMP-1.01,R4-M1	Organization Procedure
QMP-2.07,R1-M4	YMP-USGS Instruction
QMP-5.01,R4-M3	Preparation of Technical Procedures
QMP-6.01,R5-M2	Document Control
QMP-17.01,R5-M1	YMP-USGS Records Management

Requested QMP-17.01, R5 and QMP-3.03, R3 reading and classroom training assignments for personnel joining YMP-USGS since classroom training offered earlier this year and for personnel whose job duties now include implementing these procedures. Subsequently, reading assignments for both procedures distributed to appropriate personnel. Assisted instructors with lesson plan updates for both procedures.

Distributed first YMP-USGS Calendar of Training Events beginning with month of October.

Provided YMP-USGS participant training completion information for Audit USGS-92-10.

Prepared audio-visual materials and handouts for L. Hayes, USGS, for September 23, 1992 WRD Orientation Course presentation regarding Yucca Mountain Project Branch Organization.

Forms were designed to track training assignment completion requirements for YMP-USGS personnel on extended leave and to track YMP-USGS instruction assessment and assignment processes.

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

Reviewed and updated General Employee Training Refresher Examination requirements and entered participants' yearly refresher due dates into the YMP-USGS Training Data base.

WBS 1.2.9.2 Project Control
Principal Investigator - L. Hayes

OBJECTIVE

To provide Project management support in the areas of cost and schedule planning and control; to develop and maintain an integrated project management system; to implement performance measurement; to support the change control system; and to establish WBS.

ACTIVITIES AND ACCOMPLISHMENTS

The planners met with L. Hayes to discuss the simplification of the Project Schedules. The planners were given direction to prepare FY93/94 "Strawman Schedules" for the PIs to evaluate. Simplified schedules were prepared which eliminated LOE tasks as well as tasks which are not under USGS control such as Work Authorizations and NRC Approvals. The schedules were simplified by aggregating as many tasks as possible and eliminating items such as procurement and procedure preparation as individual tasks.

Schedules were statused for August, merged and uploaded to Las Vegas. Bar Charts were created and delivered to USGS management along with variance reports, summary account status sheets, and status forms to be completed for next month.

A format for analyzing the schedules and costs on a monthly basis is being evaluated in order to give management a more convenient way to review the status. The format would include Cost Performance Index and Schedule Performance Index evaluation and will save the PIs time in reviewing and evaluating their schedules and cost data.

WBS 1.2.9.3 Quality Assurance

OBJECTIVE

To establish and implement a Yucca Mountain quality assurance program.

WBS 1.2.9.3.1 Quality Assurance Program Development

Principal Investigator - T. Chaney

OBJECTIVE

To establish and maintain the QA program descriptions.

ACTIVITIES AND ACCOMPLISHMENTS

The following QMPs and/or Modifications were prepared as requested and returned to their respective authors:

QMP-1.01.R4-M1	Organization Procedure (Prerequisites Review)
QMP-2.07.R1-M4	YMP-USGS Instruction Publications
QMP-3.04.R4	Technical Review, Approval, and Distribution of YMP-USGS Publications
QMP-5.01.R4-M3	Preparation of Technical Procedures
QMP-6.01.R5-M2	Document Control
QMP-17.01.R5-M1	YMP-USGS Records Management

ACTIVITIES AND ACCOMPLISHMENTS (CONTINUED)

The Quality Management Procedure Master List was updated and forwarded to the YMP-USGS QA Office.

Participated with the GAC that met twice to consider ACSRs submitted under QMP-3.15, R0.

Personnel qualification letters and position descriptions were updated for all SAIC personnel working on the USGS contract.

WBS 1.2.9.3.2 Quality Assurance - Audits and Surveillances

Principal Investigator - T. Chaney

OBJECTIVE

To verify the QA program through periodic audits and surveillance of Project activities.

ACTIVITIES AND ACCOMPLISHMENTS

Audit Report USGS-92-07, SCP Activity 8.3.1.5.2.1.4b, was submitted with one Audit Finding. Audit Report USGS-92-08, Branch of Geologic Risk Assessment, had no findings or observations.

USGS programmatic audit USGS-92-10 was planned and conducted resulting in three AFRs, seven Observations and numerous recommendations.

Audit Plans USGS-92-11, (Azonix Corporation) and USGS-92-12 (The Vault, Inc.) were prepared and the audits performed to determine eligibility for the Approved Vendors List.

Surveillance Plan USGS-92-S13 (Scott Specialty Gases Inc.) was submitted and the surveillance performed to expand the YMP-USGS approval of additional gases.

Corrective Action Report USGS-CAR-92-11 was initiated on a trend discovered during the September Trend Analysis.

Several Nonconformance Report record packages were compiled, authenticated and transmitted to the Local Records Center.

A walk-through evaluation of the USBR's rock laboratory was performed to aid the laboratory in determining what QA requirements should apply.

Vendor Evaluations 92-E26 (Druck, Inc.) and 92-E27 (Teledyne Hastings-Raydist) were prepared and submitted, recommending retention on the Approved Vendors List.

Special Investigative Reviews were performed for the verification of disposition activities for AFR-USGS-9204-05 and USGS-NCR-92-22.

The American Society of Quality Control - Energy and Environmental Division annual conference was attended.

WBS 1.2.9.3.3 Quality Assurance - Quality Engineering

Principal Investigator - L. Hayes

OBJECTIVE

To provide quality engineering support to the project through reviews of documentation and assistance with QA training.

ACTIVITIES AND ACCOMPLISHMENTS

Approximately 53 Software Documents have been received, reviewed, and/or processed by the SCM Coordinator in accordance with QMP-3.03, R3. The Configuration Status Log has been updated and Technical Contacts have been notified of status of their software documents.

An agenda and minutes were prepared by the SCM Coordinator for the CCC meeting held September 3, 1992. CCC Review documentation was completed for each of the CCC Reviews conducted at this meeting. A proposed agenda has been prepared and distributed for the CCC meeting to be held on October 8, 1992.

Corrective action for USGS CAR 91-09 has continued. These actions include tracking and follow up for 310+ software classification and control recommendations. A memorandum to all YMP-USGS Principal Investigators regarding the status of their software was prepared on behalf of the Chief, YMPB.

Preparation and support has been provided for the upcoming DOE Audit, which is scheduled for October 19-23, 1992.

The Open Items Committee met once during September. Many open items required extensions or updates because the majority of time during September was devoted to the transition efforts to bring the USBR program and personnel into the YMP-USGS QA program. The following summarizes the open items activities for this Period:

External Item(s): DOE/YMPO CARs YM-91-74 through YM-91-76 (software requirements), YM-92-60 (post-installation testing), YM-92-63 (SGBSN calibration forms); and SDR-018 (calibration).

Internal Item(s): AUDITS: 9110-02 (YMP-USGS qualification records) and 9203-04 (TDIF submittals per PACS schedules); CARS: 90-04 (timeliness of corrective action commitments), 91-01 (graded QA transition), 91-03 (unapproved vendors), 91-05 (procurement records), 91-06 (management assessments), 91-07 (misinterpretation of QMP requirements), 91-09 (software requirements), 91-10 (exemptions from procurement QA requirements), 91-11 (scoping activities without documented authorization), 92-03 (management agreements), 92-04 (work authorization for SCP Activity 8.3.1.2.2.6.1), 92-05 (problems with manuscript processing), 92-06 (technical procedure requirements), 92-07 (USBR QA program problems), 92-08 (AP-5.1Q data submittals to LRC/CRF), 92-09 (seismic monitoring activities for 6/29 earthquake), 92-10 (procurements made by outside organizations); NCRs: 90-37 (calibration standards), 91-31 (QA Balance calibrations), 92-02 (SGBSN management agreement), 92-05 (USBR technical procedures), 92-06 (seismic publications), 92-08, 92-13 and 92-14 (report processing), 92-26 (LBL activities), and 92-30, -31 & -32 (report processing problems).

Other miscellaneous actions involved CAR-92-07. Additional meetings continue with YMP-USGS and USBR management to agree upon the details of the transition plan and associated schedule of actions required to bring the USBR personnel under the YMP-USGS QA program. Nine USBR technical activities approaching resumption, initiation, or status updates were given prerequisite reviews or evaluations.

Resolution of comments for QMP-5.05 (scientific notebooks) continues. Several Affected Document Notices received preliminary review and required actions were completed.

WBS 1.2.9.3.4 Quality Assurance - Quality Overview

Principal Investigator - T. Chaney

OBJECTIVE

To provide reviews, analysis, and interpretations of QA requirements and application of QA to technical and scientific disciplines.

ACTIVITIES AND ACCOMPLISHMENTS

The August Open Items and Trend Analysis Report was written and issued. The September Open Items and Trend Analysis Report was drafted.

Input to the Open Items data base were kept current, and daily and weekly Status of Open Items Reports were prepared.