

**CNWRA PROGRAM MANAGER'S PERIODIC REPORT
ON ACTIVITIES OF THE
CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

For the Fiscal Reporting Period

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ABBREVIATIONS

1D	1-dimensional	CEC	Commission of the European Communities
2D	2-dimensional	CFD	Computational Fluid Dynamics
3D	3-dimensional	CFR	Code of Federal Regulation
AA	Atomic Absorption	CLST	Container Life and Source Term
AAI	Average Annual Infiltration	CM	Configuration Management
ACD	Advanced Conceptual Design	CNWRA	Center for Nuclear Waste Regulatory Analyses
ACF	Alumina (in excess of alkali feldspar), Calcium Oxide, Ferromagnesian Oxide	COI	Conflict of Interest
ACNW	Advisory Committee on Nuclear Waste	COPS	CNWRA Operations
ACRS	Advanced Computer Review System	CPP	Cyclic Potentiodynamic Polarization
AI	Administrative Item	CQAM	CNWRA Quality Assurance Manual
AECL	Atomic Energy of Canada Limited	CRG	Center Review Group
AES	Atomic Emission Spectrometry	CRWMS	Civilian Radioactive Waste Management System
AGU	American Geophysical Union	CSCS	Constrained Stochastic Climate Simulator
ALTS	Apache Leap Test Site	CSH	Calcium Sulfate Hydrate
AML	Areal Mass Loading	DAS	Data Acquisition System
ANS	American Nuclear Society	DBE	Design Basis Event
ANSI	American National Standards Institute	DC	Division of Contracts
AO	Annotated Outline	DCAA	Defense Contract Audit Agency
AP	Administrative Procedure	DECOVALEX	Development of Coupled Models and their Validation Against Experiments in Nuclear Waste Isolation
APB	Acid-Producing Bacteria	DEIS	Draft Environmental Impact Statement
ARDES	Activities Related to Development of the U.S. Environmental Protection Agency Yucca Mountain Standard	DEM	Digital Elevation Model
ASCE	American Society of Civil Engineers	DF	Dilution Factor
ASCII	American Standard Code for Information Interchange	DFCSS	Division of Fuel Cycle Safety and Safeguards
ASME	American Society of Mechanical Engineers	DIE	Determination of Importance Evaluation
ASTM	American Society for Testing and Materials	DIMNS	Division of Industrial and Medical Nuclear Safety
ASU	Arizona State University	DLG	Digital Line Graph
ATDTS	Automated Technical Data Tracking System	DLM	Diffuse Layer Model
BEG	Bureau of Economic Geology	DNAG	Decade of North American Geology
BFD	Basis for Design	DNFSB	Defense Nuclear Facilities Safety Board
BM	Bare Mountain	DOE	U.S. Department of Energy
BMF	Bare Mountain Fault	DOE-DP	DOE Defense Program
BTP	Branch Technical Position	DRA	Division of Regulatory Applications
CAI	Color Alteration Index	DTED	Digital Terrain Elevation Data
CAR	Corrective Action Request	DWM	Division of Waste Management
CCDF	Complementary Cumulative Distribution Function	EBS	Engineered Barrier System
CCL	Commitment Control Log	EBSER	Engineered Barrier System Experimental Research
CCM	Constant Capacitance Model	EBSPAC	Engineered Barrier System Performance Assessment Code
CD-R	CDROM Recordable	ECM	Equivalent Continuum Model
CDF	Cumulative Distribution Function	EDO	Office of the Executive Director for Operations
CDM	Compliance Determination Method	EDX	Energy-Dispersive X-Ray Spectroscopy
CDOCS	Consolidated DOCUMENT Management System	EIS	Environmental Impact Statement
CDROM	Compact Disk Read Only Memory	EM	Element Manager
CDS	Compliance Determination Strategy	EMPA	Electron Microprobe Analysis
CDTS	Commission Decision Tracking System		
CEB	Center for Environmental Biotechnology		

ABBREVIATIONS (cont'd)

ENFE	Evolution of the Near-Field Environment	LA	Igneous Activity
ENGB	Engineering and Geosciences Branch	IBM	International Business Machines
EnPA	Energy Policy Act of 1992	ICP	Inductively Coupled Plasma
ENS	European Nuclear Society	IDLH	Immediately Dangerous to Life and Health
EPA	U.S. Environmental Protection Agency	IHLRWM	International High-Level Radioactive Waste Management Conference and Exposition
EPR	Electrochemical Potentiokinetic Reactivation	IM	Intermediate Milestone
EPRI	Electric Power Research Institute	IME	Industrial Mobilization Exemption
EQA	External Quality Assurance	IMS	Information Management Systems
EROS	Earth Resource Observation System	INEL	Idaho National Engineering Laboratory
ESP	Environmental Simulation Program	INETER	Instituto Nicaraguense de Estudios Territoriales
ESF	Exploratory Studies Facility	INTRAVAL	International Code Validation
EXAFS	Extended X-Ray Absorption Fine Structure	I/O	Input/Output
FAC	Favorable Condition	IPA	Iterative Performance Assessment
FCRG	Format and Content Regulatory Guide	IR&D	Internal Research & Development
FDSHA	Fault Displacement and Seismic Hazard Analysis	IRIS	Interim Records Information System
FEHM	Finite Element Heat and Mass Transport	IRM	Office of Information Resources Management
FEM	Finite Element Method	IRSR	Issue Resolution Status Report
FEP	Features, Events, and Processes	IVM	Interactive Volume Modeling
FFRDC	Federally Funded Research and Development Center	IWPE	Integrated Waste Package Experiments
FFT	Fast Fourier Transform	JC	Job Code
FTE	Full Time Equivalent	JPL	Jet Propulsion Laboratory
FTP	File Transfer Protocol	JRC	Joint Roughness Coefficient
FY	Fiscal Year	KT1	Key Technical Issue
FYTD	Fiscal Year-to-Date	KTU	Key Technical Uncertainty
GDF	Ghost Dance fault	LAAO	License Application Annotated Outline
GEM	General Electrochemical Migration	LAN	Local Area Network
GEOTRAP	GEOlogic Transport of RADionuclides Predictions	LANL	Los Alamos National Laboratories
GERT	General Employee Radiological Training	LARP	License Application Review Plan
GET	General Employee Training	LAW	Low-Activity Waste
GFM	Geological Framework Model	LBL	Lawrence Berkeley Laboratory
GHGC	Geohydrology and Geochemistry	LHS	Latin Hypercube Sampling
GIS	Geographic Information System	LITC	Lockheed Information Technology Company
GLGP	Geology and Geophysics	LLNL	Lawrence Livermore National Laboratory
GPS	Global Positioning Satellite	LLW	Low-Level Waste
GROA	Geologic Repository Operations Area	LSS	Licensing Support System
GS	Geologic Setting	LSSPP	Licensing Support System Pilot Project
GSA	Geologic Society of America	LWR	Light Water Reactor
GTFE	Great Tolbachik Fissure Eruption	Ma	Million Years Ago
GUI	Graphics User Interface	METRA	Mass and Energy TRANsport
GWSI	Groundwater System Integration	MGDS	Mined Geologic Disposal System
GWTT	Groundwater Travel Time	MH	Mechanical-Hydrological
HLUR	HLW and Uranium Recovery Projects Branch	MIC	Microbially Influenced Corrosion
HLW	High-Level Waste	MIT	Massachusetts Institute of Technology
HRTEM	High-Resolution Transmission Electron Microscopy	NM	Major Milestone
		MO	Management and Operations
		MOU	Memorandum of Understanding
		MPC	Multi-Purpose Canister
		MRS	Monitored Retrievable Storage

ABBREVIATIONS (cont'd)

MSS	Multispectral Scanner	PO	Project Officer
MTU	Metric Ton of Uranium	PPA	Proposed Program Approach
NAS	National Academy of Sciences	PPE	Prepassivated Platinum Electrode
NAWG	Natural Analogue Working Group	PRA	Probabilistic Risk Assessment
NCR	Nonconformance Reports	PRT	Peer Review Team
NEA	Nuclear Energy Agency	PSAG	Probabilistic System Assessment Group
NFS	Network File Server	PSHA	Probabilistic Seismic Hazard Analysis
NIOSH	National Institutes of Safety and Health	PTFE	Polytetrafluoroethylene
NIR	Near-Infrared	PTn	Paintbrush Nonwelded Tuff
NIST	National Institute of Standards and Technology	PVM	Parallel Virtual Machine
NMSS	Office of Nuclear Material Safety and Safeguards	PWR	Pressurized Water Reactor
NNE	North-Northeast	QA	Quality Assurance
NNW	North-Northwest	QAP	Quality Assurance Procedure
NOAA	National Oceanographic and Atmospheric Administration	GRAM	Quality Requirements Application Matrix
NRC	Nuclear Regulatory Commission	RASA	Regional Aquifer-System Analysis
NSRRC	Nuclear Safety Research Review Committee	RDCO	Repository Design, Construction, and Operations
NTS	Nevada Test Site	RDTME	Repository Design and Thermal-Mechanical Effects
NUREG	NRC Technical Report Designation	REE	Rare Earth Element
NWPA	Nuclear Waste Policy Act, as amended	REECO	Reynolds Electrical and Engineering Company, Inc.
NWTRB	Nuclear Waste Technical Review Board	RES	Office of Nuclear Regulatory Research
OBES	Office of Basic Energy Sciences	RFP	Request for Proposal
OCRWM	Office of Civilian Radioactive Waste Management	RH	Relative Humidity
OGC	Office of General Counsel	ROC	Repository Operations Criteria
OITS	Open-Item Tracking System	RPD	Regulatory Program Database
OMB	Office of Management and Budget	RRT	Regulatory Requirement Topic
OPS	Operations Plans	RSRG	Real Space Renormalization Group
ORR	Operations Readiness Review	RT	Radionuclide Transport
ORS	Overall Review Strategy	RTS	Radwaste Treatment System
OWFN	One White Flint North	SAR	Safety Analysis Report
PA	Performance Assessment	SCA	Site Characterization Analysis
PAAG	Performance Assessment Advisory Group	SCC	Substantially Complete Containment
PAC	Potentially Adverse Condition	SCCEX	Substantially Complete Containment Example
PAHT	Performance Assessment and Hydrologic Transport	SCM	Surface Complexation Models
PASP	Performance Assessment Strategic Plan	SCP	Site Characterization Plan
PC	Personal Computer	SDS	Structural Deformation and Seismicity
PC/TCP	Personal Computer/Transmission Control Protocol	SECY	Secretary of the Commission, Office of the (NRC)
PDR	Public Document Room	SELM	Spectral Element Method
PEL	Permissible Exposure Limit	SEM	Scanning Electron Microscopy
PEM	Program Element Manager	SER	Safety Evaluation Report
PER	Pre-Licensing Evaluation Report	SDMP	Site Decommissioning Management Plan
PFD	Probabilistic Fault Displacement	SF	Spent Fuel
PI	Principal Investigator	SFPO	Spent Fuel Project Office
PMDA	Program Management Decision Analysis	SFVF	San Francisco Volcanic Field
PMPR	Program Manager's Periodic Report	SGML	Standard Generalized Markup Language
PMT	Photo-Multiplier Tube	SHE	Standard Hydrogen Electrodes
PNNL	Pacific Northwest National Laboratory	SIP	Scientific Investigation Plan

ABBREVIATIONS (cont'd)

SKI	Swedish Nuclear Power Inspectorate	UCLA	University of California-Los Angeles
SLAR	Side Looking Airborne Radar	UDEC	Universal Distinct Element Code
SNL	Sandia National Laboratories	UK	United Kingdom
SOTEC	Source Term Code	UNM	University of New Mexico
SOW	Statement of Work	UR	Uranium Recovery
SRA	Systematic Regulatory Analysis	U.S.	United States
SRB	Sulfate-Reducing Bacteria	USDA	U.S. Department of Agriculture
SRBS	Shafts, Ramps, Boreholes, and their Seals	USGS	U.S. Geologic Survey
SRD	Software Requirements Description	UTM	Universal Transverse Mercator
SRESNR	Support Revision of the EPA Standard and NRC Rule	USFIC	Unsaturated and Saturated Flow under Isothermal Conditions
SS	Stainless Steel	VA	Viability Assessment
STEM	Scanning Transmission Electron Microscopy	VCS	Version Control System
STP	Staff Technical Position	VF	Vitrification Facility
SUFLAT	Stochastic Analyses of Unsaturated Flow and Transport	VIEW_PVH	View Probability of Volcanic Hazards
SVF	Springerville Volcanic Field, Arizona	VSIP	Vertical Slice Implementation Plan
SwRI	Southwest Research Institute	WAN	Wide Area Network
TA	Technical Assistance	WAPDEG	Waste Package DEgradation
TBD	To Be Determined	WBS	Work Breakdown Structure
TBM	Tunnel Boring Machine	WCIS	Waste Containment and Isolation Strategy
TCP/IP	Transmission Control Protocol/Internet Protocol	WFO	Work for Others
TDI	Technical Document Index	WGB	Western Great Basin
TDOCS	Technical Document Reference Database System	WIPP	Waste Isolation Pilot Plant
TEF	Thermal Effects on Flow	WMB	Waste Management Branch
TEM	Transmission Electron Microscopy	WNYNSC	Western New York Nuclear Service Center
THMC	Thermal-Hydrologic-Mechanical- Chemical	WOL	Wedge-Opening Loading
TLM	Triple-Layer Model	WP	Waste Package
TM	Thermal-Mechanical	WSEI	Waste Systems Engineering and Integration
TMH	Thermal-Mechanical-Hydrologic	WSS	Waste Solidification Systems
TMS	The Minerals, Metals, and Materials Society	WTSO	Washington Technical Support Office
TOP	Technical Operating Procedure	WVDP	West Valley Demonstration Project
TP	Technical Position	WVNS	West Valley Nuclear Services
TPA	Total Performance Assessment	WWW	World Wide Web
TPI	Time Period of Regulatory Interest	XPS	X-ray Photoelectron Spectroscopy
TR2	DOE Seismic Topical Report No. 2	XRD	X-ray Diffractometry
TRG	Technical Review Group	YM	Yucca Mountain
TSPA	Total System Performance Assessment	YMP	Yucca Mountain Project
TSPAI	Total System Performance Assessment and Integration	YMSCO	Yucca Mountain Site Characterization Office
TSw-Chnv	Topopah Spring Welded-Calico Hills Nonvitic	YMR	Yucca Mountain Region
TVD	Total Variation Diminishing	YTD	Year-to-Date
TWEN	Two White Flint North		
TWINS	Tank Waste Information Network System		
TWRS	Tank Waste Remediation System		
UA	University of Arizona		
UACH	Universidad Autónoma de Chihuahua		

EXECUTIVE SUMMARY—PERIOD 3

In the Division of Waste Management (DWM) Job Code (JC), the following items highlight the Center for Nuclear Waste Regulatory Analyses (CNWRA) key activities and accomplishments:

- A briefing on the CNWRA Five-Year Strategic Plan was made during the CNWRA Annual Program Review Meeting held on December 3-4, 1996, in San Antonio, Texas.
- Two presentations entitled Integrating Structural Models Into Volcanic Hazard Assessments: An Example from Yucca Mountain, Nevada, and Landsat TM, SPOT, and SLAR Interpretations of Volcanic and Structural Features in the Greenwater and Saline Ranges, Inyo County, California, were made at the Fall Meeting of the American Geophysical Union (AGU).
- A manuscript entitled Cooling of an Igneous Dike Twenty Years After Intrusion was accepted for submission to the journal *Geology*.
- Two presentations entitled Paleomagnetism of Ordovician Pogonip Group Carbonates in Southwestern Nevada: Implications to Tectonism of the Yucca Mountain Region, and Effects of Source Geometry and Hypocenter Depth on Earthquake Ground Motion Patterns from Finite Element Modeling were made at the Fall Meeting of the AGU.
- A presentation entitled The Solubility of Source Term Minerals as Affected by Near-field Conditions was presented at the Materials Research Society Symposium on the Scientific Basis for Nuclear Waste Management.
- The journal paper on Neptunium Sorption Modeling was submitted.
- The FY96 Annual KTI Report, a joint product of the CNWRA and NRC staffs, was submitted.

The DWM JC year-to-date (YTD) cost variance was 25.7 percent. This variance does not consider the funding decrement for Fiscal Year 1997, which will be reflected in pending Operations Plans revisions.

In the Division of Industrial and Medical Nuclear Safety JC, the CNWRA staff transmitted a report—Review of SAR-012—to the NRC staff for forwarding to WVDP. The YTD cost variance to this JC was 63.2 percent.

In the Division of Fuel Cycle Safety and Safeguards JC, the CNWRA staff submitted the first report in subtask 1.1 fulfilling the requirements for the Tank Waste System Status—Interim Report. In addition, the staff completed a revised draft of the section on safety issues, and the draft outline for the Draft Quality Assurance Report was sent to the NRC staff for review. The YTD cost variance was 59.8 percent.

**CNWRA PROGRAM MANAGER'S PERIODIC REPORT
ON ACTIVITIES OF THE
CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

TITLE: Center for Nuclear Waste Regulatory Analyses (CNWRA)

CONTRACTOR: Southwest Research Institute (SwRI)
6220 Culebra Road, San Antonio, Texas 78238-5166

CONTRACT NO: NRC-02-93-005

JOB CODES: D1035, L1793, J5164

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ESTIMATED BUDGET: \$89,898,141

PERIOD OF PERFORMANCE: 10/15/92-9/26/97

PERIOD OF THIS REPORT: 11/23/96-12/20/96

1 TECHNICAL

1.1 CNWRA Operations (COPS)

In addition to a wide range of day-to-day activities, COPS accomplishments included (i) presentation of a briefing on the CNWRA Five-Year Strategic Plan (IM 5708-158-710) during the CNWRA Annual Program Review Meeting held on December 3-4, 1996, in San Antonio; (ii) delivery of the third revision to Draft Staffing and Hiring Plans; (iii) involvement in discussions between the NRC and CNWRA management concerning an SDMP SOW, the proposed DFCSS Regulatory Guides Project, and allocation of the CNWRA resources to the NRC programs in FY97; (iv) participation in weekly HLW Management Board meetings; (v) involvement in the corrective and preventive action process which closed one of the three remaining CARs from the annual CNWRA QA audit and the conduct of scheduled and unscheduled surveillance activities; and (vi) cooperation in the LLNL audit of the CNWRA Computer Security System and support for maintaining LAN operations.

Status of the CNWRA staffing is indicated in table 1. Recruitment efforts and interviews continued for two open positions in hydrology, one in PA, one in seismology, and one in risk assessment. Two positions have been filled. One PA engineer will begin work in period 5, while a chemical/process engineer will join the staff in period 7. A third revision to the Draft Staffing and Hiring Plans was submitted this period for NRC review and approval.

In the next period, the CNWRA expects to (i) submit the revision to the CNWRA OPS and the Operations Plan for the WSS; (ii) work to provide corrective and preventive actions in response to the two remaining CNWRA QA audit CARs, coordinate technical staff responses to these CARs, perform scheduled QA surveillances of tasks and subtasks, and prepare for work with the CNWRA Quality Requirements Application Matrix when the OPS are approved; and (iii) review the findings and redress the results of the LLNL audit of the CNWRA Computer Security System as well as continue CNWRA LAN operation and maintenance support.

1.2 Igneous Activity (IA)

IA staff made a presentation at the CNWRA program review during this period. Two presentations entitled Integrating Structural Models Into Volcanic Hazard Assessments: An Example from Yucca Mountain, Nevada, and Landsat TM, SPOT, and SLAR Interpretations of Volcanic and Structural Features in the Greenwater and Saline Ranges, Inyo County, California, related to IA activities, were made at the Fall Meeting of the AGU. Preparations are underway for presentation of IA work at the International Association of Volcanology and Chemistry of the Earth's Interior meeting on January 15-27, 1997. Also, preparations continued during this period for the DOE Technical Exchange on volcanism, now scheduled for mid-February 1997.

A manuscript entitled Cooling of an Igneous Dike Twenty Years After Intrusion (IM 5708-461-750) was accepted by NRC during this period for submission to the journal *Geology*. A second manuscript, now entitled Reassessment of Neogene Volcanism Near Yucca Mountain, Nevada, was revised and returned to *EOS* for further editorial review. The FY96 Annual Report: Section on IA KTI—Joint NRC/CNWRA Report (MM 5708-461-710) was submitted during this period.

Work continued on probability model development. This work included an extensive review of the weighting schemes used to integrate structural models into volcanic hazard probability assessment. It was determined that a wide range of weighting schemes can be used and the probability of volcanic disruption of the site remains between approximately 1×10^{-8} and 1×10^{-7} per year, consistent with previously reported ranges.

Development of the PVHA_view code focused on incorporation of the ash dispersion module into the code. Such incorporation has involved recasting the code in the C++ language and building a simple user interface.

In the next period, presentations of IA work will be made at the International Association of Volcanology and Chemistry of the Earth's Interior meeting. These presentations will include topics related to ash dispersion modeling, the 1995 eruption of Cerro Negro (an analog for YM volcanism), and the relationships between fault dilation tendency and cinder cone volcanism in the San Francisco volcanic field, Arizona. Preparations will continue on a journal article on Probability Models Parameters and Sensitivities (IM 5708-461-730).

1.3 Structural Deformation and Seismicity (SDS)

The FY96 Annual Report: Section on SDS KTI—Joint NRC/CNWRA Report (MM 5708-471-700) was submitted. Revision of SDS KTI section 3.2 of the FY97 CNWRA OPS was completed. Changes were made to Table 2.3-1, Major and intermediate milestones

for Structural Deformation and Seismicity, and Table 2.13-3, Key Technical Issues—Structural Deformation and Seismicity. In addition, the FY97 budget for the SDS KTI was finalized.

The CNWRA staff made two presentations at the Fall Meeting of the AGU in San Francisco. These were entitled Paleomagnetism of Ordovician Pogonip Group Carbonates in Southwestern Nevada: Implications to Tectonism of the Yucca Mountain Region and Effects of Source Geometry and Hypocenter Depth on Earthquake Ground Motion Patterns from Finite Element Modeling.

Technical review of the revised Type 1 Faults in the Yucca Mountain Region (MM 5708-471-650) was completed and the manuscript submitted for editorial review.

In the next period, CNWRA staff and consultants will attend the DOE fourth Seismic Source Characterization Workshop in Salt Lake City. The revised milestone on Type 1 Faults in the Yucca Mountain Region (MM 5708-471-650) will be resubmitted.

1.4 Evolution of the Near-Field Environment (ENFE)

The staff attended the Materials Research Society Symposium on the Scientific Basis for Nuclear Waste Management. A presentation was given on CNWRA studies of the solubility of source term minerals as affected by near-field conditions, and a trip report was submitted to NRC. In consultation with NRC staff, a manuscript was prepared on the subject of the presentation and has been proposed (in the period 2 PMPR) to be submitted to NRC as an IM. A paper on work at Peña Blanca and Santorini is in preparation for the proceedings of the recent Natural Analogue Working Group meeting. The paper is proposed in this PMPR as a new ENFE IM.

Prolonged corrosion tests have been conducted for times up to 930 d to confirm the applicability of repassivation and corrosion potentials as predictive parameters of the long-term localized corrosion of alloy 825. No initiation of localized corrosion has been observed on specimens continuously maintained below the repassivation potential. A long-term test with a creviced alloy 825 specimen in an aerated 1,000 ppm Cl^- solution at 95 °C has been in progress for 518 d at the open-circuit potential. The open-circuit potential in the last 30 d of testing has fluctuated from 60 mV above to 100 mV below the repassivation potential.

The FY96 Annual Report: Section on ENFE KTI—Joint NRC/CNWRA Report (MM 5708-561-710) was completed and submitted to the NRC.

In the next period, review will continue of the DOE Summary and Synthesis Report on Mineralogy and Petrology Studies for the Yucca Mountain Site Characterization Project. Sensitivity studies on near-field environmental effects will be initiated using MULTIFLO. Long-term corrosion tests of alloy 825 will continue. Test specimens will be inspected for indications of localized corrosion. An evaluation and compilation of thermodynamic data on cement minerals, including recent data from the University of Aberdeen, will progress.

1.5 Container Life and Source Term (CLST)

The training workshop on the EBSPAC (Version 1.0) was held at the NRC on December 11-12, 1996. A handout, based on the previously delivered EBSPAC Technical Description and User's Manual for Version 1.0 β (IM 5708-572-640) and containing description of the technical bases for models, results of deterministic and probabilistic calculations for waste package failure and radionuclide release, and additional information on input and output files, was distributed to the attendees. Comparisons with calculations obtained with the WAPDEG code (Version 1.0) used by the DOE in TSPA-95 were included, as well as results of preliminary sensitivity analyses for several electrochemical parameters used in the corrosion models. The workshop was well attended and the computer facilities were useful in demonstrating the code. The CNWRA staff benefitted from the interaction with NRC staff in the discussion of several aspects of the code. A letter response to NRC staff comments on the EBSPAC Technical Description and User's Manual for Version 1.0 β (IM 5708-572-640) has been prepared.

Modifications have been made in EBSPAC to eliminate minor errors with the purpose of issuing Version 1.0 soon. The EBSPAC Version 1.0 Technical Description and User's Manual will be issued as an IM report in the TSPA KTI. CDFs of WP failure were calculated to confirm results previously obtained.

In the next period, the preparation of a revised User's Manual will continue and corrections and modifications necessary for transmittal of the EBSPAC (Version 1.0) will be completed. The revised EBSPAC, V.1.0 User's Manual (IM 5708-762-740) will be submitted as an IM report as part of the TSPA KTI. CDF calculations of WP failure will be provided for the Comparison of TPA and RIP Data Sets (IM 5708-761-720). The CLST KTI will be closed out as of January 17, 1997.

1.6 Thermal Effects on Flow (TEF)

The FY96 Annual Report: Section on TEF KTI—Joint NRC/CNWRA Report (MM 5708-661-710) was submitted to NRC on November 26, 1996.

Study of the causative mechanisms leading to the formation of perched water bodies near the proposed repository area under nonisothermal conditions continued. Currently, analyses are being conducted to assess the sensitivity of perched water formation to properties assigned to the Ghost Dance Fault zone.

Evaluation progressed on different conceptual models. Simulations conducted with these models will be compared to ECM simulations. The 1988-89 LLNL G-Tunnel heater experiment is being used as the test case to compare results predicted by the conceptual models with those of the heater experiment.

Gravity driven refluxing is being analyzed to assess alternative conceptual models. Two separate conceptual models are used in this analysis. The physics of the gravity driven refluxing and dripping mechanism are being evaluated.

Saturated rock samples from the ALTS have been loaded into the thermal conductivity apparatus to allow measurement of thermal conductivity under saturated conditions. Tuff from the ALTS is similar to the TSW tuff.

The capability of the EBSPAC module is being evaluated for use in assessing the effect of thermohydrologic parameters on proposed repository performance.

Temperature and humidity near the WP are being predicted with a heat conduction only model. These results will be provided to the TSPAI KTI for use in their analyses.

A series of expanded analyses has been identified to assess the sensitivity of heat and mass transfer predictions to changes in the hydraulic properties assigned to the six-layer hydrostratigraphic model identified in TSPA-95. A base case model taken from TSPA-95 will be used for these analyses.

Preparation of the revised TEF KTI section of the FY97 CNWRA OPS continued during this period. This section will reflect recent changes in the CNWRA budget and will refocus TEF KTI objectives to meet deadlines associated with the VA report review. The tasks identified for FY97 are centered around delivery of an IRSR on gravity driven refluxing.

In the next period, TEF KTI plans include (i) analysis of nonisothermal groundwater flow, (ii) laboratory investigation of thermal conductivity, (iii) progress on implementing the MULTIFLO code, (iv) continued assessment of alternative conceptual models, (v) evaluation of the capability of the EBSPAC module for use to assess the importance of thermohydrologic parameters on proposed repository performance, (vi) continuation of the sensitivity analyses, and (vii) modification of the FY97 CNWRA OPS.

1.7 Repository Design and Thermal-Mechanical Effects (RDTME)

Preparation of the FY96 Annual Report: Section on RDTME KTI—Joint NRC/CNWRA Report (MM 5708-671-700) was submitted to NRC on November 26, 1996.

Preparation of the RDTME KTI section of the FY97 CNWRA OPS continued during this period. This section will reflect the discontinuation of RDTME KTI activities at the CNWRA after period 4 and continuation of limited activities at the NRC.

In the next period, activities related to the RDTME KTI will include completion of the FY97 OPS for the RDTME KTI and revision of the letter report, Review Comments on ESF Alcove Ground Support Analysis and ESF Ground Support—Structural Analysis.

1.8 Total System Performance Assessment and Integration (TSPAI)

A User's Guide for the FAULTING module is being prepared. This work is a collaborative effort with the SDS KTI. The module will analyze the probability and consequences of waste package failure due to subsurface displacements along fault zones. This work will fulfill User's Guide for FAULTING Module—Letter Report (IM 5708-762-700).

Preparation of the TPA code version 3 SRD continued. Coding was initiated on a set of utility modules and discussions were initiated with staff about adding or modifying consequence modules. The utility modules for nuclide inventories, repository subareas, and sampled parameters were completed and testing was initiated. The container lifetime portion of EBSPAC was integrated into TPA version 3. Work also continued on short write-ups (one to two pages) for each TPA module for sensitivity studies. The write-ups contain essential information such as KTI input and output, data and assumptions, description of the sensitivity

cases to be examined, module modifications required, schedule, and technical contributors. These short write-ups are being prepared as a joint effort between the PA staff and members of the other KTI teams. This work will contribute to the Software Requirements Document for TPA (IM 5708-762-710).

Write-ups for the TSPA-95 detailed review focus topics continued. Two focus topics are nearly complete and ready for technical review: volcanic eruption scenario and matrix diffusion effects. Work continues on three other focus topics: probability and consequences of faulting, probabilistic calculation of container lifetime, and TSPA abstractions. This work will fulfill Input to Detailed Review of the DOE TSPA-95—Letter Report (IM 5708-761-710).

A User's Guide for the ASHPLUME module is being prepared. This work is a collaborative effort with the IA KTI. The module will analyze the dispersion of volcanic ash and spent-fuel at locations from the repository due to extrusive volcanic events. This work will fulfill User's Guide for ASHPLUME Module—Letter Report (IM 5708-762-720).

The TSPA staff provided the NRC staff with support for the CDOCS software installed on the NRC advanced computer system by answering technical questions via teleconference.

In the next period, the User's Guide for FAULTING Module—Letter Report (IM 5708-762-700) will be completed. In addition, write-ups for the Input to Detailed Review of the DOE TSPA-95—Letter Report (IM 5708-761-710) will be completed and review of the comments initiated. Work will begin on modification or replacement of major consequence modules of the TPA code.

1.9 Activities Related to Development of the U.S. Environmental Protection Agency Yucca Mountain Standard (ARDES)

The FY96 Annual Report: Section on ARDES KTI—Joint NRC/CNWRA Report (MM 5708-771-700) was submitted and subsequently revised in response to comments received from NRC staff.

In response to final FY97 budget allocations, CNWRA staff worked to modify the technical needs, deliverables, and resource allocations for the ARDES KTI portion of the CNWRA OPS for FY97.

The CNWRA staff continued coordination with the NRC on-site representative at YM to obtain information on soil properties, soil chemistry, and farm locations in the YM area. This information will be used to refine understanding of the likely exposure scenarios for incorporation into scheduled evaluations of reference biospheres and critical groups. Coordination with the TSPA KTI was conducted to update parameter information for dose calculations.

In the next period, revisions to the FY97 CNWRA OPS will be completed. If the updated EPA Standard for YM is formally published in the *Federal Register*, the CNWRA staff will assist the NRC in the review and comment process. Work will continue to support evaluations of exposure scenarios at YM. CNWRA will assist NRC staff in review of proposed changes to 10 CFR Part 960 if tasked.

1.10 Unsaturated and Saturated Flow under Isothermal Conditions (USFIC)

During this period, a presentation was made at the CNWRA Annual Program Review. A DOE expert elicitation workshop for modeling flow at the repository level was attended and CNWRA/NRC progress in modeling infiltration was presented. Progress was also made in reviewing infiltration-model assumptions, examining climatic information in order to reconstruct a climatic signal, and initiating studies of arid-zone vegetation effects on infiltration. Work continued on modeling drift-scale fluxes and the C-well tracer tests and integrating geochemical data into a 3D saturated-zone hydrostratigraphic model to examine saturated-zone mixing.

Efforts continued on the acquisition and development of methods to determine if the non-reactive tracer tests conducted at the C-well complex can be used to estimate the effect of matrix diffusion on radionuclide concentrations in the saturated zone. For the two-well unbalanced-strength recirculation tracer tests, a semi-analytical interpretation method has been implemented and is being evaluated.

Studies to date on infiltration at the CNWRA have conservatively assumed that plant transpiration does not occur. To become more familiar with relevant aspects of the site, a field trip was made to the YM region with an expert in field measurement techniques and computer modeling of arid-zone vegetation. In addition, CNWRA work on infiltration was presented to a DOE expert elicitation panel considering the representativeness of the DOE Site-Scale Unsaturated-Zone Flow and Transport Model.

Work continued on collating and interpreting past climatic information such as the Devil's Hole data. Climatic information will provide estimates of temperature and precipitation for input to infiltration models to examine how infiltration at YM may have varied during glacial cycles.

Efforts continued towards developing insight into fracture flow processes at the drift scale using numerical simulation. The MULTIFLO code is being used to perform 2D simulations of columns that include discrete fractures. Studies began examining the impact of various boundary conditions and fracture descriptions. These isothermal realizations are closely coordinated with the TEF KTI in which such simulations are used to evaluate thermal effects.

During this period, work continued to merge ARC/INFO GIS geologic coverages at a scale of 1:250,000 for California and Nevada in order to create a hydrostratigraphic framework for regional flow. A simplified hydrostratigraphy has been developed, and discrepancies across coverage boundaries are being reconciled to the extent possible. Hydrochemical facies have been defined for regional groundwater samples based on available chemical data.

The FY96 Annual Report: Section on USFIC KTI—Joint NRC/CNWRA Report (MM 5708-861-700) was submitted.

In the next period, staff will (i) evaluate the C-well tracer tests, (ii) analyze infiltration-model behavior and assumptions, (iii) assemble available climatic data into a form suitable for predictions of future infiltration rates, (iv) prepare drift-scale simulations of discrete fracture percolation, and (v) develop the saturated zone subregional-scale 3D hydrostratigraphic model.

1.11 Radionuclide Transport (RT)

Interpretation and modeling of CNWRA data on $\text{Np}(5+)$ sorption on montmorillonite were completed. Experimental and modeling results were presented and discussed in Neptunium Sorption Modeling—Journal Paper (IM 5708-871-710) which was submitted to the NRC. The journal paper is titled Neptunium(V) Sorption on Montmorillonite: Experimental and Surface Complexation Modeling Study. This paper summarizes CNWRA experimental results for neptunium sorption on the clay mineral montmorillonite in the presence and absence of carbon dioxide. Surface complexation models have been calibrated to one experimental data set and extrapolated to other experimental conditions with good success.

Interpretation of U/Pb and U-series data to develop conceptual models for U transport was conducted to prepare the Radiometric Dating of Minerals from the Nopal I Deposit—Journal Paper (IM 5708-871-720).

The FY96 Annual Report: Section on RT KTI—Joint NRC/CNWRA Report (MM 5708-871-700) was submitted.

In the next period, Radiometric Dating of Minerals from the Nopal I Deposit—Journal Paper (IM 5708-871-720) is anticipated to be completed.

1.12 Waste Solidification Systems (WSS)

The CNWRA staff transmitted a report—Review of SAR-012 (IM 5706-001-701)—to the NRC staff for forwarding to WVDP. Following transmittal of this report, a teleconference was held among NRC, WVDP, and CNWRA staff concerning open items in the CNWRA review of the WVNS SAR-012. The comments regarding the selection of key radionuclides and consideration of in-growth products, such as Am-241, in dose calculations can be resolved by WVDP (i) transmitting a previous document (WVDP-065) which justified selection of key radionuclides, (ii) performing new ORIGEN calculations to verify the calculations performed in WVDP-065, (iii) modifying the text in WVNS SAR-012 to acknowledge that exclusion of Am-241 in dose calculations may not be conservative from the point of the inventory assumed, and (iv) acknowledging that the total dose equivalent was calculated in the present SAR-012 based on other conservative assumptions (e.g., no burn-up). The comment on structural stability of the fuel receiving and storage building is still to be resolved pending a WVDP review of previous documents related to this subject.

In the next period, the CNWRA staff will transmit a letter to the NRC staff to complete the review of WVNS SAR-012. This letter will contain items that were resolved following the previous transmittal of CNWRA comments on WVNS SAR-012 and citation of documents reviewed by the CNWRA staff.

1.13 Tank Waste Remediation System (TWRS)

The first report in subtask 1.1 was submitted to NRC fulfilling the requirements for the Tank Waste System Status—Interim Report (IM 5709-101-710). This IM report is the first of three IMs that will form the Consolidated Hanford Tank Waste Familiarization Report—Final Report (IM 5709-101-730). Activities are proceeding on schedule for completing the second report in subtask 1.1, Nature of Tank Wastes and Hazards—Interim Report (IM 5709-101-720). DOE reports pertinent to Hanford tank waste safety issues, chemistry

and radionuclide inventory were acquired and reviewed. A revised draft of the section on safety issues was completed. The section on tank waste inventory is still in progress.

Development of a GIS database on Hanford waste tanks continued as part of the activities in subtask 1.1. The GIS format is intended to provide a convenient and graphically oriented tool for accessing and presenting information related to Hanford waste tanks, piping, and other TWRS related facilities. Input of tank information, including type, volume capacity, watch list category, and chemical and radionuclide inventory, is nearly complete.

In subtask 1.2, the literature on solidification technologies is being surveyed with a focus on vitrification and molten metal technology.

As part of subtask 1.3, a review was conducted of the guidelines for the hazard evaluation procedures published by the Center for Chemical Process Safety. The use of a consultant to assist the CNWRA staff in the selection of one or two hazard analysis methodologies appropriate for Hanford TWRS is being explored.

In subtask 1.4, work continued on the outline for the Interim Report on Methodologies for Consequence Criteria Development (IM 5709-104-710). Activities in this period consisted of identifying hazardous chemicals that are important to Hanford TWRS safety assessments (as determined by the Hanford EIS) for which no PEL concentration (as identified in 29 CFR Part 1910) or NIOSH-recommended IDLH level exists. For most (but not all) of the important hazardous chemicals, PEL levels exist in 29 CFR Part 1910. Options for chemicals that do not have PELs are being explored. NIOSH IDLH levels exist for very few of the hazardous chemicals expected to be present in the Hanford TWRS. Since NIOSH IDLH levels are specified in draft revisions of 10 CFR Part 70 as a consequence of concern, options for alternate specifications are being explored for these cases.

Activity under subtask 1.5 focused on review of the DOE document Technical Basis for Classification of Low-Activity Waste Fraction from Hanford Site Tanks, WHC-SD-WM-TI-699. The overall objective of this document is to obtain NRC concurrence on the classification of the LAW as incidental waste, thereby enabling disposal of this waste on site and removing it from NRC licensing authority. CNWRA staff conducted a detailed review of the document, focusing on determinations of technical and economic practicality of radionuclide removal technologies and on compliance of the proposed disposal options with the performance objectives of 10 CFR Part 61.

As part of the activities in subtask 1.6, an outline for the Final HLW Classification Manual (IM 5709-106-710) is being developed. The outline will be refined as information from newly acquired references are reviewed. A lease requisition was sent out to OLI Systems, Inc., for its ESP version 6.0. This program is being used by Hanford scientists to simulate chemical processing (e.g., leaching and washing) of tank wastes. Thermodynamic data relevant to Hanford wastes developed at Battelle are supposed to be provided to OLI and will be incorporated in ESP version 6.0.

In subtask 1.7, the draft outline for the Draft Quality Assurance Report was sent to the NRC staff for review. Following a discussion with NRC staff, the outline was revised. Searches are being conducted on literature pertinent to QA issues applicable to the TWRS task and the activity is on schedule.

In the next period, the Nature of Tank Wastes and Hazards—Interim Report (IM 5709-101-720) will be submitted for internal technical and programmatic reviews. Input of tank information into the GIS database will be completed. CNWRA staff will consult with NRC staff to define the scope of the continuing evaluation of the DOE document Technical Basis for Classification of Low-Activity Waste Fraction from Hanford Site Tanks, WHC-SD-WM-TI-699.

2 MANAGEMENT ISSUES

None to report.

3 MAJOR PROBLEMS

None to report.

4 SUMMARY OF SCHEDULE CHANGES

Schedule changes for IMs are included in table 2. Deliverables completed in period 2 are provided in table 3.

5 SUMMARY OF FINANCIAL STATUS

Table 3 summarizes the CNWRA financial status in the context of authorized funds provided by the NRC. Total commitments of the CNWRA are \$43,723. The appendix lists planned and actual costs to date, as well as variances between these, without allowance for fee, on both a per-period and a cumulative basis. These data do not include commitments. Pertinent financial information is provided for the DWM JC, DIMNS JC, and DFCSS JC as well as for COPS and ten KTIs. Three of these KTIs will be terminated in period 4 (see B. Meehan to W. Patrick, September 27, 1996). The planned costs per period for the DWM JC do not reflect the funding decrement for FY97. Therefore, the DWM JC cost variance for period 3 is not accurate.

This period's expenditures fell by 3.5 percent from last period. Based on currently approved estimated spending, the CNWRA composite (all three JCs) was underspent by \$871,887 or 29.1 percent, the DWM JC was underspent by \$693,436 or 25.7 percent, the DIMNS JC was underspent by \$18,596 or 63.2 percent, and the DFCSS JC was underspent by \$159,856 or 59.8 percent. Based on expenditures for the first three periods in this FY, spending in the DWM JC must average about 17 percent below the current plan to conform to the revised FY97 budget. Thus, expenditures in this JC must remain low in subsequent periods. During period 3, the DWM JC spending decreased slightly even with continued payments for work conducted in FY96; expenditures in the DIMNS JC rose significantly due to renewed tasking, while those for the DFCSS JC declined from the previous period despite activity in various subtasks.

As indicated in table 1, the CNWRA has 42 core and 2 limited-term staff members. A Draft Staffing and Hiring Plans—Third Revision was conveyed to the NRC via a memorandum from W. Patrick to J. Linehan dated December 12, 1996. Two offers were accepted; a PA engineer will begin in period 5, and a chemical process engineer will start in period 7. The available pool of approved consultants and subcontractors remains at 46. Expenditures for consultants, subcontractors, and SwRI labor in all JCs as a percentage of the CNWRA composite spending were 9.4 percent for period 3 in FY97. For consultants and subcontractors alone, this percentage was 7.2 percent, as payments resumed for consultants and subcontractors this period.

This FYTD no capital or sensitive equipment was purchased with NRC funds (other than overhead, general and administrative expenses, and fees).

DWM JC

The DWM JC cumulative cost variance through period 3 was 25.7 percent.

Expenditures in this JC declined by 2.5 percent from the previous period. Expenses rose in COPS from last period, and spending declined over period 2 in all KTIs except RDTME, TSPAI, USFIC, and RT. Specific rationales for over/underspending for COPS and each KTI follow.

The cost variance for COPS was 13.7 percent. The cost variance was 8.1 percent for the Management, Planning, and Computer Support Subtask (5708-158) and 35.4 percent for the Quality Assurance Subtask (5708-159). Spending rose in the former subtask over the last period but declined from the previous period in the latter subtask. As stated in the PMPR for period 1, the approved spending plan in Revision 8, Change 0, of the CNWRA OPS does not reflect the anticipated decrement in COPS FY97 available funding.

The cost variance for the IA KTI during this period was 13.1 percent. This variance in spending reflects the staff allocating part of their time developing a WFO proposal. It is anticipated that spending will increase in the next two periods reflecting increased staff work in the KTI and payment of carryover expenses associated with analytical services that occurred in late FY96.

The cost variance for the SDS KTI was -35.9 percent. This variance in spending is a result of FY96 carryover expenses paid during previous periods. Period 3 costs were 4.6 percent below budgeted expenses. Costs are anticipated to decrease in period 4 because of reallocation of staff in work for others activities.

The cost variance for the ENFE KTI was 38.9 percent. This variance is anticipated to decrease in the future as budgets for FY97 are finalized and staffing adjustments are completed.

The cost variance for the CLST KTI was 66.0 percent. This variance, however, does not reflect the revised budget. The spending rate in this period decreased to comport with the close out of this KTI.

The cost variance for the TEF KTI was 17.7 percent. The expenditures in this KTI during periods 1, 2, and 3 of FY97 do not reflect anticipated changes in funding. Spending is expected to adjust to the revised FY97 spending plan.

The cost variance for the RDTME KTI was 65.0 percent. This underspending will accommodate the proposed reduced budget for this KTI.

The cost variance for the TSPAI KTI was 3.1 percent. This small cost variance, however, reflects a slight increase in spending. Anticipated budget revisions will affect future spending in this KTI.

The cost variance for the ARDES KTI was 47.9 percent. This positive variance reflects reduced activity on this KTI pending further tasking related to review of a proposed EPA Standard for YM. Anticipated adjustments to FY97 funding will affect future spending in this KTI.

The cost variance for the USFIC KTI was 33.2 percent, indicating a continued reduction in variance from earlier periods. Further decreases in the cost variance are anticipated in the future as the revised budget is implemented and staffing is completed.

The cost variance for the RT KTI was 56.6 percent. This variance is consistent with the reduced budget for the RT KTI associated with its termination. The variance will decrease once the revised budget is in place.

The cost variance for WSS was 63.2 percent. The spending rate increased significantly due to close out of comments on WVNS SAR-012 and delivery of a report.

The cost variance for the TWRS project was 59.8 percent. This large cost variance reflects the late start of this project. The spending rate is expected to increase further with the acquisition of new staff and consultants.

Table 1. CNWRA Core Staff—Current Profile and Hiring Plan* (Period 3)

EXPERTISE/EXPERIENCE	CURRENT NO.	PROFESSIONAL STAFF	POSITIONS OPEN FY96
ADMINISTRATION	4	H. GARCIA, W. PATRICK, J. RUSSELL, B. SAGAR	
CODE ANALYSIS/DEVELOPMENT	3	B. HENDERSON, R. JANETZKE, R. MARTIN	
DATABASE MANAGEMENT AND DATA PROCESSING	0		1
ELECTROCHEMISTRY	1	G. CRAGNOLINO	
ENGINEERING GEOLOGY/GEOLOGICAL ENGN	2	R. CHEN, G. OFOEGBU	
ENVIRONMENTAL SCIENCES	1	P. LAPLANTE	
GEOCHEMISTRY	5	W. MURPHY, R. PABALAN, E. PEARCY, J. PRIKRYL, D. TURNER	
GEOHYDROLOGY/HYDROGEOLOGY	3	R. GREEN, S. STOTHOFF, J. WINTERLE	2
GEOLOGY	2	L. McKAGUE, M. MIKLAS	
HYDROLOGIC TRANSPORT	2	A. BAGTZOGLU, G. WITTMAYER	
INFORMATION MANAGEMENT SYSTEMS	1	R. MARSHALL	1
MATERIAL SCIENCES	2(1)†	P. ANGELL†, D. DUNN, N. SRIDHAR	1
MECHANICAL, INCLUDING DESIGN AND FABRICATION			1
MINING ENGINEERING	1	S.-M. HSIUNG	
NUCLEAR ENGINEERING			1
PERFORMANCE ASSESSMENT	4	R. BACA, R. MANTEUFEL, S. MOHANTY, M. JARZEMBA	2
QUALITY ASSURANCE	1	B. MARRITO	
RADIOISOTOPE GEOCHEMISTRY	1	D. PICKETT	
REGULATORY ANALYSIS	0		
ROCK MECHANICS	3	M. AHOLA, A. CHOWDHURY, A. GHOSH	
SEISMOLOGY	0		1
SOURCE-TERM/SPENT FUEL DEGRAD	1	P. LICHTNER	
STRUCTURAL GEOLOGY/SEISMO-TECTONICS	2	D. FERRILL, J. STAMATAKOS	1
SYSTEMS ENGINEERING	1	P. MACKIN	1
VOLCANOLOGY/IGNEOUS PROCESSES	2(1)†	C. CONNOR, B. HILL, M. CONWAY†	
TOTAL	42(2)†		12

* SEE STAFFING PLAN FOR DETAILS (Open positions will be filled in FY96 on a selective basis due to budget reduction.)

† LIMITED TERM

Table 2. Summary of Schedule Changes (Period 3)

MILESTONE NUMBER	TYPE	DESCRIPTION	ORIGINAL DATE	REVISED DATE	RATIONALE FOR CHANGE
5708-561-720	IM	Summary results from Peña Blanca and Santorini—Journal Paper	02/21/96	02/21/96	New deliverable developed after consultation with NRC PEM.

Table 3. Deliverables (Period 3)

MILESTONE NO.	TYPE	DESCRIPTION	ORIGINAL COMPLETION DATE	REVISED DATE	# OF REVISIONS	ACTUAL COMPLETION DATE	REASON (IF DELAYED)
5706-001-701	IM	Review of SAR-012	12/11/96			12/12/96	
5708-158-710	IM	Briefing on CNWRA 5-YR Strategic Plan	12/12/96			12/03/96	
5708-461-710	MM	FY96 Annual Report:Section on Igneous Activity KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-471-700	MM	FY96 Annual Report:Section on Structural Deformation and Seismicity KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-561-710	MM	FY96 Annual Report:Section on Evolution of the Near-Field Environment KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-571-710	MM	FY96 Annual Report:Section on Container Life and Source Term KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-661-710	MM	FY96 Annual Report:Section on Thermal Effects on Flow KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-671-700	MM	FY96 Annual Report:Section on Repository Design & Thermal Mechanical Effects on KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.

Table 3. Deliverables (Period 3)(cont'd)

MILESTONE NO.	TYPE	DESCRIPTION	ORIGINAL COMPLETION DATE	REVISED DATE	# OF REVISIONS	ACTUAL COMPLETION DATE	REASON (IF DELAYED)
5708-761-700	MM	FY96 Annual Report-Section on TSPA/Integration KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-771-700	MM	FY96 Annual Report-Section on EPA Standard KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-861-700	MM	FY96 Annual Report-Section on Isothermal Flow KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-871-700	MM	FY96 Annual Report-Section on Radionuclide Transport KTI Joint NRC/CNWRA Report	10/30/96	11/22/96	1	11/25/96	Postponed at NRC request to incorporate additional review comment.
5708-871-710	IM	Neptunium Sorption Modeling—Journal Paper	12/14/96			12/11/96	
5709-101-710	IM	Tank Waste System Status-Interim Report	12/19/96			12/18/96	

Table 4. Financial Status (Period 3)

COPS/KTI/WSS/TWRS	Funds Authorized	Funds Costed to Date	Funds Uncosted	Commitments
COPS	1,823,081	1,559,735	263,346	0
IA	1,021,059	869,153	151,906	2,563
SDS	1,467,355	1,417,799	49,556	21,169
ENFE	988,015	764,780	223,235	3,230
CLST	1,034,017	786,200	247,817	660
TEF	752,056	637,085	114,971	2,329
RDTME	1,060,494	790,281	270,213	9,949
TSPAI	1,875,928	1,655,413	220,516	4,161
ARDES	602,210	480,336	121,874	0
USFIC	795,076	595,015	200,061	1,127
RT	620,453	467,324	153,128	639
DWM COSTS	12,039,744	10,023,121	2,016,623	
DWM AWARD FEE	0	0	0	
DWM BASE FEE	0	388,726	(388,726)	
TOTAL DWM	12,039,744	10,411,848	1,627,896	45,825
WSS COSTS	620,126	563,148	56,977	0
WSS AWARD FEE	0	0	0	
WSS BASE FEE	0	24,351	(24,351)	
TOTAL WSS	620,126	587,499	32,627	0
TWRS COSTS	505,654	107,252	398,402	1,500
TWRS AWARD FEE	33,600	0	33,600	
TWRS BASE FEE	20,746	4,156	16,590	
TOTAL TWRS	560,000	11,408	448,592	1,500
TOTAL	13,219,870	11,110,754	2,109,116	47,325
Note: All authorized funds have been allocated.				

APPENDIX A
Planned and Actual Costs,
and Cost Variances
Period 3, FY97

CNWRA COMPOSITE TOTAL ESTIMATE COST													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pd Cost	1,001,121	1,002,192	996,663	1,007,859	998,384	1,011,071	984,253	1,012,511	979,907	1,016,401	978,455	1,071,347	2,993,976
Act Pd Cost	845,277	652,931	679,882	0	0	0	0	0	0	0	0	0	2,128,069
Variance, \$	155,844	349,262	366,782	0	0	0	0	0	0	0	0	0	871,887
Variance, %	15.6%	34.8%	36.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	29.1%
Est FY Cumul	1,001,121	2,003,313	2,999,976	4,007,835	4,996,219	6,007,290	6,991,539	8,004,100	8,984,007	10,000,408	10,978,873	12,000,220	12,976,625
Act FY Cumul	845,277	1,498,208	2,128,089	0	0	0	0	0	0	0	0	0	0
% Complete	6.5%	11.5%	16.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var, \$	155,844	505,175	871,887	0	0	0	0	0	0	0	0	0	0
Cumul Var, %	15.6%	25.2%	29.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DIVISION OF WASTE MANAGEMENT (DWM) 5708-060													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pd Cost	301,802	902,869	898,753	905,443	897,192	907,917	894,096	909,235	890,674	912,950	889,343	916,434	2,703,424
Act Pd Cost	832,548	596,259	581,121	0	0	0	0	0	0	0	0	0	2,009,988
Variance, \$	69,255	306,610	317,571	0	0	0	0	0	0	0	0	0	693,436
Variance, %	7.7%	34.0%	25.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.7%
Est FY Cumul	301,802	1,204,671	2,703,424	3,608,867	4,506,059	5,413,975	6,308,071	7,217,306	8,107,979	9,020,929	9,910,273	10,826,706	11,714,056
Act FY Cumul	832,548	1,428,806	2,009,988	0	0	0	0	0	0	0	0	0	0
% Complete	7.1%	12.2%	17.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var, \$	69,255	375,865	693,436	0	0	0	0	0	0	0	0	0	0
Cumul Var, %	7.7%	20.8%	25.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

CHWR OPERATIONS (COPS)													
5708 150													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pg Cost	137 967	138 223	137 875	138 468	137 844	138 469	137 813	138 609	137 812	138 671	137 532	135 967	137 363
Act Pg Cost	138 117	106 238	113 059	0	0	0	0	0	0	0	0	0	0
Variance \$	(150)	31 585	24 786	0	0	0	0	0	0	0	0	0	357 445
Variance %	-0.1%	23.1%	18.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Est FY Cumul	137 967	276 191	414 066	552 534	690 378	828 847	966 660	1 105 269	1 243 080	1 381 751	1 519 283	1 658 250	1 795 614
Act FY Cumul	138 117	244 355	357 445	0	0	0	0	0	0	0	0	0	0
% Complete	7.7%	13.6%	19.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var. \$	(150)	31 835	56 621	0	0	0	0	0	0	0	0	0	0
Cumul Var. %	-0.1%	11.5%	13.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

AGREOUS ACTIVITY (AA)													
5708 460													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pg Cost	65 566	65 706	65 360	65 972	65 327	66 175	65 125	66 395	64 842	66 644	64 840	67 171	196 634
Act Pg Cost	56 487	66 448	47 904	0	0	0	0	0	0	0	0	0	170 839
Variance \$	9 079	(740)	17 456	0	0	0	0	0	0	0	0	0	25 795
Variance %	13.8%	-1.1%	26.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.1%
Est FY Cumul	65 566	131 274	196 634	262 606	327 933	394 108	459 233	525 628	590 470	657 114	721 955	789 126	853 885
Act FY Cumul	56 487	122 935	170 839	0	0	0	0	0	0	0	0	0	0
% Complete	6.6%	14.4%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var. \$	9 079	8 335	25 795	0	0	0	0	0	0	0	0	0	0
Cumul Var. %	13.8%	6.4%	13.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

STRUCTURAL DEFORMATION AND SEISMICITY (SDS)
5708-470

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	77,497	77,501	77,011	77,878	76,839	78,048	76,850	78,158	76,368	78,406	76,278	78,770	76,197	232,009
Act Pd Cost	161,282	80,540	73,497	0	0	0	0	0	0	0	0	0	0	315,319
Variance, \$	(83,784)	(3,039)	3,514	0	0	0	0	0	0	0	0	0	0	(83,310)
Variance, %	-108.1%	-3.9%	4.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-35.9%
Est FY Cumul	77,497	154,998	232,009	309,887	386,726	464,773	541,423	619,581	695,949	774,355	850,633	929,403	1,005,800	
Act FY Cumul	161,282	241,822	315,319	0	0	0	0	0	0	0	0	0	0	
% Complete	16.0%	24.0%	31.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var, \$	(83,784)	(86,823)	(83,310)	0	0	0	0	0	0	0	0	0	0	
Cumul Var, %	-108.1%	-56.0%	-35.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

EVOLUTION OF THE NEAR FIELD ENVIRONMENT (ENFE)
5708-560

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	83,796	83,859	83,564	84,143	83,395	84,395	82,783	84,396	82,335	84,846	82,253	85,119	81,975	251,219
Act Pd Cost	62,233	52,181	38,993	0	0	0	0	0	0	0	0	0	0	153,407
Variance, \$	21,563	31,678	44,571	84,143	83,395	84,395	82,783	84,396	82,335	84,846	82,253	85,119	81,975	
Variance, %	25.7%	37.8%	53.3%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Est FY Cumul	83,796	167,655	251,219	335,362	418,757	503,152	585,935	670,331	752,666	837,513	919,765	1,004,885	1,086,860	
Act FY Cumul	62,233	114,414	153,407	0	0	0	0	0	0	0	0	0	0	
% Complete	5.7%	10.5%	14.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var, \$	21,563	53,241	97,812	0	0	0	0	0	0	0	0	0	0	
Cumul Var, %	25.7%	31.8%	38.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

CONTAINER LIFE AND SOURCE TERM (CLST)													
5708.570													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pd Cost	84,373	84,519	83,971	84,660	83,833	84,911	83,284	85,036	83,112	85,478	83,080	85,628	252,864
Act Pd Cost	56,243	15,698	13,946	0	0	0	0	0	0	0	0	0	85,886
Variance, \$	28,131	68,821	70,025	0	0	0	0	0	0	0	0	0	166,977
Variance, %	33.3%	81.4%	83.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.0%
Est FY Cumul	84,373	168,892	252,864	337,524	421,357	506,268	589,552	674,588	757,700	843,158	926,238	1,011,867	1,094,838
Act FY Cumul	56,243	71,940	85,886	0	0	0	0	0	0	0	0	0	0
% Complete	5.1%	6.6%	7.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var, \$	28,131	96,952	166,977	0	0	0	0	0	0	0	0	0	0
Cumul Var, %	33.3%	57.4%	66.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

THERMAL EFFECTS ON FLOW (TEF)													
5708.680													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est Pd Cost	56,440	56,442	56,139	56,653	55,861	56,984	55,720	56,984	55,636	57,421	55,573	57,502	169,020
Act Pd Cost	56,775	43,156	39,111	0	0	0	0	0	0	0	0	0	139,043
Variance, \$	(336)	13,286	17,028	0	0	0	0	0	0	0	0	0	29,976
Variance, %	-0.6%	23.5%	30.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17.7%
Est FY Cumul	56,440	112,882	169,020	225,673	281,534	338,517	394,237	451,221	506,857	564,278	619,851	677,352	732,862
Act FY Cumul	56,775	99,932	139,043	0	0	0	0	0	0	0	0	0	0
% Complete	7.7%	13.6%	19.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var, \$	(336)	12,950	29,976	0	0	0	0	0	0	0	0	0	0
Cumul Var, %	-0.6%	11.5%	17.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

REPOSITORY DESIGN AND THERMAL MECHANICAL EFFECTS (RDTME)
5708 670

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	78,119	78,120	77,975	78,262	77,834	78,590	77,741	78,731	77,572	78,960	77,510	79,452	77,129	234,215
Act Pd Cost	26,768	23,095	32,011	0	0	0	0	0	0	0	0	0	0	81,873
Variance \$	51,351	55,026	45,964	0	0	0	0	0	0	0	0	0	0	152,341
Variance %	65.7%	70.4%	58.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	65.0%
Est FY Cumul	78,119	156,239	234,215	312,477	390,311	468,901	546,642	625,373	702,944	781,904	859,415	938,867	1,015,995	
Act FY Cumul	26,768	49,862	81,873	0	0	0	0	0	0	0	0	0	0	
% Complete	2.8%	4.9%	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var. \$	51,351	106,377	152,341	0	0	0	0	0	0	0	0	0	0	
Cumul Var. %	65.7%	68.1%	65.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

TOTAL SYSTEM PERFORMANCE ASSESSMENT AND INTEGRATION (TSPAI)
5708 760

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	137,140	137,303	136,833	137,728	136,772	137,978	136,058	138,335	134,930	139,068	134,552	139,453	134,191	411,277
Act Pd Cost	162,260	111,904	124,509	0	0	0	0	0	0	0	0	0	0	398,673
Variance \$	(25,120)	25,400	12,324	0	0	0	0	0	0	0	0	0	0	12,603
Variance %	18.3%	18.5%	9.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%
Est FY Cumul	137,140	274,444	411,277	549,005	685,777	823,755	959,813	1,098,147	1,233,077	1,372,146	1,506,697	1,646,160	1,780,351	
Act FY Cumul	162,260	274,164	398,673	0	0	0	0	0	0	0	0	0	0	
% Complete	9.1%	15.4%	22.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var. \$	(25,120)	279	12,603	0	0	0	0	0	0	0	0	0	0	
Cumul Var. %	18.3%	0.1%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

ACTIVITIES RELATED TO DEVELOPMENT OF THE U.S. ENVIRONMENT & PROTECTION AGENCY YUCCA MOUNTAIN STANDARD (ARDES)													
5708 770													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est P3 Cost	47,642	47,766	47,445	47,846	47,027	48,047	46,857	48,079	46,854	48,402	46,827	48,658	142,852
Act P3 Cost	38,571	21,128	14,667	0	0	0	0	0	0	0	0	0	74,416
Variance \$	9,070	26,588	32,778	0	0	0	0	0	0	0	0	0	68,436
Variance %	19.0%	55.7%	69.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	47.9%
Est FY Cumul	47,642	95,407	142,852	190,698	237,725	285,772	322,628	380,707	427,561	475,963	522,790	571,447	618,273
Act FY Cumul	38,571	59,749	74,416	0	0	0	0	0	0	0	0	0	0
% Complete	8.2%	9.7%	12.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var. \$	9,070	35,658	68,436	0	0	0	0	0	0	0	0	0	0
Cumul Var. %	19.0%	37.4%	47.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

UNSATURATED AND SATURATED FLOW UNDER ISOTHERMAL CONDITIONS (USFC)													
5708 860													
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	Total
Est P3 Cost	85,152	85,234	84,839	85,497	84,749	85,847	84,467	85,957	83,688	86,318	83,374	86,540	258,225
Act P3 Cost	50,108	53,439	62,069	0	0	0	0	0	0	0	0	0	170,617
Variance \$	35,044	26,795	22,769	0	0	0	0	0	0	0	0	0	84,608
Variance %	41.2%	31.4%	26.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.2%
Est FY Cumul	85,152	170,386	255,225	340,721	425,471	511,317	595,785	681,742	765,430	851,747	935,121	1,021,662	1,104,828
Act FY Cumul	50,108	103,547	170,617	0	0	0	0	0	0	0	0	0	0
% Complete	4.5%	9.8%	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cumul Var. \$	35,044	61,839	84,608	0	0	0	0	0	0	0	0	0	0
Cumul Var. %	41.2%	36.3%	33.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

RADONUCLEIDE TRANSPORT (RT)
5708-870

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	48,110	48,192	47,740	48,336	47,710	48,476	47,598	48,557	47,525	48,756	47,524	49,163	47,262	144,043
Act Pd Cost	23,704	17,381	21,384	0	0	0	0	0	0	0	0	0	0	62,469
Variance \$	24,406	30,811	26,356	0	0	0	0	0	0	0	0	0	0	81,573
Variance %	50.7%	63.9%	55.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	56.6%
Est FY Cumul	48,110	96,302	144,043	192,379	240,089	288,564	336,162	384,720	432,244	481,000	528,524	577,687	624,948	
Act FY Cumul	23,704	41,085	62,469	0	0	0	0	0	0	0	0	0	0	
% Complete	3.8%	8.6%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var \$	24,406	55,217	81,573	0	0	0	0	0	0	0	0	0	0	
Cumul Var %	50.7%	57.3%	56.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

WASTE SOLIDIFICATION SYSTEMS (WSS)
5706-000

ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	9,986	9,989	9,470	9,989	8,914	10,486	8,658	10,487	8,098	10,550	8,098	10,802	8,095	29,445
Act Pd Cost	6,285	249	4,316	0	0	0	0	0	0	0	0	0	0	10,849
Variance \$	3,701	9,740	5,154	0	0	0	0	0	0	0	0	0	0	18,596
Variance %	37.1%	97.5%	54.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.2%
Est FY Cumul	9,986	19,975	29,445	39,434	48,348	58,834	67,492	77,979	86,077	96,627	104,725	115,527	123,622	
Act FY Cumul	6,285	6,534	10,849	0	0	0	0	0	0	0	0	0	0	
% Complete	5.1%	5.3%	8.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var \$	3,701	13,441	18,596	0	0	0	0	0	0	0	0	0	0	
Cumul Var %	37.1%	67.3%	63.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

TARR WASTE REMEDIATION SYSTEM (TWRS)														
5709 000														
ITEM	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Est Pd Cost	89 332	89 334	88 441	92 426	82 278	92 668	81 545	92 789	81 136	92 901	81 024	94 111	80 960	267 107
Act Pd Cost	6 445	56 423	44 385	0	0	0	0	0	0	0	0	0	0	107 252
Variance \$	82 888	32 912	44 056	0	0	0	0	0	0	0	0	0	0	159 856
Variance %	92.8%	36.8%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	59.8%
Est FY Cumul	89 332	178 667	267 107	359 534	441 812	534 481	616 026	708 815	789 951	882 852	963 876	1 057 987	1 138 947	
Act FY Cumul	6 445	62 867	107 252	0	0	0	0	0	0	0	0	0	0	
% Complete	0.6%	5.5%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cumul Var. \$	82 888	115 799	159 856	0	0	0	0	0	0	0	0	0	0	
Cumul Var. %	92.8%	64.8%	59.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	