

OCRWM AUDIT
YMP-93-14
OF
LAWRENCE LIVERMORE
NATIONAL LABORATORY

JULY 19 - 23, 1993

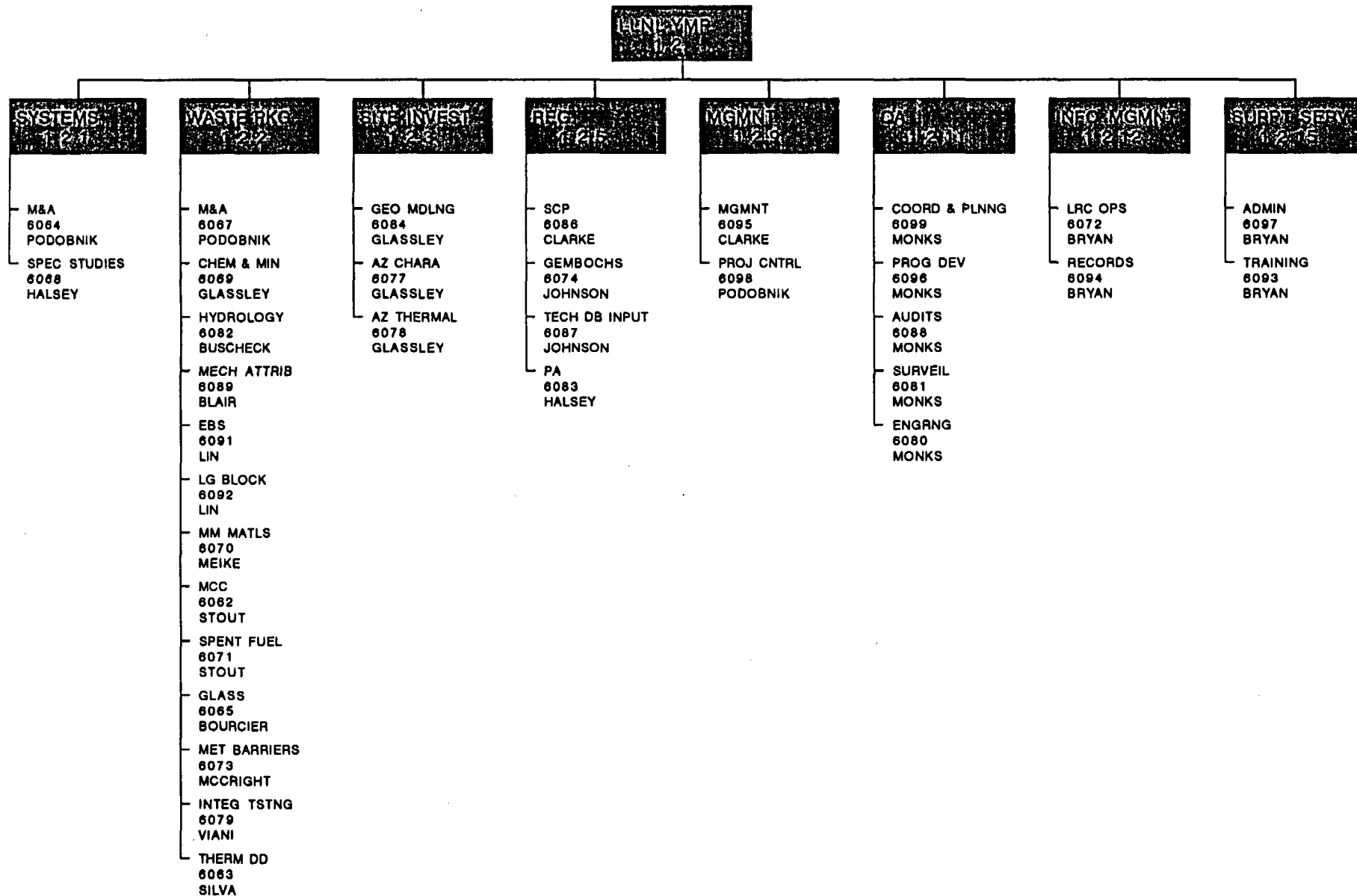
RESERVED CONFERENCE ROOMS
AUDIT YMP-93-14
July 19 - 23, 1993

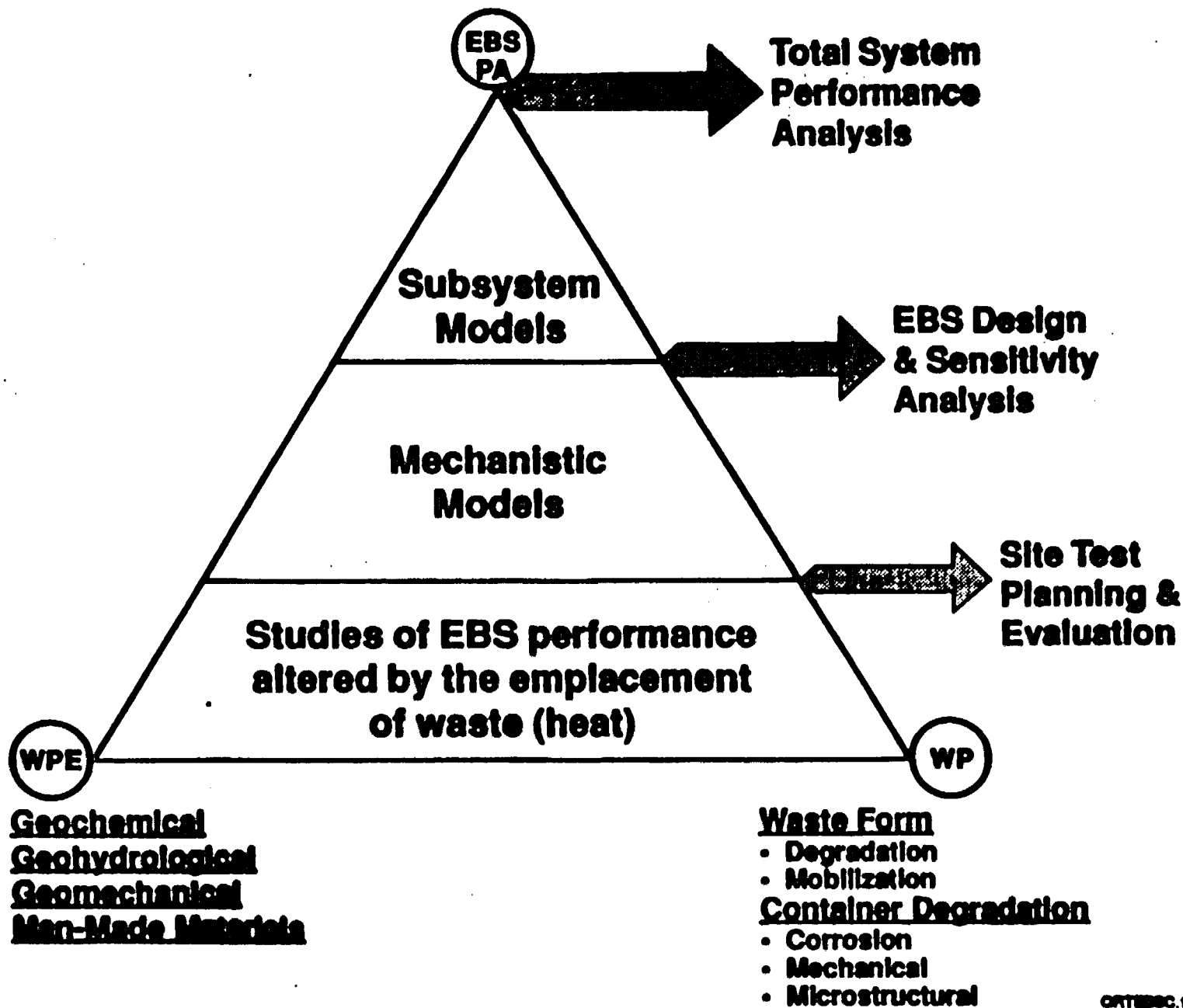
	<u>Monday</u>	<u>Tuesday</u>	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>
<u>T-1478</u> <u>Franciscan Rm</u> (Phone: 44632)	7:00-5:00	7:00-5:00	-----	7:00-5:00	7:00-5:00
<u>T-1452</u> <u>Greenville Rm</u> (Phone: 36684)	7:00-5:00	7:00-5:00	7:00-5:00	7:00-5:00	7:00-5:00
<u>T-1450</u> <u>Education Trlr</u> (Phone: 38257)	7:00-5:00	7:00-5:00	7:00-5:00	7:00-5:00	7:00-5:00

FY94 BUDGET-\$10M-WLC

WASTE PACKAGE BUDGET DISTRIBUTION (FY 93 & 94)									
\$10M BUDGET CASE									
WBS ELEMENT	ACCOUNT TITLE	FY93 BUDGET							
		M&O	LLNL	TOTALS					
1.2.2.1	WP COORDINATION AND PLANNING	395	440	835					
1.2.2.2	WASTE PACKAGE ENVIRONMENT								
1.2.2.2.1	CHEMICAL & MINERALOGICAL PROPERTIES	28	500	528					
1.2.2.2.2	HYDROLOGIC PROPERTIES	28	800	828					
1.2.2.2.3	MECHANICAL ATTRIBUTES	19	150	169					
1.2.2.2.4	EBS FIELD TESTS	49	2080	2129					
1.2.2.2.5	EFFECTS OF MAN-MADE MATERIALS	19	200	219					
	SUB-TOTAL	143	3730	3873					
1.2.2.3	WASTE FORM AND MATERIALS TESTING								
1.2.2.3.1	WASTE FORM	0	150	150					
1.2.2.3.1.1	WASTE FORM TESTING-SPENT FUEL	139	1480	1619					
1.2.2.3.1.2	WASTE FORM TESTING-GLASS	111	194	305					
1.2.2.3.2	METAL BARRIERS	93	600	693					
1.2.2.3.3	OTHER MATERIALS	18	0	18					
1.2.2.3.4.1	INTEGRATED RADIONUCLIDE RELEASE	37	386	423					
1.2.2.3.4.2	THERMODYNAMIC DATA DETERMINATION	18	100	118					
1.2.2.3.5	NON-METALLIC BARRIER CONCEPTS	0	0	0					
	SUB-TOTAL	416	2910	3326					
1.2.2.4	WP DESIGN, FAB. & PROTOTYPE TESTING								
1.2.2.4.1	WASTE PACKAGE DESIGN	663	0	663					
1.2.2.4.2	FABRICATION AND CLOSURE DEVELOPMENT	37	0	37					
1.2.2.4.3	WASTE PACKAGE INTERFACE ANALYSIS	106	0	106					
	SUB-TOTAL	806	0	806					
1.2.2	WASTE PACKAGE PROGRAM TOTALS	1760	7080	8840					
	Percent of Total Budget (%)	19.9	80.1	100					

ACCOUNT STRUCTURE YMP FY93





MAJOR FY1993 WORK

(CONTINUED)

1.2.2 Waste Package \$8.8M

Start Waste Package Advanced Conceptual Design 10/92

Issue revised Waste Package Plan and Waste Package Implementation Plan

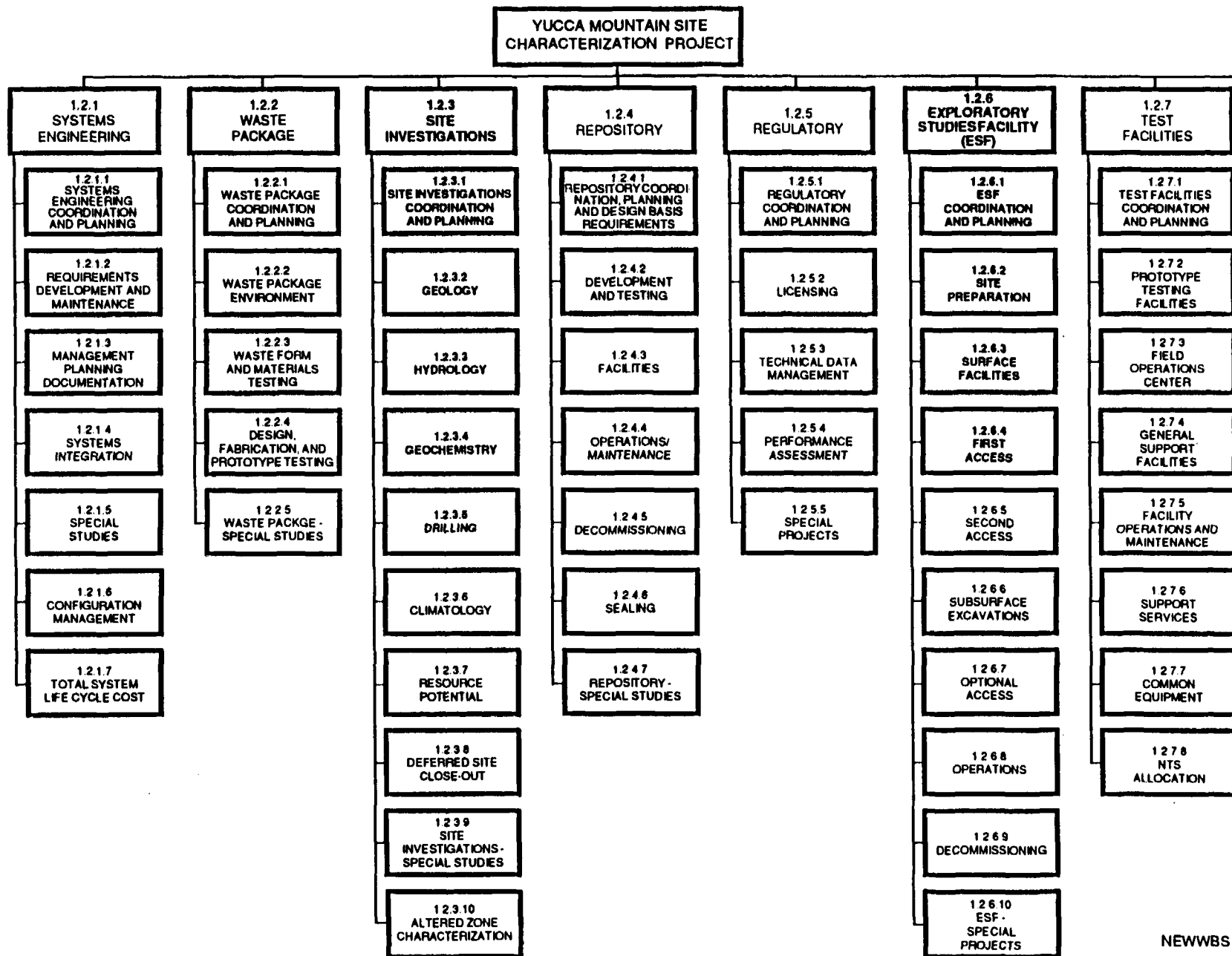
Start laboratory large block thermal tests

Support conceptual design of multi-purpose canister

Develop plans for thermal testing in ESF

Continue study of degradation of waste package

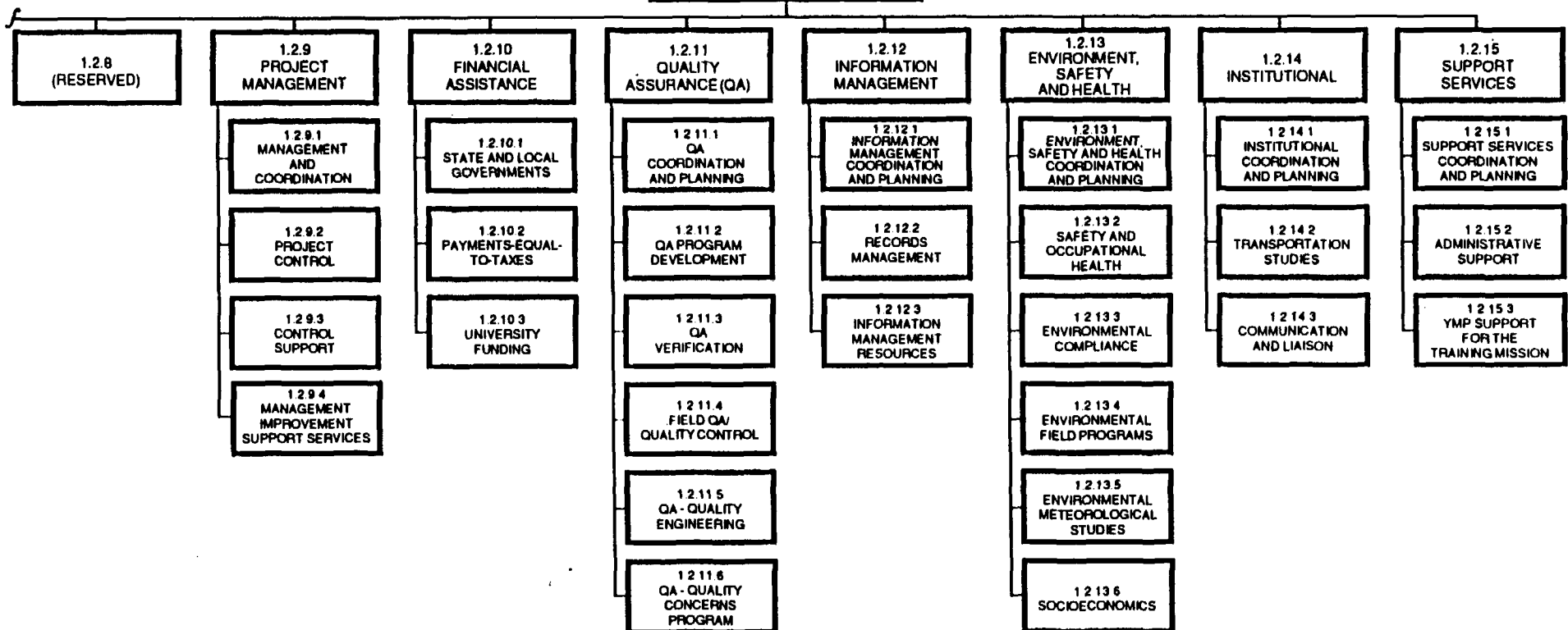
YMP WORK BREAKDOWN STRUCTURE



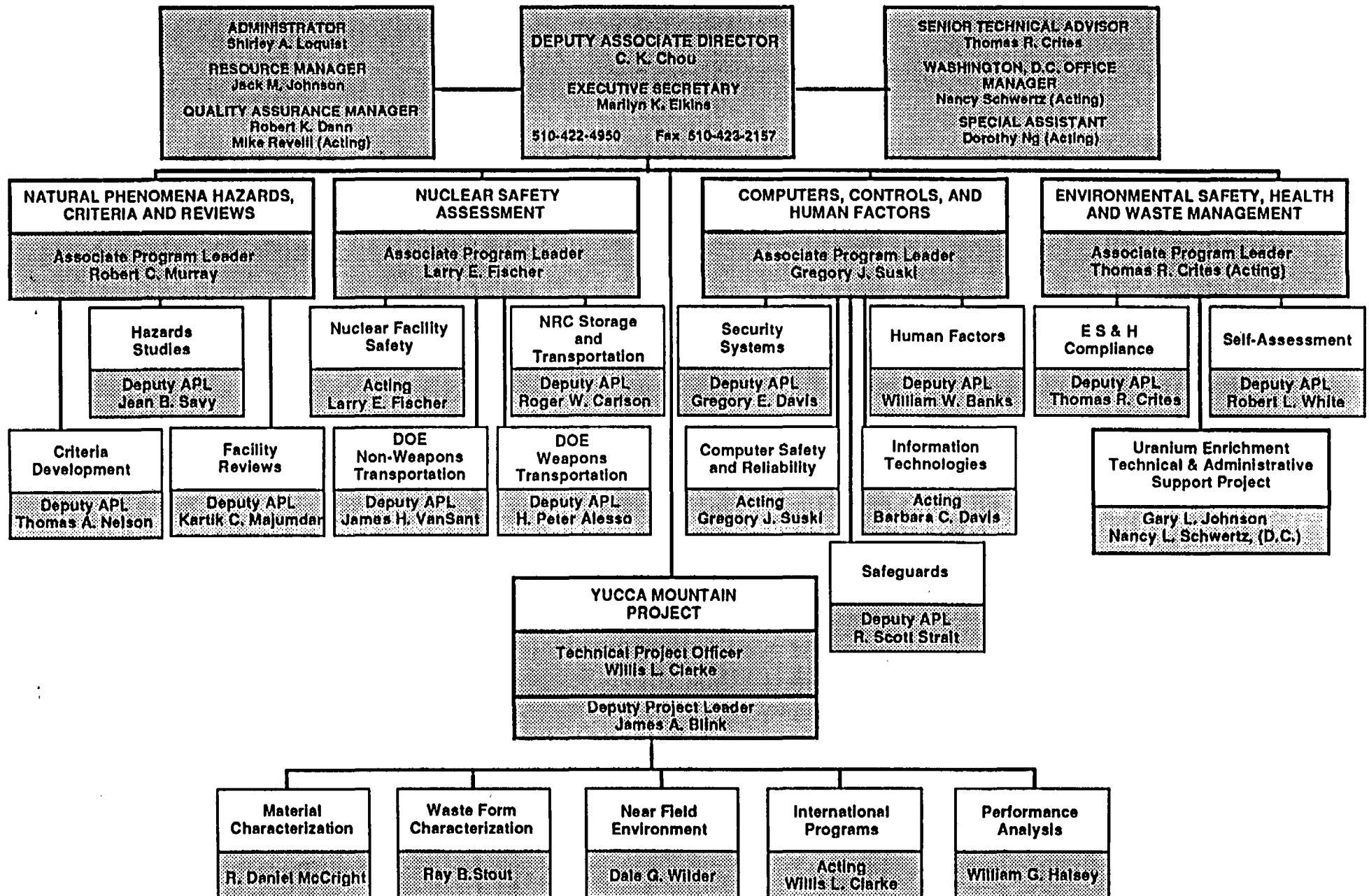
YMP WORK BREAKDOWN STRUCTURE

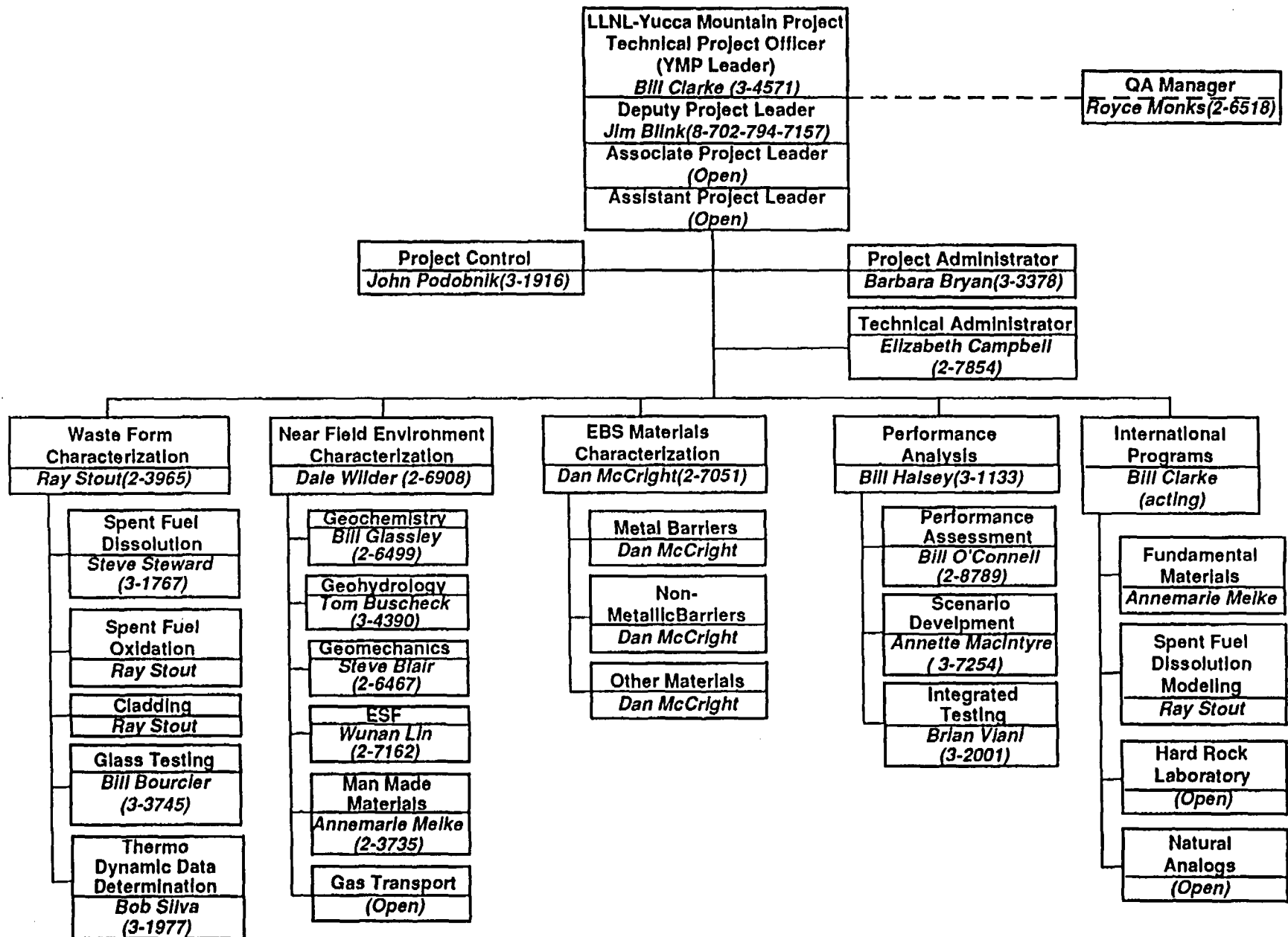
(CONTINUED)

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT



FISSION ENERGY AND SYSTEMS SAFETY PROGRAM ORGANIZATION



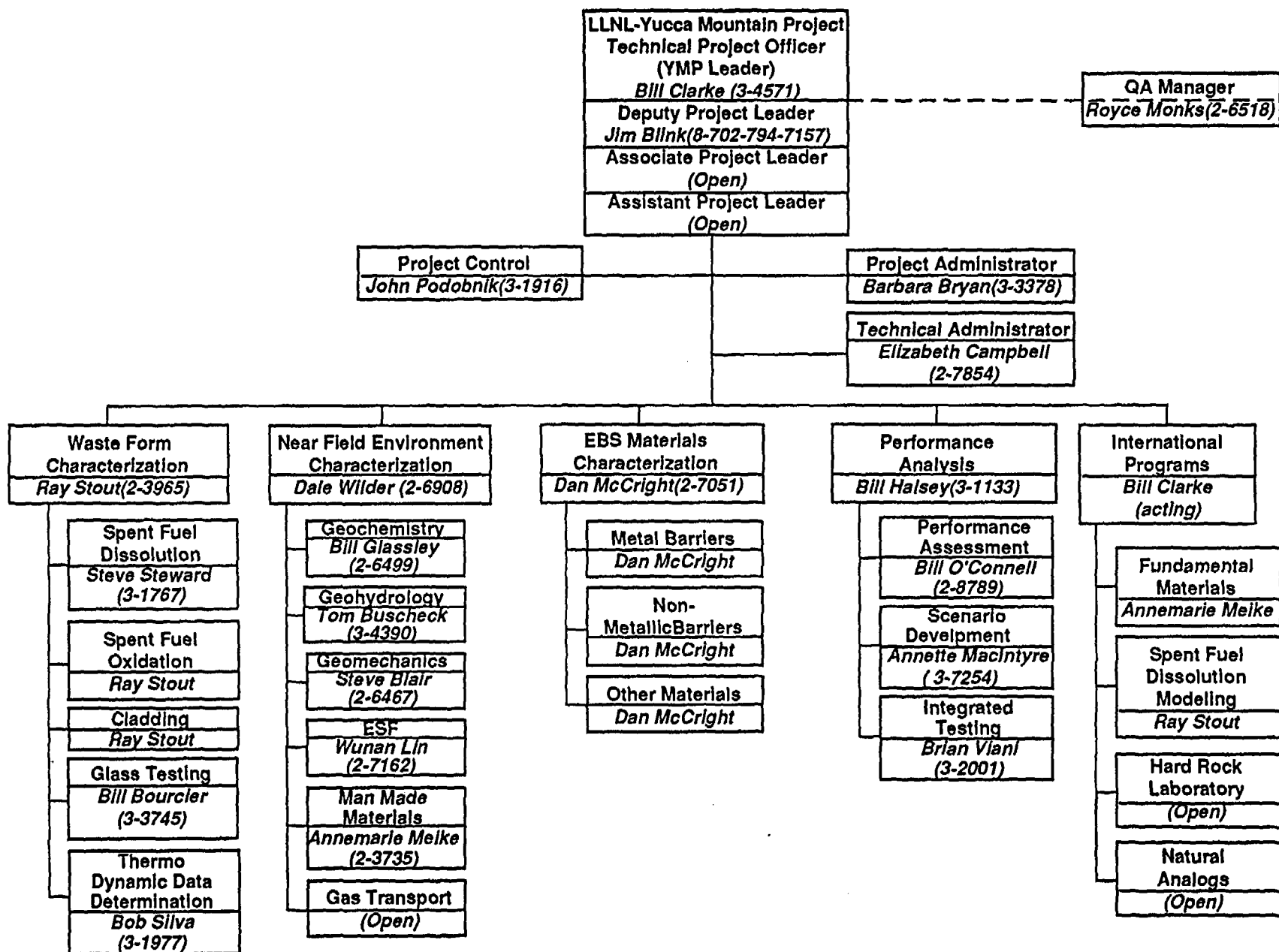


PHONE NUMBERS OF CONFERENCE ROOMS

Trailer 1450 - 38257

Trailer 1478 (Franciscan Rm) 44632

Trailer 1452 - 36684



PHONE NUMBERS OF CONFERENCE ROOMS

Trailer 1450 - 38257

Trailer 1478 (Franciscan Rm) 44632

Trailer 1452 - 36684

AUDIT YMP-93-14

**TENTATIVE SCHEDULE OF AUDIT ACTIVITIES FOR
LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL)**

MONDAY 7/19/93	TUESDAY 7/20/93	WEDNESDAY 7/21/93	THURSDAY 7/22/93	FRIDAY 7/23/93
<p>8:30 am - Team/ Observer Meeting</p> <p>9:00 am - Preaudit Conference</p> <p>10:00 am - Audit Starts</p> <p>M. Diaz - 15 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>8:15 am - TPO Meeting</p> <p>Audit Activities 8:00 am - 4:00 pm</p> <p>M. Diaz - 15 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>8:15 am - TPO Meeting</p> <p>Audit Activities 8:00 am - 4:00 pm</p> <p>M. Diaz - 8 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>8:15 am - TPO Meeting</p> <p>Audit Activities 8:00 am - 4:00 pm</p> <p>M. Diaz - 13 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>8:15 am - TPO Meeting</p> <p>8:00 am - 11:00 am Audit Team Follow-up Activities</p> <p>11:00 am - Postaudit Conference</p>
LUNCH 11:30 - 12:30	LUNCH 11:30 - 12:30	LUNCH 11:30 - 12:30	LUNCH 11:30 - 12:30	
<p>M. Diaz - 15 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>M. Diaz - 8 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>M. Diaz - 8 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	<p>M. Diaz - 13 T. Higgins - 19 K. McFall/D. Stahl - 3 J. Therien - 4/7</p>	
4:00 pm - Team Caucus	4:00 pm - Team Caucus	4:00 pm - Team Caucus	4:00 pm - Team Caucus	

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT DIRECTORY - LLNL

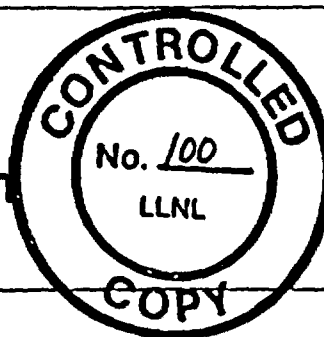
<u>NAME</u>	<u>PHONE</u>	<u>ORG.</u>	<u>REPORTS TO</u>
ALEGRE, BARBARA	510-422-0537	LLNL	BRYAN
BLAIR, STEVE	510-422-6467	LLNL	WILDER
BLINK, JAMES A.	702-794-7157	LLNL	CLARKE
BOURCIER, WILLIAM L.	510-423-3745	LLNL	STOUT
BRADFORD, RICHARD	510-422-2870	LLNL	O'CONNELL
BRYAN, BARBARA A.	510-423-3378	LLNL	BLINK
BUSCHECK, THOMAS A.	510-423-9390	LLNL	WILDER
CAMPBELL, ELIZABETH	510-422-7854	LLNL	BRYAN
CASKEY, TRENA A.	510-423-0672	LLNL	BRYAN
CHESNUT, DWAYNE	510-423-5053	LLNL	HALSEY
CHOU, CK	510-422-4949	LLNL	BALDWIN
CHUBB, KRIS	510-423-8463	LLNL	JOHNSON
CLARK, JOANNE F.	510-422-3916	LLNL	WOLFE
CLARKE, WILLIS L.	510-423-4571	LLNL	TPO
COMSTOCK, PERPETUA	510-422-0461	LLNL	PODOBNIK
VELER, STEPHANIE	510-423-2249	LLNL	BUSCHECK
KINS, MARILYN	510-422-4950	LLNL	CHOU
NSEMER, JAMES	510-422-7553	LLNL	MACINTYRE
BARBER, SUE	510-422-7085	LLNL	BRYAN
GDOWSKI, GREG	510-423-3486	LLNL	CLARKE
GLASSLEY, WILLIAM	510-422-6499	LLNL	WILDER
HALSEY, WILLIAM G.	510-423-1133	LLNL	CLARKE
HAMATI, RAYMOND	510-422-0527	LLNL	WOLFE
HENSHALL, GREGORY	510-423-4417	LLNL	CLARKE
HOLMES, TONI	510-422-0510	LLNL	BRYAN
JOHNSON, GARY	510-422-9323	LLNL	CLARKE
JOHNSON, JAMES	510-423-7352	LLNL	GLASSLEY
KANSA, EDWARD	510-423-0151	LLNL	STOUT
KISHI, TADASHI	510-423-0835	LLNL	GLASSLEY
KRANTZ, PETRA	510-422-0543	LLNL	BRYAN
LAMONT, ALAN	510-423-2575	LLNL	MACINTYRE
LARSEN, SHAWN	510-423-9617	LLNL	BUSCHECK
LEIDER, HERMAN	510-422-9947	LLNL	STOUT
LEWIS, LYNN	510-422-8949	LLNL	HALSEY
LIN, WUNAN	510-422-7162	LLNL	WILDER
LOVETT, BEVERLY	510-422-3900	LLNL	BRYAN
LUNDEEN, SUZANNE	510-422-7895	LLNL	JOHNSON
MACINTYRE, ANNETTE	510-423-7254	LLNL	HALSEY
MARTIN, SUE	510-422-7085	LLNL	VIANI
MEIKE, ANN MARIE	510-422-3735	LLNL	CLARKE/WILDER
MERRIGAN, JAMES	510-424-6983	LLNL	SILVA

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT DIRECTORY - LLNL

<u>NAME</u>	<u>PHONE</u>	<u>ORG.</u>	<u>REPORTS TO</u>
MITCHELL, JACK	510-422-7357	LLNL	CLARKE
MOWREY, O. RUSSELL	510-422-1265	LLNL	O'CONNELL
<i>MONKS, R</i>	<i>510-422-6518</i>		
NIELSEN, JACQUELYN	510-423-7265	LLNL	BOURCIER
NITAO, JOHN J.	510-423-0297	LLNL	BUSCHECK
O'CONNELL, WILLIAM J.	510-422-8789	LLNL	HALSEY
PHINNEY, DOUGLAS L.	510-423-1968	LLNL	VIANI
PLETCHER, RONALD J.	510-422-5773	LLNL	VIANI
PODOBNIK, JOHN	510-423-1916	LLNL	CLARKE
QUINN, TERESA	510-423-2385	LLNL	BUSCHECK
RAINWATER, GRACE	510-422-0542	LLNL	RYAN
REVELLI, MICHAEL A.	510-422-1982	LLNL	HALSEY
ROBERTS, JEFF	510-423-7552	LLNL	LIN/WILDER
RUDDLE, DAVID	510-422-7338	LLNL	LIN
RUSO, RICHARD	510-486-4258	LLNL	LBL
SILVA, ROBERT J.	510-423-1977	LLNL	JT
STEWART, STEVEN	510-423-1767	LLNL	JT
STOUT, RAYMOND	510-422-3965	LLNL	CLARKE
UENG, JOE	510-423-9681	LLNL	O'CONNELL
VAN KONYNENBERG, RICHARD A.	510-422-0456	LLNL	CL
VIANI, BRIAN E.	510-423-2001	LLNL	HA
WALDEN, PATRICIA A.	510-423-7938	LLNL	WO
WEED, HOMER C.	510-422-8151	LLNL	STE
WILDER, DALE G.	510-422-6908	LLNL	CLA
WOLERY, THOMAS J.	510-422-5789	LLNL	GIA
WOLFE, DEAN W.	510-422-6518	LLNL	SCH



YUCCA MOUNTAIN PROJECT



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Subject:

QUALITY PROCEDURES
TABLE OF CONTENTS

Approved:

Jon Halmer 4/10/93

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C.	Terms & Definitions	11/01/91	2
D.	Table of Contents	4/16/93	59
CN 1.0-3-1	change notice QP 1.0	1/22/93	-
033-YMP-QP 1.0	Organization	1/8/93	3
CN 2.0-0-3	change notice QP 2.0	*12/3/90	-
CN 2.0-0-2	change notice QP 2.0	*5/30/90	-
CN 2.0-0-1	change notice QP 2.0	*5/22/90	-
033-YMP-QP 2.0	Assurance	2/24/89	0
CN 2.1-4-2	change notice QP 2.1	11/25/92	-
CN 2.1-4-1	change notice QP 2.1	9/23/92	-
033-YMP-QP 2.1	Preparation, Approval, & Revision of Procedures, Require- ments, Plans, and the Quality Assurance Program Description	8/24/92	4
CN 2.2-0-1	change notice QP 2.2	*7/11/89	-
033-YMP-QP 2.2	Peer Review	*2/24/89	0
CN 2.3-0-2	change notice QP 2.3	*9/13/89	-
CN 2.3-0-1	change notice QP 2.3	*3/15/89	-
033-YMP-QP 2.3	Management Assessments	2/24/89	0
CN 2.4-0-2	change notice QP 2.4	*2/26/91	-
CN 2.4-0-1	change notice QP 2.4	*3/15/89	-
033-YMP-QP 2.4	Technical Review	2/24/89	0
CN 2.5-0-1	change notice QP 2.5	*2/26/91	-
033-YMP-QP 2.5	Acceptance of Data Not Generated Under the Control of the YMP QAPP	2/24/89	0

*Denotes procedures which reflect approval/distribution date prior to implementation of effective date.

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CN 3.5-0-1	change notice QP 3.5	*2/26/91	-
033-YMP-QP 3.5	Control of Internal Technical Interfaces	11/30/89	0
CN 4.0-3-1	change notice QP 4.0	8/24/92	-
033-YMP-QP 4.0	Procurement Document Control	5/20/92	3
CN 4.1-2-1	change notice QP 4.1	11/25/92	-
033-YMP-QP 4.1	Preparation of QA Requirements Specifications & Approval of Subcontractor QA Programs	8/24/92	2
033-YMP-QP 5.0	Technical Implementing Procedures	1/27/92	2
CN 6.0-3-1	change notice QP 6.0	1/8/93	-
033-YMP-QP 6.0	Document Control	11/25/92	3
033-YMP-QP 7.0	Control of Purchased Items	2/24/89	0
CN 8.0-0-1	change notice QP 8.0	*9/13/89	-
033-YMP-QP 8.0	Identification & Control of Items, Samples, & Data	2/24/89	0
CN 9.0-0-1	change notice QP 9.0	*2/26/91	-
033-YMP-QP 9.0	Control of Processes	2/24/89	0
CN 10.0-0-3	change notice QP 10.0	10/8/91	-
CN 10.0-0-2	change notice QP 10.0	*2/26/91	-
CN 10.0-0-1	change notice QP 10.0	*5/3/89	-
033-YMP-QP 10.0	Inspection	2/24/89	0
CN 11.0-0-1	change notice QP 11.0	*5/3/89	-
033-YMP-QP 11.0	Test Control	2/24/89	0
033-YMP-QP 12.0	Control of Measuring & Test Equipment	3/26/93	5
033-YMP-QP 13.0	Handling, Storage, & Shipping	2/24/89	0

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033-YMP-QP 2.6	Readiness Reviews	2/7/91	1
CN 2.7-1-1	change notice QP 2.7	10/8/91	-
033-YMP-QP 2.7	Stop Work Order	8/30/90	1
033-YMP-QP 2.8	Quality Assurance Grading	4/16/93	3
CN 2.9-3-1	change notice QP 2.9	3/27/92	-
033-YMP-QP 2.9	Indoctrination & Training	3/6/92	3
033-YMP-QP 2.10	Qualification of Personnel	3/27/92	4
CN 2.11-0-1	change notice QP 2.11	*5/3/89	-
033-YMP-QP 2.11	Qualification and Certification	2/24/89	0
CN 3.0-2-3	change notice QP 3.0	8/24/92	-
CN 3.0-2-2	change notice QP 3.0	5/20/92	-
CN 3.0-2-1	change notice QP 3.0	10/8/91	-
033-YMP-QP 3.0	Scientific Investigation Control	5/2/91	2
033-YMP-QP 3.1	Design Control	6/1/92	1
CN 3.2-0-3	change notice QP 3.2	10/8/91	-
CN 3.2-0-2	change notice QP 3.2	*2/26/91	-
CN 3.2-0-1	change notice QP 3.2	*3/15/89	-
033-YMP-QP 3.2	Software Quality Assurance	2/24/89	0
CN 3.3-2-2	change notice QP 3.3	11/01/91	-
CN 3.3-2-1	change notice QP 3.3	9/13/91	-
033-YMP-QP 3.3	Review of Technical Publications and Data	5/31/91	2
CN 3.4-2-4	change notice QP 3.4	3/27/92	-
CN 3.4-2-3	change notice QP 3.4	10/23/91	-
CN 3.4-2-2	change notice QP 3.4	*6/26/91	-
CN 3.4-2-1	change notice QP 3.4	*5/22/91	-
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CN 14.0-0-1	change notice QP 14.0	*5/3/89	-
033-YMP-QP 14.0	Inspection, Test & Operating Status	2/24/89	0
CN 15.0-2-3	change notice QP 15.0	12/5/91	-
CN 15.0-2-2	change notice QP 15.0	10/23/91	-
CN 15.0-2-1	change notice QP 15.0	*10/19/90	-
033-YMP-QP 15.0	Nonconforming Items	9/13/90	2
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033-YMP-QP 16.2	Trend Analysis	12/5/91	3
CN 17.0-4-1	change notice QP 17.0	9/23/92	-
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033-YMP-QP 18.0	Audits	11/25/92	4
033-YMP-QP 18.1	Surveillances	7/29/92	4
033-YMP-QP 18.2	Qualification of Quality Assurance Audit Personnel	8/5/92	2

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1990/1991 QA DOCUMENT REVIEW LOG
"Technical Implementing Procedures"

TITLE	1ST REV.	OUT	2ND REV.	OUT	FIN. REV.	OUT/TPO	TO D.C.	AUTHOR	Memo to AUTHOR
TIP-NF-17. "Carbonate Analysis with the OIC Model 524D Carbon Analyzer"	3/27								
TIP-NF-23. "Autoclave Temperature & Pressure System Calib."	3/27				11/7	11/14	11/15		
TIP-NF-18. "Testing Rock-Water Interactions Using a Rocking Autoclave"	4/2								
TIP CN - 6.0-1							5/10		
Change Notice TIP-YM-05			7/3		7/12	7/13	7/16		
TIP-NF-16. "Prepare Core Wafer Sample"					7/9	7/18	7/18		
TIP-YM-7. "Operation of the Jarrel Ash 975 Atom Comp. ICP-OES (Previous NF21)"						7/18	7/18		
TIP-YM-6 "Measurement of the pH of Aqueous Solutions with the Glass Electrode"						7/26	7/26		
TIP-YM-10					10/2	10/17	10/18		
TIP-YM-11 "Software Configuration Management Sp."			1/9/91		2/6/91	3/4/91			
Change Notice TIP-CM-6-0-2						6/5/91	6/7/91		
Change Notice TIP-GM-01-0-1						6/5/91	6/7/91		
Change Notice TIP-GM-02-0-1						6/5/91	6/7/91		
Change Notice TIP-GM-03-0-1						6/5/91	6/7/91		
Change Notice TIP-GM-04-0-1						6/5/91	6/7/91		
Change Notice TIP-GM-05-0-2						6/5/91	6/7/91		
Change Notice TIP-GM-06-0-1						6/5/91	6/7/91		
Change Notice TIP-GM-07-0-1						6/5/91	6/7/91		

1991 QA DOCUMENT REVIEW LOG
"Technical Implementing Procedures"

TITLE	1ST REV.	OUT	2ND REV.	OUT	FIN. REV.	OUT/TPO TO D.C. AUTHOR	Memo to AUTHOR
Change Notice TIP-GM-08-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-09-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-10-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-11-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-12-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-13-0-1						6/5/91 6/7/91	
Change Notice TIP-GM-15-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-16-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-17-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-18-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-23-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-28-0-1						6/5/91 6/7/91	
Change Notice TIP-NF-30-0-1						6/5/91 6/7/91	
Change Notice TIP-YM-2-0-1						6/5/91 6/7/91	
Change Notice TIP-YM-4-0-1						6/5/91 6/7/91	
Change Notice TIP-YM-6-0-1						6/5/91 6/7/91	
Change Notice TIP-YM-7-0-1						6/5/91 6/7/91	
TIP-PA-01						1/21/92	
TIP-PA-02						1/23/92	
TIP-YM-09						2/4/92	
TIP-YM-12						4/28/92	
TIP-YM-11-0-1						5/1/92	
TIP-YM-12						5/23/92	

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED LLNL	<input checked="" type="checkbox"/> EXTERNAL <input type="checkbox"/> INTERNAL	<input checked="" type="checkbox"/> AUDIT <input type="checkbox"/> SURVEILLANCE	PREPARED BY <u>J. Kevin McCoy</u> DATE _____	
DATES OF EVALUATION 7/19-23/93				
CONTROLLING DOCUMENT (Title, Number, Revision)			ACTIVITY EVALUATED WBS 1.2.2.3.1.1 and 1.2.2.3.1.2	
ITEM NO.	CHARACTERISTICS TO BE EVALUATED		REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	ACTIVITY D-20-53A FLOW-THROUGH DISSOLUTION TESTS ON UO SUB 2 Obtain evidence of qualification for Ray Stout, Steven Steward, and Homer Weed (LLNL).			
2	Why should we study unirradiated uranium dioxide? How is its behavior pertinent to that of irradiated spent fuel? What results do we hope to obtain that will not be obtained by our study of spent fuel?			

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3	Why was carbonate chosen as the primary solute to be controlled? Why were other solutes neglected?		
4	Explain the reasons for status meetings with PNL on Activity D-20-53a. What was the date of the last meeting? What plans have been made for the next meeting?		
5	Describe the correspondence between test conditions used at PNL (for spent fuel) and LLNL (for uranium dioxide).		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
6	Describe the methods you use for controlling systematic errors.		
7	Describe the methods you use for controlling problems due to inexperience. (See section 4.2. of the Activity Plan)		
8	Describe the methods you use for controlling working spreadsheets.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
9	Do you plan to vary the flow rate and surface area of the solid to determine where dissolution is controlled by solubility and where it is controlled by dissolution rate? Why or why not?		
10	What data are available on the effects of solutes other than carbonate on the solubility and dissolution rate of uranium dioxide?		
11	How do you clean your tubing? Have you studied contamination of solutions by deposits inside the tubing?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
12	Visit uranium dioxide dissolution laboratory and examine experimental setup for uranium dioxide dissolution tests, if possible.		
13	Audit checklist YMP-92-21-02, item T-29 discusses changes to experimental setup in response to oxygen diffusion through plastic tubing. (See also Activity Plan D-20-53a, appendix B, page 15.) Were these changes in effect at the time of the audit? If not, examine documentation of changes in experimental setup.		
14	Visit SEM laboratory to observe how work is actually done, if possible.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
15	Examine records for determination of uncertainty in measurement of chemical analysis.		
16	Examine records for determination of uncertainty in measurement of pH.		
17	Examine calibration and alignment records for x-ray diffractometer.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
18	If you were going to add more TIPs, which measurements would benefit the most from them?		
19	Measurements of solution and gas composition are obviously important to the results and appear to be repeated at least 38 times each (Activity Plan D-20-53a, Appendix B, pp. 16-19), but there are no TIPs for these measurements. Explain.		
20	Dissolution tests in J-13 well water are planned (Activity Plan D-20-53a, Appendix B, p. 19), and a procedure for handling this water (TIP-YM-2) exists, but it is not cited. Explain.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
21	Examine evidence that water was handled according to TIP-YM-2.		
22	Describe how this activity and activity D-20-53b complement activities D-20-54.1 and D-20-54.2		
23	What has been learned about the release of Tc? What is the effect of oxygen fugacity?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
24	What information has been relayed to the modeling effort and how is it being utilized?		
25	What different samples of uranium dioxide have been tested? Have single crystal and mineral samples been tested? Are there differences in response?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
26	Early models have indicated a dependency on carbonate concentration. How has this changed with additional testing?		
27	Comment on the use of the statistical test matrix. Has it been effective in defining major dependencies? Should additional tests be performed?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	ACTIVITY D-20-53B FLOW-THROUGH DISSOLUTION TESTS ON SPENT FUEL Obtain evidence of qualification for Walter Gray (PNL).		
2	Explain how the spent fuel samples were selected. Discuss how selection affects the applicability of the results to performance assessment.		
3	What provisions have been imposed on PNL, for the QA and technical supervision of subcontracted work, by LLNL personnel?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
4	Obtain copies of all Memoranda of Understanding between LLNL and PNL for work on this activity.		
5	Review Memoranda of Understanding.		
6	Obtain copies of all LLNL procedures for work on this activity.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
7	Obtain copies of all PNL procedures for work on this activity.		
8	Select an appropriate number of LLNL and PNL procedures and review documentation of technical reviews. Obtain names and review qualifications of reviewers. Review technical content of review comments and see how the review was carried out.		
9	Obtain records from audits of PNL work by LLNL to evaluate effectiveness and thoroughness of audits.		

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10	Grain boundary release is expected to exceed that from the matrix for 20000 years (Activity Plan D-20-53b, Appendix A, p. 10), so kinetics of grain boundary release are important to performance assessment. Explain how the results obtained in this activity can be used to find kinetics of grain boundary release.		
11	LLNL will study both acidic (pH = 4 to 6) and alkaline (pH = 8 to 10) environments; PNL will study only alkaline environments. Explain.		
12	J-13 well water contains substantial concentrations of Ca (11.5 to 15 ppm) and Si (26.6 to 31.9 ppm). PNL has measured drops in dissolution rates by two orders of magnitude in response to 1.5 ppm of Si (Activity Plan D-20-53b, Addendum to Appendix A, p. 2.) There are no plans to study effects of Ca and Si on dissolution behavior. Explain.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
13	The activity plan expresses concern about changing personnel on the experiment (p. 4). Describe past or planned personnel changes.		
14	Describe observed differences between the dissolution behaviors of uranium dioxide and spent fuel.		

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15	What different samples of spent fuel and UO ₂ have been tested? Have single crystal and mineral samples been tested? Are there differences in response?		
16	What plans are there to obtain fuel samples with more burnup poison?		
17	The SIP (Page 33) notes the potential for analysis of C-14. However, the test plans do not mention the collection of C-14. Is the concentration too low to measure? Please explain.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
18	What release dependencies have been determined from the spent fuel tests? Are they the same or different from those obtained for UO2?		
19	<p>What is the current schedule for testing and completion? The Test Plan (Page 22) notes completion in FY 91.</p> <p style="text-align: center;">3</p> <p>C-14: may be difficult to be released during the repository performance (Stahl)</p>	<p>agreement with the NRC postulates only to a certain extent. (NRC, T-Ahn, 7/17/93)</p>	

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	ACTIVITY D-20-27 UNSATURATED TESTING OF WVDP AND DWPF GLASS Our copy of the activity plan is 28 months old. The test plans are 30 months old. Are revisions scheduled?		
2	Obtain evidence of qualification for William Bourcier (LLNL), John Bates (ANL).		
3	The glasses under study are ATM-10 (West Valley) and 165A (Savannah River). (See NNWSI-05-036, p. 4 and NNWSI-05-037, p. 4) These are fairly old compositions. How have waste glasses evolved since these glasses were developed? How will these changes affect the applicability of the results? Do you foresee tests on additional glasses?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
4	What provisions have been imposed on ANL, for the QA and technical supervision of subcontracted work, by LLNL personnel?		
5	Obtain copies of all Memoranda of Understanding between LLNL and ANL for work on this activity.		
6	Review Memoranda of Understanding.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
7	Obtain copies of all LLNL procedures for work on this activity.		
8	Obtain copies of all ANL procedures for work on this activity.		
9	Select an appropriate number of LLNL and ANL procedures and review documentation of technical reviews. Obtain names and review qualifications of reviewers. Review technical content of review comments and see how the review was carried out.		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
10	Obtain records from audits of ANL work by LLNL to evaluate effectiveness and thoroughness of audits.		
11	Ten reports are cited regarding 165A glass (NNWSI-05-036, p. 10), but none on ATM-10 glass (NNWSI-05-037, p. 10). Explain the lack of publishable results on ATM-10 glass.		
12	The SIP discusses testing at several laboratories. Are tests at LLNL planned to confirm the results obtained at ANL?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
13	How long will the tests be run?		
14	What is the status of the analysis of the N3 batch tests?		
15	What has been learned about colloid generation?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
16	How can the test be modified to help understand colloid retardation? Are these modifications planned for the future?		
17	What information has been relayed to the modeling effort and how is it being utilized?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1	ACTIVITY D-20-45 LOW-TEMPERATURE OVEN METHOD FOR SPENT-FUEL OXIDATION TESTING The test plan has been essentially unchanged since 1988. Does the lack of changes reflect a desire to maintain consistency or the basic simplicity of the experiments?		
2	Obtain evidence of qualification for Bob Einziger (PNL).		
3	The experiments have included a small number of approved test materials. How well do these represent the oxidation behavior of other fuels?		

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4	What provisions have been imposed on PNL, for the QA and technical supervision of subcontracted work, by LLNL personnel?		
5	Obtain copies of all Memoranda of Understanding between LLNL and PNL for work on this activity.		
6	Review Memoranda of Understanding.		

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7	Obtain copies of all LLNL procedures for work on this activity.		
8	Obtain copies of all PNL procedures for work on this activity.		
9	Select an appropriate number of LLNL and PNL procedures and review documentation of technical reviews. Obtain names and review qualifications of reviewers. Review technical content of review comments and see how the review was carried out.		

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10	Obtain records from audits of PNL work by LLNL to evaluate effectiveness and thoroughness of audits.		
11	PNL-6427 says that LWR fuel "tends to fracture intragranularly" (p. 2.12), but PNL's test plan for Activity D-20-53b says that spent fuel "tends to fracture along grain boundaries" (p. 5). Reconcile these two statements. If PNL's method for separating grains fails, are the measurements of grain boundary inventory reliable?		
12	Some of the fuels seem to be described inconsistently. See Activity Plan D-20-45, Appendix B, pp. 3-4. Is ATM-106 PWR or BWR fuel? Is ATM-104 the same as ATM-104?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
13	The oxidation measurements to date have been made in air. Describe how you expect the oxidation rate will depend on oxygen pressure.		
14	How have the results of the tests affected other experimental programs, such as the TGA experiments?	U4O9 transient — DOE does not know reasons — need more experiments.	
15	What information has been relayed to the modeling effort and how is it being utilized?	<p>For PA performance: dissolution: no detailed description</p> <p> { oxidation $\begin{cases} 200 \text{ U4O9} \\ 200 \text{ U3O8} \end{cases}$ cladding: the same } qualitative development </p> <p>this is similar to the NRC report (7/17/93).</p> <p>Discussions of UO2 to U4O9 → some in agreement with NRC, others are not.</p>	

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
16	A new series of tests has begun at 255 C. Describe the results obtained to date and compare them to those expected.		
17	What data has been collected on the release of C-14 from the spent fuel?		
18	What techniques are available to better define the location of the excess oxygen in the U sub 4 O sub 9 lattice?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
19	What new fuels will be added to the test matrix and when will this be done?		
20	Are there any low-temperature, long-term field data for spent fuel stored in air that could be used to help confirm the laboratory results?		

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21	The Test Plan for BWR spent fuel indicates that the tests "will run for up to two years." (PNL-6427, P.iii) What is the actual elapsed time and when will the tests be terminated?		
22	Explain how surface (rim) versus bulk pellet oxidation effects are being addressed.		
23	What was the basis for selection of Bath 5 for test termination to permit the use of the bath for the 255 C tests? (See Activity Plan D-20-45, Page D-5)		

20°C → RT