



## Technical Data Report Error Resolution Document

QA: QA  
Page 1 of 8

*Complete only applicable items.*

### INITIATION

1. Originator: Roger J. Henning	2. Date: 06/27/08	3. ERD No. TDR-CRW-GS-000001 ERD 02
4. Document Identifier: TDR-CRW-GS-000001 REV 02 ICN 01 and TDR-CRW-GS-000001 ERD 01	5. Document Title: Yucca Mountain Site Description and Technical Data Report Error Resolution Document	

6. Description of and Justification for Change (Identify applicable CRs and TBVs):

### I Background Information Summary

This ERD is prepared to resolve CRs 12203 and 12204 associated with the ERD process and specifically, in part, *Yucca Mountain Site Description (YMSD)*, TDR-CRW-GS-000001 REV02 ICN 01 and TDR-CRW-GS-000001 ERD 01. There are no open TBVs associated with this document. LCR 0008-00 was written to correct the inconsistencies in the SAR and this ERD makes three changes to the technical product to ensure consistency and transparency with the SAR changes documented in LCR 0008-00.

CR 12203 states that:

Technical Data Report Error Resolution Document, TDR-CRW-GS-000001 ERD 01, (LLR.20080423.0019) indicates that the name of the "Gold Mountain Fault" should be changed to "Gold Mountains Fault". This does not appear to be correct as multiple sources indicate that the name "Gold Mountain Fault" is correct. See, for example, Piety 1996 [DIRS 106540] Pages 77a through 77c; BSC 2004 [DIRS 168030], Figure 6; CRWMS M&O 2000 [DIRS 151968], Figure 2-8; and Anderson 1999 [DIRS 185574].

CR12204 states that:

LS-PRO-001, Revision 8, Technical Reports; SCI-PRO-006, Revision 10, Models; and SCI-PRO-005, Revision 10, Scientific Analyses and Calculations all allow the use of an Error Resolution Document (ERD) "to document resolution to an error (because of a CR action or TBV closure) in a technical product when minor corrections are necessary to clarify and/or strengthen existing discussion and the corrections have no impact on the conclusion." There are two apparent problems with the ERD process as implemented. In the instructions for ERD completion, the procedures require that originator provide: a list of other documents that have been evaluated for impact and justification identifying why there is no impact to the conclusion of the document in question or any other affected documents.

(continued — see attached)

### CONCURRENCE

	Printed Name	Signature	Date
7. Checker	Peter Persoff		06/30/2008
8. QCS/QA Reviewer	Brian Mitcheltree		6/30/08

### APPROVAL

9. Originator	Roger J. Henning		6/30/08
10. Responsible Manager	Paul Dixon		7-2-08

(Continued from Block 6)

One of the examples cited in CR 12204 is the YMSD. The CR states: TDR-CRW-GS-000001 ERD 01 for the Yucca Mountain Site Description (YMSD) documented multiple changes made to the YMSD. Several of these changes need to be made to correct similar errors in the License Application (e.g., correcting Table 4-8 of the YMSD to revise the location of the Fairview Peak earthquake from Fairview Peak, CA to Fairview Peak, NV also needs to be corrected in Table 1.1-65 of the LA SAR; correcting 3.7 MPa to 4.7 MPa on p. 3-106 of the YMSD also needs to be corrected in Section 1.1.5.3.1.2.4 of the LA SAR; and correcting Figure 4-23 of the YMSD to change "Grapevine Mountain" to "Grapevine Mountains" and "Spotted Ridge" to "Spotted Range" also needs to be corrected in Figure 1.1-73 of the LA SAR).

The editorial and minor typographical errors identified by these two CRs are corrected as follows:

1. For consistency of fault names between the SAR and the YMSD, Figure 4-23 should reverse the change made by ERD01 and return "Gold Mountains" to "Gold Mountain". The YMSD Figure 4-23 is changed to "Gold Mountain" (CR 12203). In addition, for traceability, added reference to Anderson 1999 [DIRS 185574].

The following two changes were made in the section I Background Information Summary in text, but page replacements showing the changes were not included in the ERD. To clarify the changes and make it more transparent, page changes as instituted by ERD 01 are made here on the pages of the parent document because they are sources for the license application. (CR 12204)

2. Table 4-8 needs to be corrected to revise the location of the Fairview Peak earthquake from Fairview Peak, CA to Fairview Peak, NV. (ERD 01 Item 24, page 3)
3. Page 3-106 of the text is corrected to reflect the information from Table 3-29 of 3.7 MPa to 4.7 MPa. (ERD 01 Item 14, page 3)

## **II Inputs and/or Software**

There are no direct inputs to this error resolution analysis. No software controlled under IM-PRO-003, *Software Management*, is used in this analysis.

## **III Impact Evaluation for LCR 0008-00, CRs 12203 and 12204**

LCR 0008-00 details changes to be made to the license application. These changes are consistent with the changes that are made as a result of this ERD. CRs 12203 and 12204 identified only minor editorial/typographical errors or suggested improvements for clarification and/or consistency between the SAR and its supporting documentation. There are no impacts to the analyses or conclusions in TDR-CRW-GS-000001 REV 02 ICN 01 or to any downstream technical products.

The following controlled and under development documents were evaluated for impacts:

**Parent Document:**

[DIRS 169734] BSC (Bechtel SAIC Company) 2004. *Yucca Mountain Site Description*. TDR-CRW-GS-000001 REV 02 ICN 01. Two volumes. Las Vegas, Nevada: Bechtel SAIC Company. ACC: DOC.20040504.0008.

**Controlled:**

000-00C-MGR0-00500-000-00C EXTERNAL EVENTS HAZARDS SCREENING ANALYSIS  
000-PSA-MGR0-01500-000-00A INDUSTRIAL/MILITARY ACTIVITY-INITIATED ACCIDENT SCREENING ANALYSIS  
190-MAC-VN00-00400-000-00B THERMAL ANALYSIS OF THE CANISTER HANDLING FACILITY CANISTER PITS AND STAGING AREA  
800-K0C-SS00-00200-000-00A LITHOPHYSAL ROCK MASS MECHANICAL PROPERTIES OF THE REPOSITORY HOST HORIZON  
860-K0C-SSD0-00100-000-00B SHAFT LINER DESIGN  
ANL-EBS-GS-000002 Rev. 01 GEOCHEMISTRY MODEL VALIDATION REPORT: EXTERNAL ACCUMULATION MODEL  
ANL-EBS-MD-000033 Rev. 06 ENGINEERED BARRIER SYSTEM: PHYSICAL AND CHEMICAL ENVIRONMENT  
ANL-EBS-MD-000038 Rev. 01 EVALUATION OF POTENTIAL IMPACTS OF MICROBIAL ACTIVITY ON DRIFT CHEMISTRY  
ANL-MGR-GS-000004 Rev. 00, ICN 00 PEAK GROUND VELOCITIES OF SEISMIC EVENTS AT YUCCA MOUNTAIN, NEVADA  
ANL-MGR-GS-000005 Rev. 00 MAGMA DYNAMICS AT YUCCA MOUNTAIN, NEVADA  
ANL-NBS-HS-000005 Rev. 03 IN SITU FIELD TESTING OF PROCESSES  
ANL-NBS-HS-000055 Rev. 00 DATA ANALYSIS FOR INFILTRATION MODELING: DEVELOPMENT OF SOIL UNITS AND ASSOCIATED HYDRAULIC PARAMETER VALUES  
ANL-SSD-GE-000001 Rev. 00 SUBSURFACE GEOTECHNICAL PARAMETERS REPORT  
ANL-WIS-MD-000027 Rev. 00 FEATURES, EVENTS, AND PROCESSES FOR THE TOTAL SYSTEM PERFORMANCE ASSESSMENT: ANALYSES  
DIE-MGR-PA-000001 Rev. 00, ICN 01 DETERMINATION OF IMPORTANCE EVALUATION FOR COMMUNICATIONS TOWERS ON THE CREST OF YUCCA MOUNTAIN AND ON EXILE HILL  
MDL-MGR-GS-000003 Rev. 01 DEVELOPMENT OF EARTHQUAKE GROUND MOTION INPUT FOR PRECLOSURE SEISMIC DESIGN AND POSTCLOSURE PERFORMANCE ASSESSMENT OF A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NV  
MDL-MGR-GS-000005 Rev. 02 DIKE/DRIFT INTERACTIONS  
MDL-MGR-GS-000007 Rev. 000 SUPPLEMENTAL EARTHQUAKE GROUND MOTION INPUT FOR A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NV  
MDL-MGR-MD-000001 Rev. 02 BIOSPHERE MODEL REPORT  
MDL-NBS-GS-000002 Rev. 02 GEOLOGIC FRAMEWORK MODEL (GFM2000)  
MDL-NBS-HS-000006 Rev. 03 UZ FLOW MODELS AND SUBMODELS  
MDL-NBS-HS-000008 Rev. 02 RADIONUCLIDE TRANSPORT MODELS UNDER AMBIENT CONDITIONS  
MDL-NBS-HS-000011 Rev. 03 SATURATED ZONE SITE-SCALE FLOW MODEL  
MDL-NBS-HS-000019 Rev. 01 ABSTRACTION OF DRIFT SEEPAGE  
MDL-NBS-HS-000020 Rev. 02, Addendum 01 PARTICLE TRACKING MODEL AND ABSTRACTION OF TRANSPORT PROCESSES

MDL-WIS-PA-000005 Rev. 00, MiscId 01 TOTAL SYSTEM PERFORMANCE ASSESSMENT MODEL/ANALYSIS FOR THE LICENSE APPLICATION - Volume I

MDL-WIS-PA-000005 Rev. 00, MiscId 02 TOTAL SYSTEM PERFORMANCE ASSESSMENT MODEL/ANALYSIS FOR THE LICENSE APPLICATION - Volume II

MDL-WIS-PA-000005 Rev. 00, MiscId 03 TOTAL SYSTEM PERFORMANCE ASSESSMENT MODEL/ANALYSIS FOR THE LICENSE APPLICATION - Volume III

TDR-MGR-MD-000056 Rev. 00 PERFORMANCE CONFIRMATION ANNUAL REPORT FISCAL YEAR 2007

TDR-MGR-MM-000002 Rev. 000 LOCAL METEOROLOGY OF YUCCA MOUNTAIN, NEVADA: 1994-2006

TDR-PCS-SE-000001 Rev. 05, ACN 01, Addendum 01 PERFORMANCE CONFIRMATION PLAN

TDR-PCS-SE-000001 Rev. 05 PERFORMANCE CONFIRMATION PLAN

TDR-WIS-PA-000014 Rev. 00 TSPA INFORMATION PACKAGE FOR THE DRAFT SEIS

LAGI-1 LA GENERAL INFORMATION SECTION 1

LAGI-5 LA GENERAL INFORMATION SECTION 5

LASAR-1.01 LA SAFETY ANALYSIS REPORT SECTION 1.1

LASAR-2.02 LA SAFETY ANALYSIS REPORT SECTION 2.2

LASAR-2.03.01 LA SAFETY ANALYSIS REPORT SECTION 2.3.1

LASAR-2.03.02 LA SAFETY ANALYSIS REPORT SECTION 2.3.2

LASAR-2.03.03 LA SAFETY ANALYSIS REPORT SECTION 2.3.3

LASAR-2.03.04 LA SAFETY ANALYSIS REPORT SECTION 2.3.4

LASAR-2.03.08 LA SAFETY ANALYSIS REPORT SECTION 2.3.8

LASAR-2.03.10 LA SAFETY ANALYSIS REPORT SECTION 2.3.10

LASAR-4 LA SAFETY ANALYSIS REPORT CHAPTER 4

LASAR-5.08 LA SAFETY ANALYSIS REPORT CHAPTER 5.8

**Under Development:**

DOE/EIS-0250F-S1 MiscId 02 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A GEOLOGIC REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA - CHAPTER 3

DOE/EIS-0250F-S1 MiscId 03 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A GEOLOGIC REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA - CHAPTER 4

DOE/EIS-0250F-S1 MiscId 04 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A GEOLOGIC REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA - CHAPTER 5

DOE/EIS-0250F-S1 MiscId 18 FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A GEOLOGIC REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA - APPENDIX F

DOE/EIS-0369 ENVIRONMENTAL IMPACT STATEMENT FOR THE ALIGNMENT, CONSTRUCTION, AND OPERATION OF A RAIL LINE TO A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA

DOE/EIS-0369D DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE ALIGNMENT, CONSTRUCTION, AND OPERATION OF A RAIL LINE TO A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA

**IV Analysis Results and Conclusions**

The remainder of this ERD consists of a revised figure and table, which address various comments from CRs 12203 and 12204. The descriptions of the changes relative to the original

figures and tables are provided in Section I. None of these changes result in impacts to the analyses or conclusions in TDR-CRW-GS-000001 REV 02 ICN 01 or to any downstream technical products. An updated DIRS report for the Yucca Mountain Site Description Section 4 is included with this ERD because of the addition of a new reference to Figure 4-23.

Anderson, R.E. 1999. "Quaternary Fault and Fold Database of the United States." Washington, DC: U.S. Geological Survey. Accessed June 26, 2008. URL: <a href="http://earthquakes.usgs.gov/regional/qfaults">http://earthquakes.usgs.gov/regional/qfaults</a> 185574	Entire	Figure 4-23	Quaternary fault names	Indirect Input	N/A	N/A	N/A
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**V References:**

[DIRS 185574] Anderson, R. Ernest, compiler 1999. "Quaternary fault and fold database of the United States." Washington, DC: U.S. Geological Survey. Accessed June 26, 2008. URL: <http://earthquakes.usgs.gov/regional/qfaults>

[DIRS 168030] BSC 2004. *Characterize Framework for Seismicity and Structural Deformation at Yucca Mountain, Nevada*. ANL-CRW-GS-000003 REV 00 [Errata 001]. Las Vegas, Nevada: Bechtel SAIC Company. ACC: MOL.20000510.0175; DOC.20040223.0007.

[DIRS 151968] CRWMS M&O 2000. *Disruptive Events Process Model Report*. TDR-NBS-MD-000002 REV 00 ICN 02. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20001220.0047.

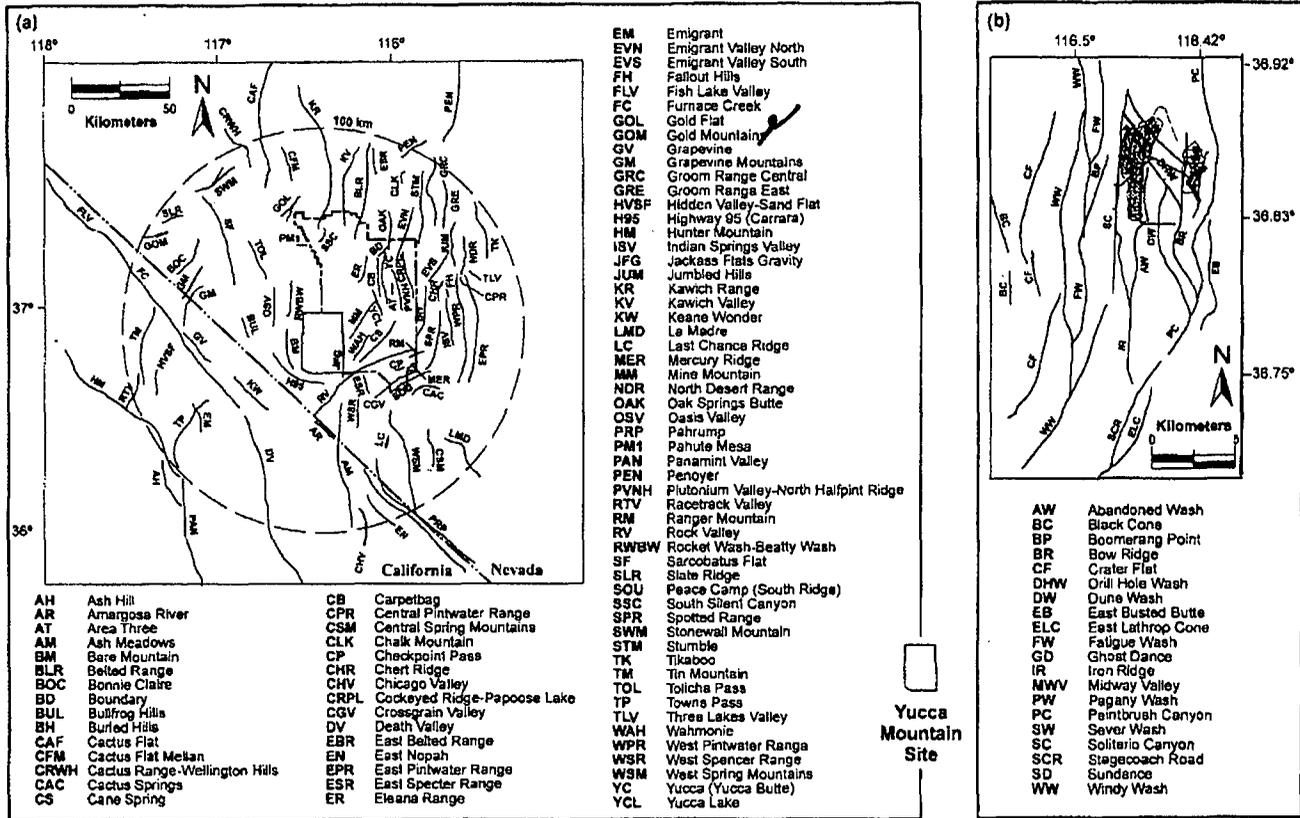
[DIRS 106540] Piety, L.A. 1996. *Compilation of Known or Suspected Quaternary Faults Within 100 km of Yucca Mountain, Nevada and California*. Open-File Report 94-112. Denver, Colorado: U.S. Geological Survey. ACC: MOL.19971009.0003.

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**CHANGES TO THE DOCUMENT SHOWN ON IMAGES OF THE ORIGINAL DOCUMENT**

Copies of the pages showing the corrections are included with this ERD.  
*(see attached)*

1. Figure 4-23[a] from TDR-CRW-GS-000001 ERD 01 (all other corrections in ERD 01 are valid except for "s" removed from "Gold Mountains" and addition of reference.)
2. Table 4-8 from TDR-CRW-GS-000001 REV02 ICN01 (corrected in the text of ERD01 but not transparent to license application)
3. Page 3-106 from TDR-CRW-GS-000001 REV02 ICN01 (corrected in the text of ERD01 but not transparent to license application)



Source: Faults included in the probabilistic seismic hazard analyses (CRWMS M&O 1998 [DIRS 103731]) and/or considered relevant by Pezzopane (1996 [DIRS 106524], Table 11-1); **Anderson, 1999 [DIRS 185574]**

Figure 4-23(a). Known or Suspected Quaternary Faults and Other Notable Local Faults within 100 km of Yucca Mountain (Addresses CR 2656, comments 8, 9, 10, 11, 12)

Table 4-8. Significant Earthquakes ( $M_w > 5.0$ ) within 300 Kilometers of Yucca Mountain

Date	Origin Time (GMT) (hr:min:sec)	Latitude (degrees)	Longitude (degrees)	Depth (km)	Magnitude ( $M_w$ )	Location
March 26, 1872	10:30:00	36.70	-118.10	-	7 3/4	Owens Valley, CA
November 17, 1902	19:50:00	37.39	-113.52	-	6	Pine Valley, NV
November 10, 1916	09:11:00	36.20	-116.90	-	6.1	Death Valley, CA
December 21, 1932	06:10:04	38.80	-117.98	-	6.8	Cedar Mountain, NV
January 30, 1934	20:16:35	38.28	-118.37	-	6.1	Excelsior Mountain, NV
April 10, 1947	15:58:06	34.98	-116.55	-	6.5	Manix, CA
December 16, 1954	11:07:11	39.28	-118.12	15	7.1	Fairview Peak, CA NV
December 16, 1954	11:11:00	39.67	-117.90	12	6.8	Dixie Valley, NV
September 22, 1966	18:57:34	37.37	-114.18	7	5.7	Clover Mountain, NV
June 1, 1975	01:38:49	34.52	-116.50	4.5	5.2	Galway Lake, CA
March 15, 1979	21:07:17	34.33	-116.44	2.5	5.5	Homestead Valley, CA
May 25, 1980	16:33:44	37.59	-118.85	10.2	6.2	Mammoth Lakes, CA
May 25, 1980	16:49:27	37.67	-118.92	8.9	5.9	Mammoth Lakes, CA
May 25, 1980	20:35:48	37.63	-118.84	8.2	5.6	Mammoth Lakes, CA
May 27, 1980	14:50:57	37.49	-118.81	16.1	5.9	Mammoth Lakes, CA
September 30, 1981	11:53:26	37.59	-118.87	5.7	5.6	Mammoth Lakes, CA
November 23, 1984	18:08:25	37.46	-118.61	11.5	5.8	Round Valley, CA
July 20, 1986	14:29:45	37.57	-118.44	6.7	5.8	Chalfant Valley, CA
July 21, 1986	14:42:26	37.54	-118.44	10.5	6.3	Chalfant Valley, CA
July 21, 1986	14:51:09	37.49	-118.43	11.8	5.5	Chalfant Valley, CA
July 31, 1986	07:22:40	37.47	-118.37	8.1	5.5	Chalfant Valley, CA
June 28, 1992	11:57:34	34.20	-116.44	1.0	7.3	Landers, CA
June 29, 1992	10:14:20	36.72	-116.29	11.8	5.6	Little Skull Mountain, NV
September 2, 1992	10:26:19	37.17	-113.33	9.6	5.9	St. George, UT
May 17, 1993	23:20:50	37.18	-117.83	9.1	6.1	Eureka Valley, CA
August 17, 1995	22:39:58	35.77	-117.65	10.5	5.2	Ridgecrest, CA
September 20, 1995	23:27:36	35.75	-117.64	8.3	5.3	Ridgecrest, CA
August 1, 1999	16:06:22	37.39	-117.08	7.6	5.7	Scotty's Junction, NV
October 16, 1999	09:46:44	34.59	-116.27	5.0	7.1	Hector Mine, CA

DTNs: MO9906COV99279.000 [DIRS 166582]; MO0006COV00226.000 [DIRS 166581]

Sources: CRWMS M&O 2000 [DIRS 150640]; Hector Mine Earthquake Geologic Working Group 2000 [DIRS 156296], p. 11

NOTES: GMT = Greenwich Mean Time;  $M_w$  = moment magnitude. To convert km to mi, multiply by 0.621.

A series of five hydraulic-fracturing tests were conducted in the DST block, but only one test yielded what were considered reliable results. Based on this test result, the principal horizontal stresses around this borehole were estimated to be (SNL 1997 [DIRS 106854]):  $\sigma_h$  (least-horizontal principal stress) = 1.7 ( $\pm$  0.1) MPa acting in the N75°W ( $\pm$  14°) direction and  $\sigma_H$  (greatest-horizontal principal stress) = 2.9 ( $\pm$  0.4) MPa acting in the N15°E ( $\pm$  14°) direction.

Because vertical stress was not measured, it was approximated as the weight of the overburden at the depth of the tests as follows (SNL 1997 [DIRS 106854]):  $\sigma_v$  (vertical stress) = 34.7 MPa. Although the measured horizontal stresses differ, both are smaller than the vertical stress. This measured-stress regime, one of low horizontal magnitudes, is in accord with the predominant local normal faults. The north-northeastern, maximum-horizontal, stress direction is subparallel to the average strike of these faults and is supported by previous measurements in the Yucca Mountain area (Zoback and Healy 1984 [DIRS 108657]). Additional information is presented in SNL (1997 [DIRS 106854]) and CRWMS M&O (1997 [DIRS 101539]).

### **3.7.6 Excavation Characteristics of the Rock Mass**

Geotechnical monitoring data were developed during excavation of the north ramp starter tunnel and upper Tiva Canyon Alcove to provide the basis for design verification. The north ramp starter tunnel was constructed to prepare for the construction of the ESF north ramp, main drift, and south ramp. The upper Tiva Canyon Alcove was excavated off the north ramp starter tunnel to provide access for site characterization testing. Design-verification studies are being performed to monitor and observe the long-term behavior of openings in the range of rock conditions to be encountered in the repository host rock, to observe and evaluate the construction of the ESF (with respect to implications for repository construction and performance), and to collect information for design of the ventilation systems in the repository (DOE 1988 [DIRS 100282]).

#### **3.7.6.1 Excavation Methods Used at Yucca Mountain**

Both SNL (1995 [DIRS 106851]) and CRWMS M&O (1997 [DIRS 101537]) addressed evaluations of mining methods and monitoring of ground-support systems and drift stability. Rock-mass-quality evaluations, an evaluation of as-built mapping data, and blast-vibration monitoring were performed as part of the mining-methods evaluation. An evaluation of rock-structure data from surface and underground mapping is presented in Section 3.7.2; an evaluation of Q data is presented in Section 3.7.4, and blast monitoring is discussed in this section and in CRWMS M&O (1997 [DIRS 103564]).

The north ramp starter tunnel was constructed to launch the 7.6 m (24.9 ft) diameter tunnel-boring machine to construct the ESF north ramp, main drift, and south ramp. The north ramp starter tunnel, upper Tiva Canyon Alcove, Alcove 2, and sections of the Alcove 5 thermal testing facility were excavated by drilling and blasting. In addition, the ECRB Cross-Drift was excavated by a tunnel-boring machine, with a starter tunnel excavated by drill and blast methods.