NOTE TO: FILE

FROM: PAULINE BROOKS

DATE: JUNE 9, 1994

SUBJECT: STRATIGRAPHIC SECTIONS OF ESF NORTH RAMP

Attached are color diagrams of stratigraphic sections of the ESF North Ramp for three different cross-sections, a summary of the major stratigraphic units of the SWNVF, a 1988 diagram of a generalized regional stratigraphic column and a 1993 stratigraphic column of UE-25 UZ16 (VSP 2) in color.

NH03 1/1
102.8
WM-11

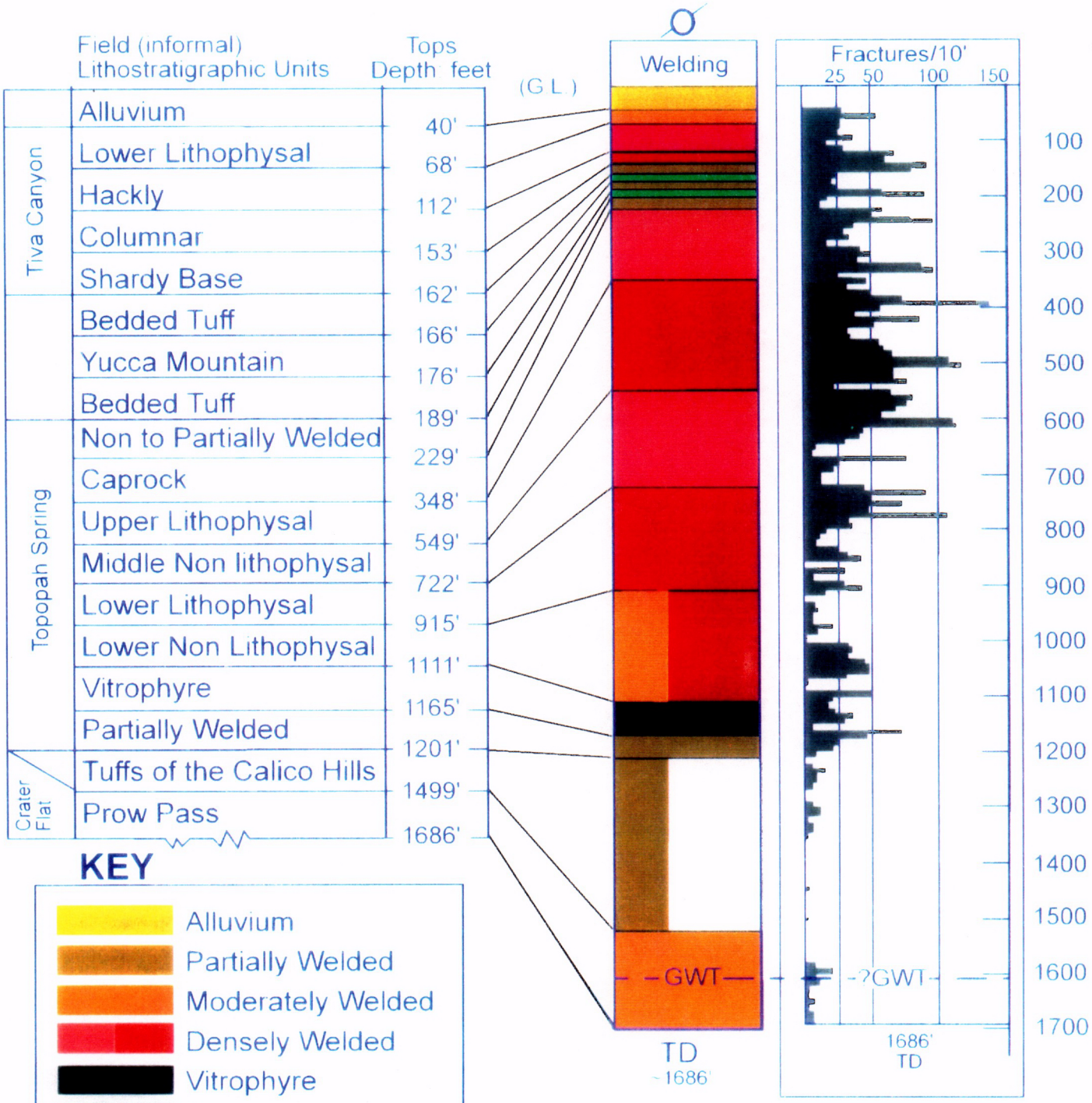
9406100328 940604
PDR WASTE
WM-11 PDR

UE-25 UZ16 (VSP 2)

GL = 4000'

TD ≅ 1686'

spud dt 5/27/92
T.D. dt 3/11/93



KEY

- Alluvium
- Partially Welded
- Moderately Welded
- Densely Welded
- Vitrophyre
- Bedded Tuff
- Nonwelded
- GWT Groundwater Table

(For Information Purposes Only)

Status 4/16/93

UE25MTYN DOE CDR/4 21 93

C-01

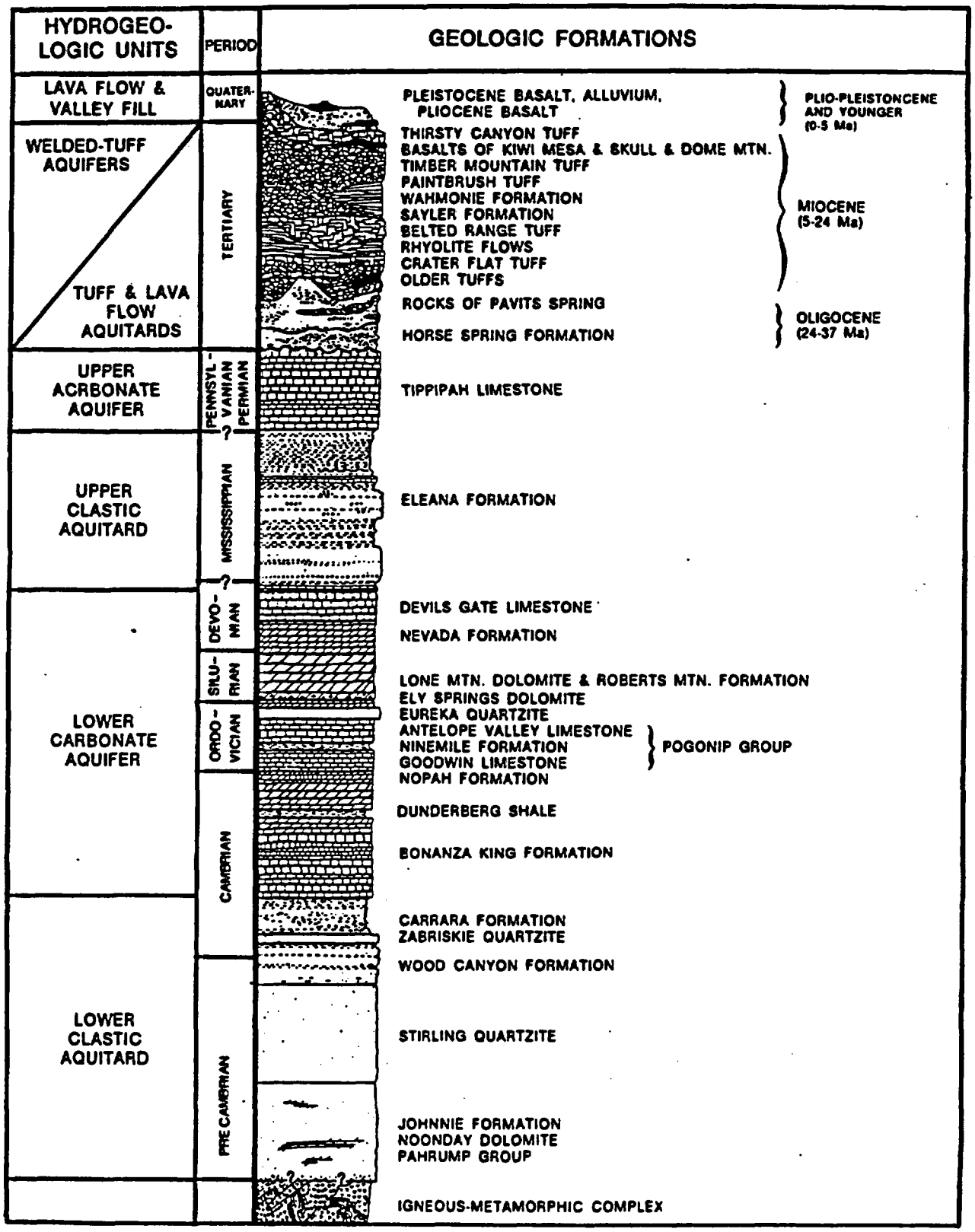
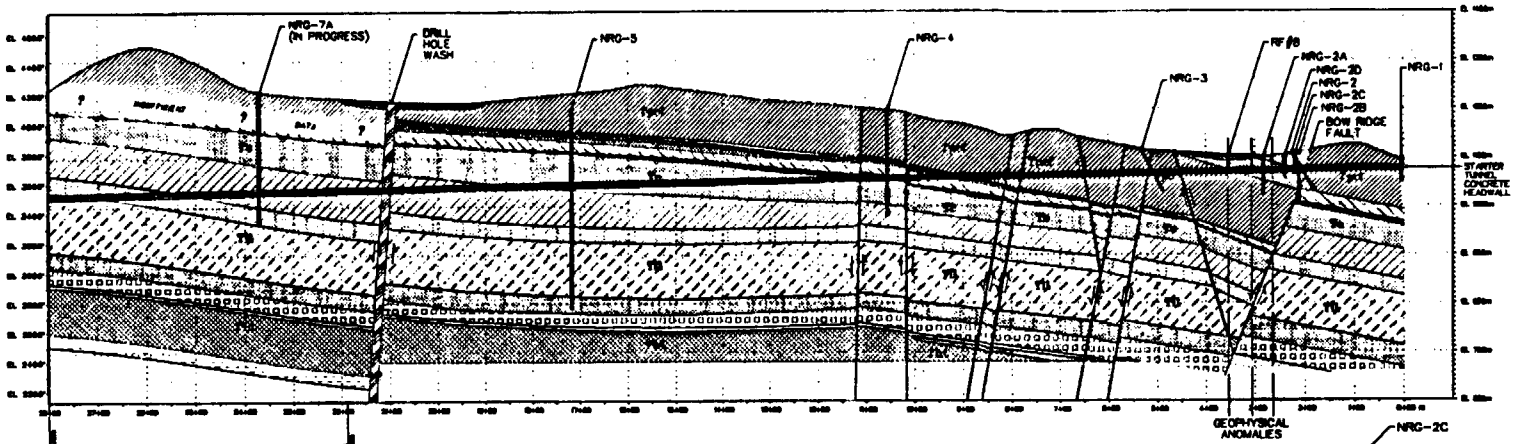


Figure 1-10. Generalized regional stratigraphic column showing geologic formations and hydrogeologic units in the Nevada Test Site area. Modified from Sinnock (1982) and Carr et al. (1986).

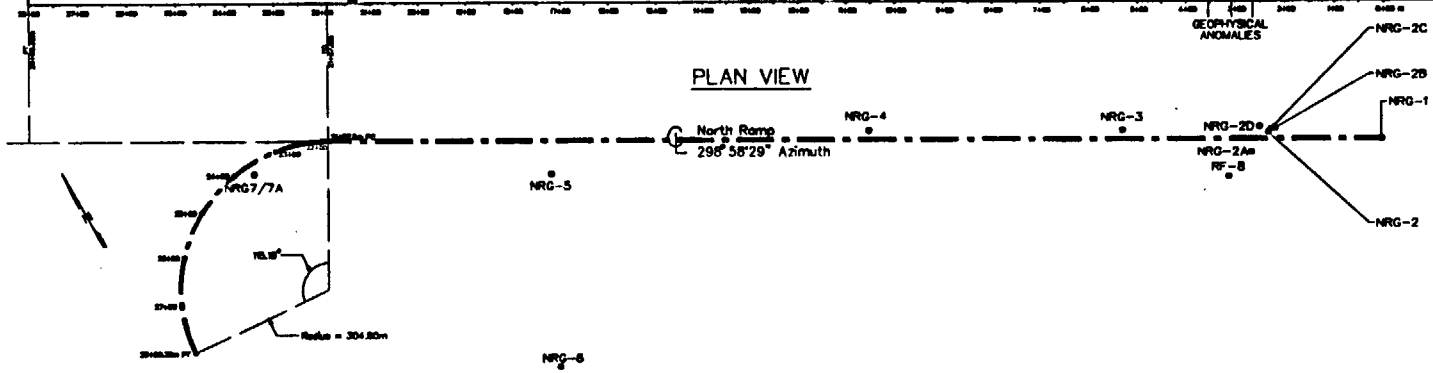
[TABLE 1: SUMM[illegible]Y OF MAJOR STRATIGRAPHIC UNITS OF THE SWNVF
[* Indicates newly defined with forma[illegible]tigraphic name. No entry in Old column indica[illegible]at current usage is unchanged]

ssemblage Symbol	Current Name and Age		Estimated EruptedMagma Volumes (km^3)	Old (previous usage)	Volcanic center
Ts	Stonewall Flat Tuff		125		STONEWALL MOUNTAIN VOLCANIC CENTER
	Civet Cat Canyon Member		40		
	Spearhead Member		80		
Tt	Thirsty Canyon Group		300	Thirsty Canyon Tuff	Black Mountain caldera
	Gold Flat Tuff		20	Gold Flat Member	
	Trail Ridge Tuff		50	Trail Ridge Member	
	Pahute Mesa Tuff		100	Pahute Mesa Member	
	Rocket Wash Tuff	9.4 Ma	100	Rocket Wash Member	
Tf	Fortymile Canyon assemblage		140		Diverse vent areas
	Beatty Wash Formation*		110	rhyolite of Beatty Wash	
Tm	Timber Mountain Group		2275	Timber Mountain Tuff	TIMBER MOUNTAIN CALDERA COMPLEX
	Ammonia Tanks Tuff	11.45 Ma	900	Ammonia Tanks member	Ammonia Tanks caldera
	Rainier Mesa Tuff	11.6 Ma	1200	Rainier Mesa Member	Rainier Mesa caldera
Tp	rhyolite of the Loop	12.5 Ma	40		
	Paintbrush Group		2270	Paintbrush Tuff	
	Tiva Canyon Tuff	12.7 Ma	1000	Tiva Canyon Member	Claim Canyon caldera
	Yucca Mountain Tuff		25	Yucca Mountain Member	Claim Canyon caldera?
	Pah Canyon Tuff		35	Pah Canyon Member	Uncertain
	Topopah Spring Tuff	12.8 Ma	1200	Topopah Spring Member	Uncertain
Ta	Calico Hills Formation*	12.9 Ma	160	tuffs and lavas of Calico Hills, Area 20	
Tw	Wahmonie Formation	13.0 Ma	90		Wahmonie volcano
Tc	Crater Flat Group		880	Crater Flat Tuff	SILENT CANYON CALDERA COMPLEX
	Prow Pass Tuff		45	Prow Pass Member	
	Bulfrog Tuff	13.25 Ma	650	Bullfrog Member (and Stockade Wash Tuff)	Uncertain Area 20 Caldera
	Tram Tuff		170	Tram Member	Prospector Pass caldera complex?
Tb	Belted Range Group		350	Belted Range Tuff	
	Dead Horse Flat Fm.*	13.5 Ma	120	tuff and lava of Dead Horse Flat/volcanics of Saucer Mesa	
	Grouse Canyon Tuff bedded member	13.7 Ma	210	Grouse Canyon Member tunnel bed 5	Grouse Canyon caldera
	comendite of Split Ridge	13.85 Ma	20	rhyolite of Split Ridge	
Tr	Lithic Ridge Tuff	14.0 Ma	250		Uncertain
	lava of Tram Ridge	14.0 Ma	60	quartz latite lava and unit C tuff	
Tn	Tunnel Formation*		50	tunnel beds 3 and 4	
Tu	Tub Spring Tuff	14.9 Ma	130	Tub Spring Member	Uncertain
To	tuff of Yucca Flat	15.1 Ma	50		Uncertain
	Redrock Valley Tuff	15.25 Ma	360		Uncertain

SECTION VIEW



PLAN VIEW



STATE PLANE COORDINATES ALONG RAMP ALIGNMENT (m)

0 100 200m
SCALE

LEGEND

FORMATION	MEMBER	MAJOR ZONE	TYPICAL MECHANICAL UNITS
QUATERNARY		Qac : Alluvium	
TIMBER MOUNTAIN TUFF	RAINIER MESA	Tmrf and Tmrt: Rainier Mesa Tuff and Pre-Rainier Bedded Tuff	UD
	?	Tx and Txt: Tuff "X" Ash Flow and Bedded Tuff	
	TIVA CANYON	Tpcf : Tiva Canyon Ash Flow Tuff	
		Tpct: Tiva Canyon Bedded Tuff	
	YUCCA MTN.	Tpyf : Yucca Mountain Ash Flow Tuff	
		Tpyt : Yucca Mountain Bedded Tuff	PTn
	PAH CANYON	Tpaf : Pah Canyon Ash Flow Tuff	
PAINTBRUSH TUFF		Tpat : Pah Canyon Bedded Tuff	
	TOPOPAH SPRING	Tc : Cecroek	TSw1
		Tul : Upper Lithophysal	
		Tmn : Middle Nonlithophysal	
		Tll : Lower Lithophysal	TSn2
		Tln : Lower Nonlithophysal	
		Tv : Vitrophyre	TSw3
		Tptt : Topopah Spring Bedded Tuff	
	CALICO HILLS	Thf : Calico Hills Lava Flow	CHn1
		Tht : Calico Hills Bedded Tuff	CHn2
CRATER FLAT TUFF	PROW PASS	Tcpf : Prow Pass Ash Flow Tuff	CHn3 PPu

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

FAULT ZONE, ? ATTITUDE UNCERTAIN

FAULT, ?-ATTITUDE UNCERTAIN

PROPOSED NORTH RAMP ALIGNMENT

APPROXIMATE

PRELIMINARY RAMP DATA
QA:NO

Station (m)	Grade	State Plane Coord. (m) Northing	State Plane Coord. (m) Easting	Elevation (m)
0+00 (Portal)		[illegible]	[illegible]	[illegible]
0+07.3 (PT)		[illegible]	[illegible]	[illegible]
2+00		[illegible]	[illegible]	[illegible]
3+00		[illegible]	[illegible]	[illegible]
4+00	-2.000°	[illegible]	[illegible]	[illegible]
5+00		[illegible]	[illegible]	[illegible]
6+00		[illegible]	[illegible]	[illegible]
7+00		[illegible]	[illegible]	[illegible]
8+00.38 (PT)		[illegible]	[illegible]	[illegible]

* Reference Dwg. 93-0-DR005.DGN and verbal communication from U-2, December, 1993.

BOREHOLE PROJECTIONS
QA:NO

Borehole	Projected to Section along Azimuth	Ground Elevation (m)	Distance and Elevation to Section (m)
NRG-1	0°	[illegible]	[illegible]
NRG-2	0°	[illegible]	[illegible]
NRG-2A	0°	[illegible]	[illegible]
NRG-2B	0°	[illegible]	[illegible]
NRG-2C	0°	[illegible]	[illegible]
NRG-2D	0°	[illegible]	[illegible]
NRG-3	0°	[illegible]	[illegible]
NRG-4	0°	[illegible]	[illegible]
NRG-5	0°	[illegible]	[illegible]
NRG-6	0°	[illegible]	[illegible]
NRG-7A	3.4°	[illegible]	[illegible]
RF/8	0°	[illegible]	[illegible]

Note: Elevations projected into cross section along strike of room walls

REV. NO.	DATE	BY	VERSION	SUPERSEDES
4	3-29-1994	CEB	GA14	GA13
3	3-8-1994	CEB	GA13	GA12
2	2-1-1994	CEB	GA12	GA11
1	1-6-1994	CEB	GA11	GA1

REVISIONS

PRELIMINARY

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION ALONG RAMP FROM
0+00 to 28+00.38m (PT)

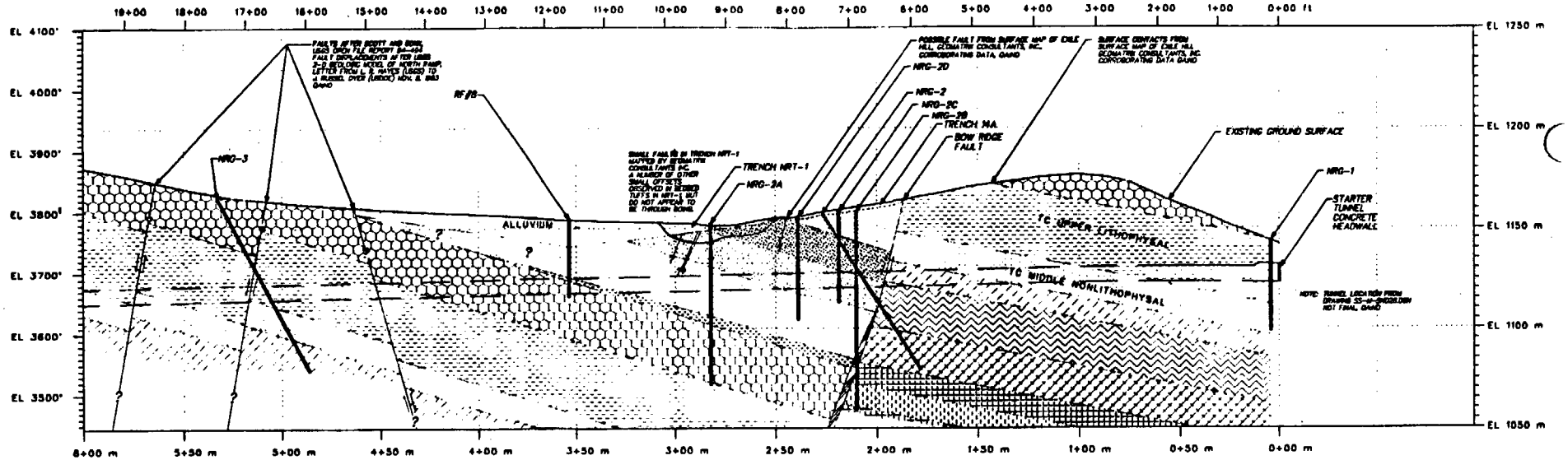
Sandia National Laboratories

DATE DRAWING ISSUED[1] 8-8-93
MODIFICATIONS CEB 1-3-94
CHECKED BY: MPN/ML
HOR. SCALE: AS SHOWN
VERT. SCALE: AS SHOWN

[1] 3-D MODEL OF NORTH RAMP, LETTER FROM R. HAYES (USGS) TO J. RUSSELL DYER (USGS), NOVEMBER 8, 1993 (GAMO)

J.R.S. MAPPING & MODEL INC.
SAN JOSE, CALIFORNIA, USA

DRAWING NO. 93-0-0-0
VERSION GA14
SHEET 1 OF 1



FORMATION	MEMBER	MAJOR ZONES	CORRELATIVE SUBZONES	FURTHER DESCRIPTION
TIMBER MOUNTAIN TUFF	RAINIER MESA			LITHIFIED, NONWELDED
				NONLITHIFIED, TUFF AND FALLOUT
	?	PRE-RAINIER MESA BEDDED TUFF		NONLITHIFIED, TUFF AND FALLOUT
		TUFF UNIT "X"		PYROCLASTIC FLOW AND FALLOUT
		PRE-TUFF UNIT "X"		REWORKED PYROCLASTIC FLOW AND FALLOUT
PAINTBRUSH TUFF	TIVA CANYON	UPPER NONLITHOPHYSAL	CAPROCK, UPPER CLIFF	NONWELDED TO DENSELY WELDED
		UPPER LITHOPHYSAL		DENSELY WELDED
		MIDDLE NONLITHOPHYSAL		DENSELY WELDED
		LOWER LITHOPHYSAL		DENSELY WELDED
		HACKLY		DENSELY WELDED
		COLUMNAR		DENSELY WELDED
	PAH CANYON	BEDDED TUFF		NONWELDED
				NONWELDED
		BEDDED TUFF		NONWELDED

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

LEGEND

- LITHOLOGIC CONTACT, SOLID LINE WHERE APPROPRIATE, DASHED LINE WHERE INFERRED
- FAULT ZONE
- FAULT, P-ATTITUDE UNCERTAIN
- PROPOSED TUNNEL OUTLINE

Borehole	Projected to Section along Azimuth	Ground Elevation (m)	Distance to Section (m)
NRG-1	2°	1144	0.0
NRG-2	2°	1137	15.2 SW
NRG-2A	2°	1152	30.85 NE
NRG-2B	2°	1138	24.05 SW
NRG-2C	2°	1138	22.34 SW
NRG-2D	2°	1138	28.88 SW
NRG-3	31°	1183	20.2 SW
RF/8	2°	1134	86.45 NE

Note: Boreholes projected into cross section along strike of rock units

CROSS SECTION CONSTRUCTED ALONG RAMP ALIGNMENT – AZIMUTH 299°

0 20 40 60 80 100m

1 : 2000

REV. NO.	DATE	BY	VERSION	SUPERSEDES
3				
2	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]

REVISIONS

PRELIMINARY

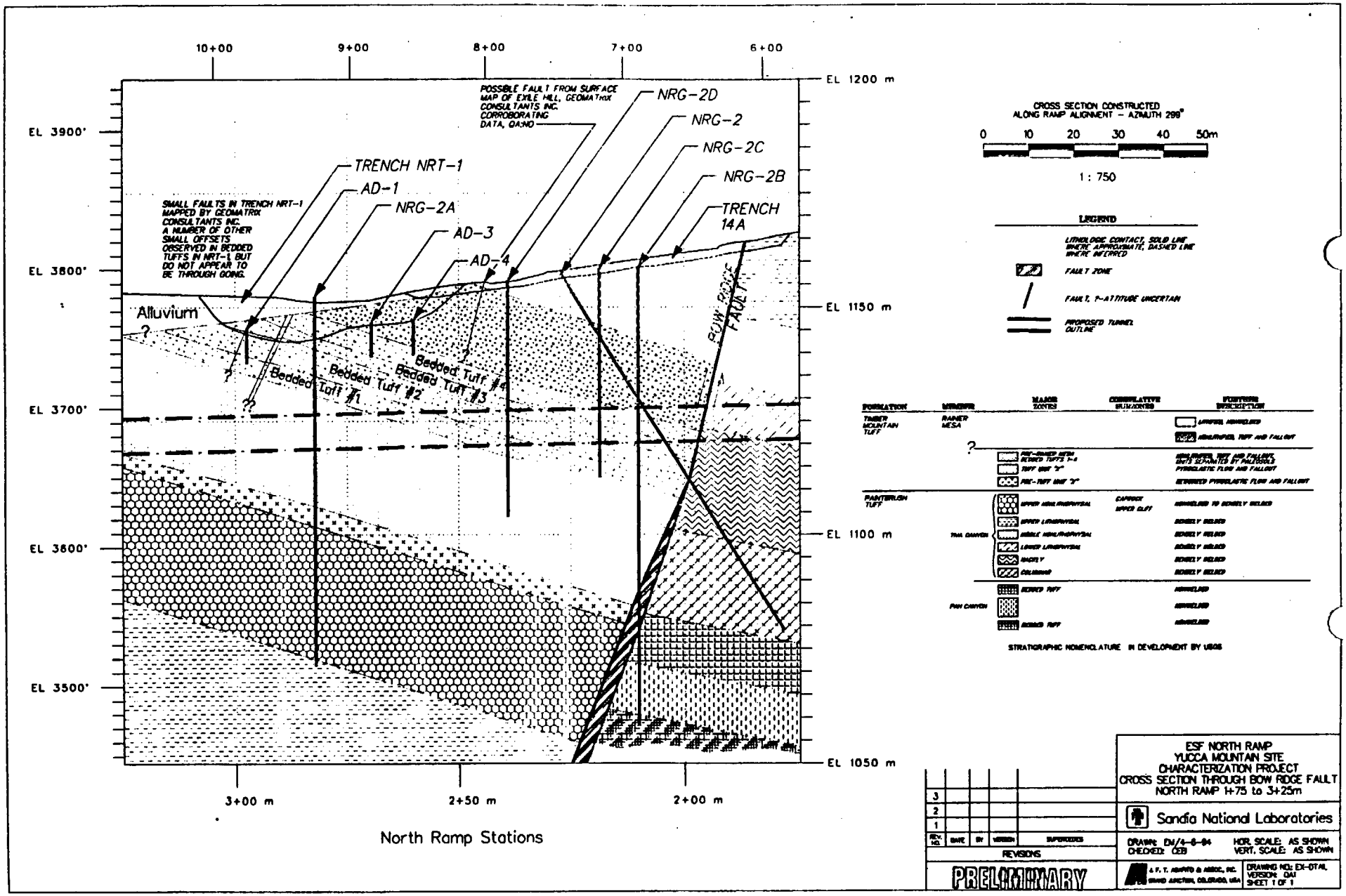
ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION THROUGH EXILE HILL
NORTH RAMP 0+00 to 6+00m

Sandia National Laboratories

DRAWN: RA/12-10-93 CHECKED: CEB
HOR. SCALE: AS SHOWN VERT. SCALE: AS SHOWN

A.F.T. MARTIN & ASSOC., INC. GRAND JUNCTION, COLORADO, USA

DRAWING NO: 88-40-08
VERSION: DAL2
SHEET 1 OF 1



REV. NO.	DATE	BY	VERSION	SUPERSEDES
3				
2				
1				

REVISIONS

PRELIMINARY

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION THROUGH BOW RIDGE FAULT
NORTH RAMP 1+75 to 3+25m

Sandia National Laboratories

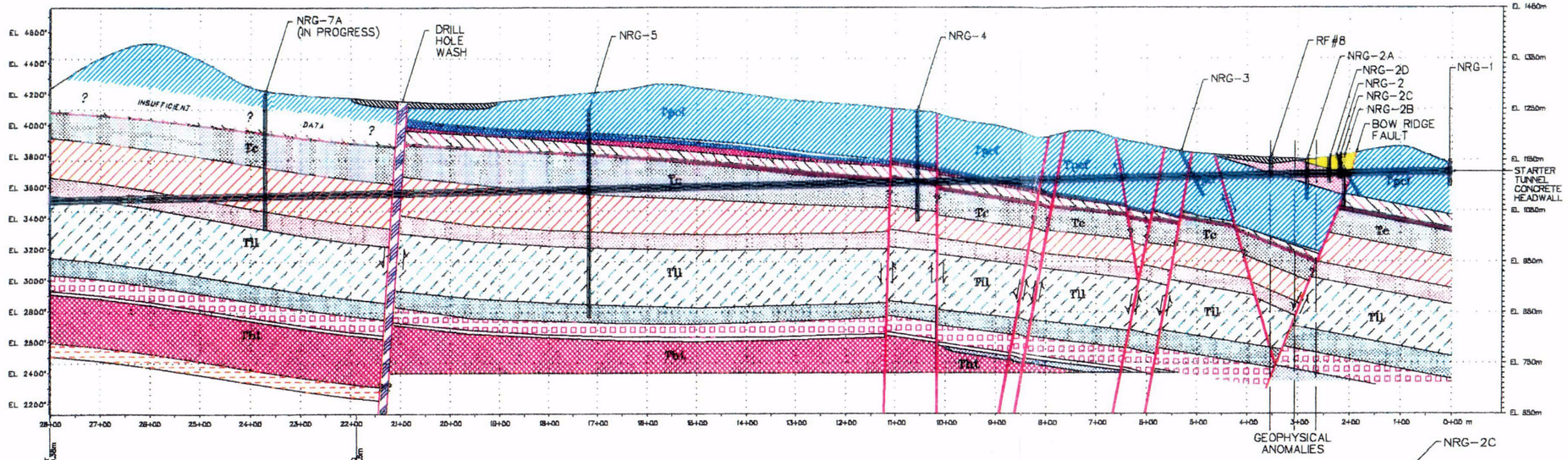
DRAWN: DM/4-8-94
CHECKED: CEB

HOR. SCALE: AS SHOWN
VERT. SCALE: AS SHOWN

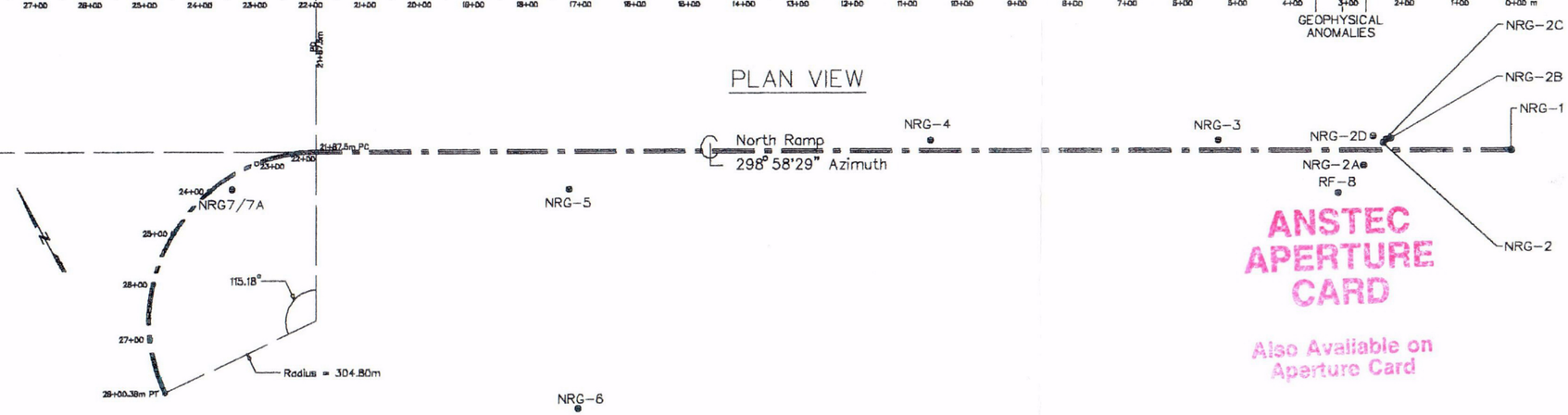
A. F. T. ASHFORD & ASSOC., INC.
GRAND JUNCTION, COLORADO, USA

DRAWING NO: EX-0TAL
VERSION: OA1
SHEET 1 OF 1

SECTION VIEW



PLAN VIEW



ANSTEC APERTURE CARD

Also Available on Aperture Card

0 100 200m
SCALE

LEGEND

FORMATION	MEMBER	MAJOR ZONES	THERMO-MECHANICAL UNITS
QUATERNARY		Qac : Alluvium	
TIMBER MOUNTAIN TUFF	RAINIER MESA	Tmrf and Tmrt: Rainier Mesa Tuff and Pre-Rainier Bedded Tuff	UO
	?	Tx and Txt: Tuff "X" Ash Flow and Bedded Tuff	
PAINTBRUSH TUFF	TIVA CANYON	Tpcf : Tiva Canyon Ash Flow Tuff	TCw
		Tpct: Tiva Canyon Bedded Tuff	
	YUCCA MTN.	Tpyf : Yucca Mountain Ash Flow Tuff	PTn
		Tpyt : Yucca Mountain Bedded Tuff	
	PAH CANYON	Tppf : Pah Canyon Ash Flow Tuff	
		Tppt : Pah Canyon Bedded Tuff	
		Tc : Caprock	TSw1
	TOPOPAH SPRING	Tul : Upper Lithophysal	
		Tmn : Middle Nonlithophysal	
		Tll : Lower Lithophysal	TSw2
		Tln : Lower Nonlithophysal	
		Tv : Vitrophyre	TSw3
		Tptt : Topopah Spring Bedded Tuff	
	CALICO HILLS	Thf : Calico Hills Lava Flow	Chn1
		Tht : Calico Hills Bedded Tuff	Chn2
CRATER FLAT TUFF	PROW PASS	Tcpf : Prow Pass Ash Flow Tuff	Chn3 PPw

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

- FAULT ZONE, ? ATTITUDE UNCERTAIN
- FAULT, ?-ATTITUDE UNCERTAIN
- PROPOSED NORTH RAMP ALIGNMENT
- APPROXIMATE

E:171299 | E:171604 | N:234394 | E:171909 | E:172214 | N:234089 | E:172519 | N:233784 | E:172823 | E:173128 | N:233479 | E:173433 | E:173738

STATE PLANE COORDINATES ALONG RAMP ALIGNMENT (m)

9406100328-01

PRELIMINARY RAMP DATA
QA:NO

Station (m)	Grade	State Plane Coord. (m) Northing	State Plane Coord. (m) Easting	Elevation (m)
0+00 (Portal)		233280.0	173879.8	1122.55
21+87.5 (PC)		234339.4	171766.8	1079.78
22+00		234343.2	171755.5	1078.53
23+00		234374.7	171660.5	1077.48
24+00	-2.05%[2]	234372.0	171561.0	1075.43
25+00		234337.3	171467.7	1073.38
26+00		234274.5	171390.5	1071.33
27+00		234190.2	171337.7	1069.28
28+00.38 (PT)		234082.9	171314.8	1067.22

[2] Reference Dwg. SS-N-SKD28.DGN and verbal communication from M-K; December, 1993.

BOREHOLE PROJECTIONS
QA:NO

Borehole	Projected to Section along Azimuth	Ground Elevation (m)	Distance and Direction to Section (m)
NRG-1	2°	1144.05	0.0
NRG-2	2°	1157.23	15.2 SW
NRG-2A	2°	1152.31	30.85 NE
NRG-2B	2°	1158.67	24.05 SW
NRG-2C	2°	1158.80	22.34 SW
NRG-2D	2°	1155.82	28.88 SW
NRG-3	31°	1165.35	20.2 SW
NRG-4	31°	1249.62	18.52 SW
NRG-5	31°	1251.71	68.44 NE
NRG-7A	340°	1282.29	22.44 NW
RF#8	2°	1154.55	88.03 NE

Note: Boreholes projected into cross section along strike of rock units

REV. NO.	DATE	BY	VERSION	SUPERCEDES
4	3-28-1994	CEB	QA1.4	QA1.3
3	2-9-1994	CEB	QA1.3	QA1.2
2	2-1-1994	CEB	QA1.2	QA1.1
1	1-19-1994	CEB	QA1.1	QA1

REVISIONS

PRELIMINARY QA:QA

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION ALONG RAMP FROM 0+00 to 28+00.38m (PT)

Sandia National Laboratories

BASE DRAWING: USGS[1] 11-8-93
MODIFICATIONS: CEB 1-3-94
CHECKED BY: MPH/ML

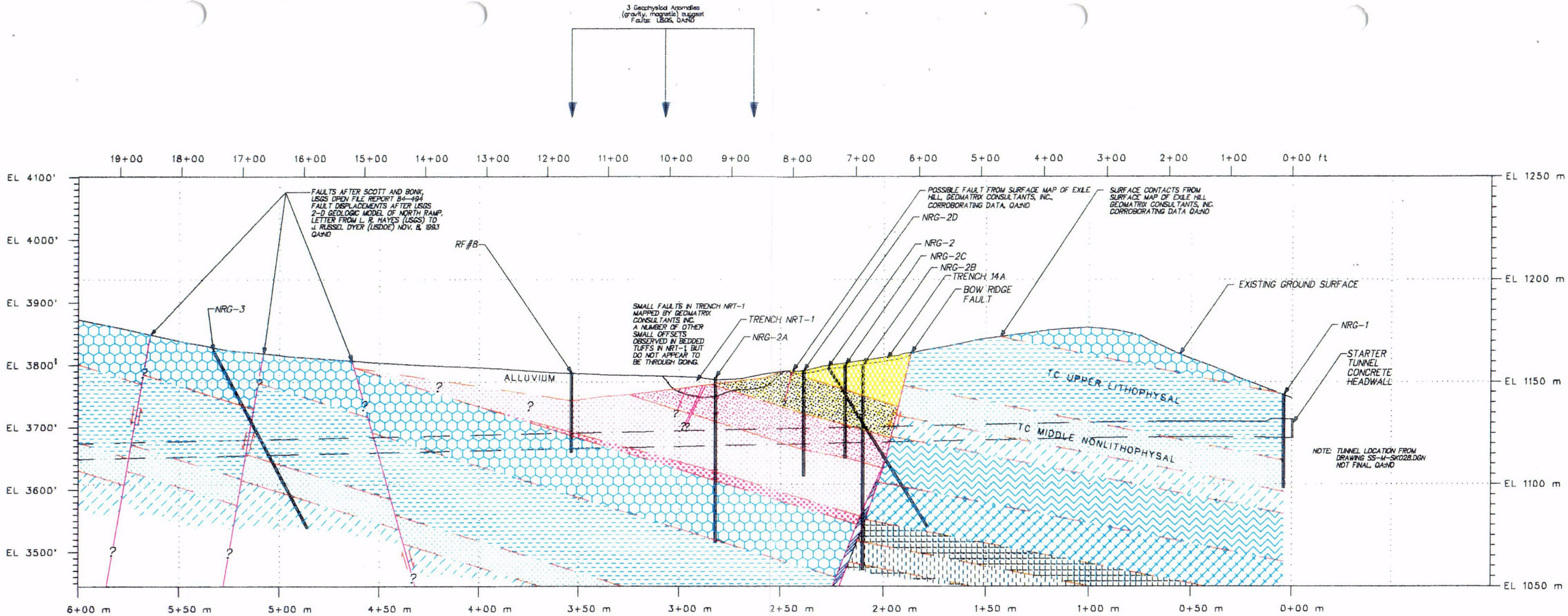
HOR. SCALE: AS SHOWN
VERT. SCALE: AS SHOWN

[1] 2-D MODEL OF NORTH RAMP, LETTER FROM R. HAYES (USGS) TO J. RUSSELL DYER (USDOE), NOVEMBER 8, 1993 [QA:NO]

J. F. T. AGAPITO & ASSOC., INC.
GRAND JUNCTION, COLORADO, USA

DRAWING NO.: SB-60-09
VERSION: QA1.4
SHEET 1 OF 1

C-02



FORMATION	MEMBER	MAJOR ZONES	CORRELATIVE SUBZONES	FURTHER DESCRIPTION
TIMBER MOUNTAIN TUFF	RAINIER MESA			LITHIFIED, NONWELDED
				NONLITHIFIED, TUFF AND FALLOUT
	?			
		PRE-RANIER MESA BEDDED TUFF		NONLITHIFIED, TUFF AND FALLOUT
		TUFF UNIT "X"		PYROCLASTIC FLOW AND FALLOUT
		PRE-TUFF UNIT "X"		REWORKED PYROCLASTIC FLOW AND FALLOUT
PAINTBRUSH TUFF	TIVA CANYON	UPPER NONLITHOPHYSAL	CAPROCK UPPER CLIFF	NONWELDED TO DENSELY WELDED
		UPPER LITHOPHYSAL		DENSELY WELDED
		MIDDLE NONLITHOPHYSAL		DENSELY WELDED
		LOWER LITHOPHYSAL		DENSELY WELDED
		HACKLY		DENSELY WELDED
		COLUMNAR		DENSELY WELDED
	PAH CANYON	BEDDED TUFF		NONWELDED
				NONWELDED
		BEDDED TUFF		NONWELDED

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

LEGEND

- LITHOLOGIC CONTACT, SOLID LINE WHERE APPROXIMATE, DASHED LINE WHERE INFERRED
- FAULT ZONE
- FAULT, ?-ATTITUDE UNCERTAIN
- PROPOSED TUNNEL OUTLINE

Borehole	Projected to Section along Azimuth	Ground Elevation (m)	Distance to Section (m)
NRG-1	2°	1144	0.0
NRG-2	2°	1157	15.2 SW
NRG-2A	2°	1152	30.85 NE
NRG-2B	2°	1158	24.05 SW
NRG-2C	2°	1159	22.34 SW
NRG-2D	2°	1156	28.86 SW
NRG-3	31°	1165	20.2 SW
RF#8	2°	1154	86.45 NE

Note: Boreholes projected into cross section along strike of rock units

ANSTEC APERTURE CARD
Also Available on Aperture Card
9406100328-02

CROSS SECTION CONSTRUCTED ALONG RAMP ALIGNMENT – AZIMUTH 299°

0 20 40 60 80 100m

1 : 2000

REV. NO.	DATE	BY	VERSION	SUPERCEDES
3				
2	4-6-1994	CEB	QA.L2	QA.L1
1	12-20-1994	CEB	QA.L1	QA1

REVISIONS

PRELIMINARY

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION THROUGH EXILE HILL
NORTH RAMP 0+00 to 6+00m

Sandia National Laboratories

DRAWN: RJL/12-10-93
CHECKED: CEB
HOR. SCALE: AS SHOWN
VERT. SCALE: AS SHOWN

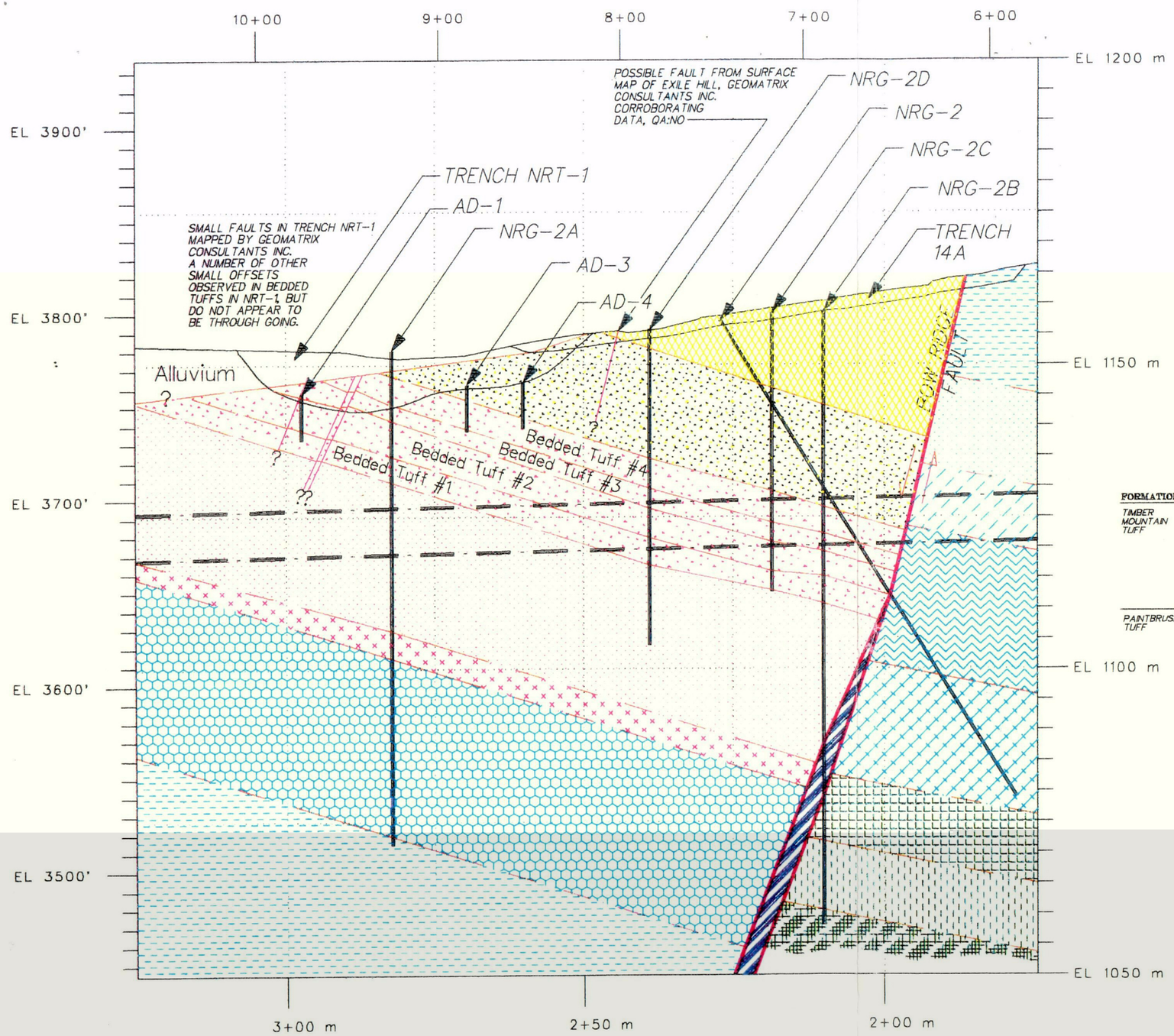
J. F. T. AGARITO & ASSOC., INC.
GRAND JUNCTION, COLORADO, USA

DRAWING NO: 88-60-08
VERSION: QA.L2
SHEET 1 OF 1

C-03

ANSTEC APERTURE CARD

Also Available on Aperture Card



CROSS SECTION CONSTRUCTED ALONG RAMP ALIGNMENT – AZIMUTH 299°

0 10 20 30 40 50m

1 : 750

LEGEND

- LITHOLOGIC CONTACT, SOLID LINE WHERE APPROXIMATE, DASHED LINE WHERE INFERRED
- FAULT ZONE
- FAULT, ?–ATTITUDE UNCERTAIN
- PROPOSED TUNNEL OUTLINE

FORMATION	MEMBER		MAJOR ZONES	CORRELATIVE SUBZONES	FURTHER DESCRIPTION
TIMBER MOUNTAIN TUFF	RAINIER MESA				LITHIFIED, NONWELDED
					NONLITHIFIED, TUFF AND FALLOUT
	?	PRE–RAINER MESA BEDDED TUFFS 1–4			NONLITHIFIED, TUFF AND FALLOUT, UNITS SEPARATED BY PALEOSOLS
		TUFF UNIT "X"			PYROCLASTIC FLOW AND FALLOUT
		PRE–TUFF UNIT "X"			REWORKED PYROCLASTIC FLOW AND FALLOUT
PAINTBRUSH TUFF	TIVA CANYON	UPPER NONLITHOPHYSAL	CAPROCK	UPPER CLIFF	NONWELDED TO DENSELY WELDED
		UPPER LITHOPHYSAL			DENSELY WELDED
		MIDDLE NONLITHOPHYSAL			DENSELY WELDED
		LOWER LITHOPHYSAL			DENSELY WELDED
		HACKLY			DENSELY WELDED
		COLUMNAR			DENSELY WELDED
	PAH CANYON	BEDDED TUFF			NONWELDED
					NONWELDED
		BEDDED TUFF			NONWELDED

STRATIGRAPHIC NOMENCLATURE IN DEVELOPMENT BY USGS

9406100328-03

REV. NO.	DATE	BY	VERSION	SUPERCEDES
3				
2				
1				

REVISIONS

PRELIMINARY

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION THROUGH BOW RIDGE FAULT
NORTH RAMP 1+75 to 3+25m

Sandia National Laboratories

DRAWN: EM/4–6–94
CHECKED: CEB

HOR. SCALE: AS SHOWN
VERT. SCALE: AS SHOWN

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GRAND JUNCTION, COLORADO, USA

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SHEET 1 OF 1

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