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Title: Geotechnical Report Mina Rail Corridor Volume 1

Supplier Document #: 21-1-20102-214

Supplier Rev.: 1

Supplier Date: 07/24/07

NVM Nevada Transportation Manager Bill Garfield
NE Nevada Engineering Kathy Mrotek

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Subcontractor:	Item Number/Title/Revision:	Submittal Date:	SRCT No.:
Shannon & Wilson, Inc.	Geotechnical Report, Volume 1 of 2 - Mina, Rev. 1 (Submittal No. 7.28)	24 Jul 2007	07-00025

Section I. Submittal Information (includes above information)

Submittal Description and Revision Summary for Entire Submittal:

This report documents information collected from a literature review and field reconnaissance performed for the purpose of describing geologic conditions and presenting preliminary geotechnical recommendations for the proposed Mina alignment of the Nevada Rail Line for the Yucca Mountain Project.

Revision Summary:
Rev 0, 24 Apr 07: Original submittal
Rev 1, 24 Jul 07: Revised Appendix F to address copyrighted material

Special Instructions:

Section II. Data File Information (Add lines below if needed for additional files. Indicate "Last item" or "End of list" after last line used.)

Filename	Rev.	File Size	Description (File description and revision summary for file)	Application and Version/ Add-in or Extension and Version
_Cover (Vol 1 of 2) 24 July 07.ppt	1	698 KB	Preliminary Geotechnical Report Front Cover, Vol. 1 of 2	MS Power Point 2003 SP2
SW-ColourMidWidth100.ctb	1	5 KB	Preliminary Geotechnical Report Cover, Vol. 1 of 2	AutoCAD 2007
_Spines 2007.dwg	1	300 KB	Preliminary Geotechnical Report Cover Spine, Vol. 1 of 2	AutoCAD 2007
Cover Background.jpg	1	2,653 KB	Preliminary Geotechnical Report Cover, Vol. 1 of 2	Corel PHOTO-PAINT 8.0 Image
Spine 1.5.jpg	1	417 KB	Preliminary Geotechnical Report Cover Spine, Vol. 1 of 2	Corel PHOTO-PAINT 8.0 Image
BSC Logo.jpg	1	22 KB	Preliminary Geotechnical Report Cover and CD Label Image	Corel PHOTO-PAINT 8.0 Image
Jacobs LOGO.jpg	1	29 KB	Preliminary Geotechnical Report Spine Image	Corel PHOTO-PAINT 8.0 Image
CD Background 2007.jpg	1	1,280 KB	Preliminary Geotechnical Report CD Label	Corel PHOTO-PAINT 8.0 Image
_CD Labels 2007.dwg	1	619 KB	Preliminary Geotechnical Report CD Label	AutoCAD 2007
21-1-20102-214-R1-Rev1-X.doc	1	283 KB	Preliminary Geotechnical Report Title Sheet	MS Word 2003 SP2
21-1-20102-214-Change-History-M-Geot.doc	1	34 KB	Geotechnical Report Change History Sheet	MS Word 2003 SP2
21-1-20102-214-Rev1.doc	1	363 KB	Preliminary Geotechnical Report Text	MS Word 2003 SP2
21-1-20102-214-AX-Rev1.doc	1	32 KB	Preliminary Geotechnical Report Appendix Flysheets	MS Word 2003 SP2
Black-Tabs.doc	1	59 KB	Preliminary Geotechnical Report Appendix Tabs	MS Word 2003 SP2
21-1-20102-214 Mina Plate (plotted date 6-24-07).dwg	1	79 KB	Plate 3, Geologic Cross Sections	AutoCAD 2007

Subcontractor: Shannon & Wilson, Inc.			Item Number/Title/Revision: Geotechnical Report, Volume 1 of 2 - Mina, Rev. 1 (Submittal No. 7.28)	Submittal Date: 24 Jul 2007	SRCT No.: 07-00025
Mina_x-sections_29jan2007_proj-loc_a.tif	1	219 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-065.tif	1	2,302 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-065_Legend.tif	1	2,938 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-067.tif	1	2,989 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-067_Legend.tif	1	2,528 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-071.tif	1	370 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-079.tif	1	1,456 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-079_Legend.tif	1	3,143 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-096.tif	1	2,296 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
M-096_Legend.tif	1	4,175 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
A-005.tif	1	1,665 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
A-013.tif	1	5,816 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
A-013_Legend.tif	1	1,840 KB	Plate 3, Geologic Cross Sections, Image	Corel PHOTO-PAINT 8.0 Image	
21-1-20102-214-R0-PhotoLog-Rev1.xls	1	523 KB	Table F-1, Log of Photographs	MS Excel 2003 SP2	
SOIL FIELD REFERENCE, rev-jul07.pdf	1	1,485 KB	Geotechnical Report Soil Field Reference	Adobe Acrobat 7.0	
ROCK FIELD REFERENCE, rev-jul07.pdf	1	624 KB	Geotechnical Report Rock Field Reference	Adobe Acrobat 7.0	
Mina_S&W_GEO.mdb	1	18,736 KB	ESRI 9.2 Personal Geodatabase containing the following Shannon & Wilson, Inc. native files pertaining to studies related to the Preliminary Geotech Report dated 07/24/07.	ESRI Geodatabase	
Photos.*	1	985 MB	Geotechnical Report Appendix H photos folder	Corel Photo-Paint 8.0	
MinaGeotechRpt-V1,R1,24Jul07.pdf	1	124,355 KB	Adobe Acrobat report, Volume 1	Adobe Acrobat 7.0	
			----------Last Item----------		

Section III. Metadata

☒ **GIS Metadata** All GIS data is preferred in ArcGIS9.1 UTM, NAD1983,	Projection: UTM
	Datum: NAD 83

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Transportation Data Pedigree Form

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Shannon & Wilson, Inc.	Geotechnical Report, Volume 1 of 2 - Mina, Rev. 1 (Submittal No. 7.28)	24 Jul 2007	07-00025

Zone11, Feet.	Zone: 11 N
	Units: Feet
☐ **CAD Metadata** CAD drawings are preferred in **Bentley MicroStation V8 and/or InRoads** and should adhere to established **CAD standards.**	Level descriptions:
	Scale:
	Units of Measurement:
	Horizontal and Vertical Datum:

Section IV. Data Screening (Completed by BSC personnel)

Acceptable for Review?	Screener Name:	Signature:	Date:
☒ Yes* ☐ No	Cathy Stettler	Cathy Stettler	8/23/07

*If "Yes", Data Storage Location: nvtdata\SW\Phase1\07-00025 Geotech Report Mina Rev 01 07-24-07

Comments: *(Justification for returning submittal is **required**; other comments are optional.)*

Section V. STR/STR Support Disposition of Submittal

Process for Review?	** If "No", date returned:	Comments:
☐ Yes ☐ No**		

STR/STR Support Name:	Signature:	Date:
Wm. Garfield	Wm. Garfield	8/23/07

KAM 8/24/07

Data Definitions for Preliminary Geotechnical Report GIS Features

Feature Class: Buffer_of_mina022307_SW_10

Description: This polygon feature class represents a 10 mile buffer of the alignment file "mina022307.shp" provided by BSC.

Purpose: To identify limits of project area.

Revision History:
No Changes.

Number of records: 1

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Polygon.
BufferDist	Double	Distance, in miles, of buffer based on mina022307.shp.
SHAPE_Length	Double	Length of feature in feet generated by software.
SHAPE_Area	Double	Area of feature in feet generated by software.

Feature Class: faults_24k_sw_mina

Description: Polyline feature showing structures/faults at 24k scale based on Shannon & Wilson field reconnaissance of the Mina corridor.

Purpose: Identify faults and structures along the mina corridor.

Revision History: No Changes.

Number of records: 47

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
Shape	Geometry	Polyline.
Feature	Text	Type of structure/fault.
SHAPE_Length	Double	Length of feature in feet generated by software.

Feature Class: geologic_condition_areas_sw_mina

Description: Polyline features outlining areas from Table 2 of this report. This feature class is for drafting presentation purposes only.

Purpose: Outline geologic condition areas relating to Table 2.

Revision History: No Changes.

Number of records: 5

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Polyline.
SHAPE_Length	Double	Length of feature in feet generated by software.

Feature Class: geology_24k_sw_mina

Description: Polygon feature class showing geology at 24k scale based on Shannon & Wilson field reconnaissance of the Mina corridor.

Purpose: Define surface geology along Mina alignment.

Revision History: No Changes.

Number of records: 359

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Polygon.
Geology	Text	Geologic unit
SHAPE_Length	Double	Length of feature in feet generated by software.
SHAPE_Area	Double	Area of feature in feet generated by software.

Feature Class: geology_index_24k_sw_mina

Description: Polygon feature to serve as the sheet index for Figure 3 of this report. This feature is associated with the production of Shannon & Wilson, Inc. plates and figures only. This polygon feature class is for drafting presentation purposes only.

Purpose: For presentation purposes only. The features provide an index of map sheet areas in Figure 3 of this report.

Revision History: No Changes.

Number of records: 61

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Polygon.
Sheet_No	Text	Sheet number in Figure 3.
SHAPE_Length	Double	Length of feature in feet generated by software.
SHAPE_Area	Double	Area of feature in feet generated by software.

Feature Class: title_block_250k_sw_mina

Description: This polygon feature class is for drafting presentation purposes only. This feature is associated with the production of Shannon & Wilson, Inc. plates only. It contains no data associated with study of this report.

Purpose: For presentation purposes only. The feature allows areas to be masked at a 250k scale to clearly represent the title block area.

Revision History: No Changes.

Number of records: 1

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Polygon.
SHAPE_Length	Double	Length of feature in feet generated by software.
SHAPE_Area	Double	Area of feature in feet generated by software.

Feature Class: unrsl_eq_00_prsnt

Description: Point feature class showing seismic events. Data acquired from the University of Nevada-Reno Seismological Laboratory. Catalog includes events from 2000 to October 24, 2004. See Plate 4 for full source information.

Purpose: Show location and magnitude of seismic events.

Revision History: No Changes.

Number of records: 3233

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Point.
YR	Long Integer	Four digit year, yyyy format. GMT
MAG	Double	Event magnitude.

Feature Class: unrsl_eq_1852_1999

Description: Points showing seismic events. Data acquired from the University of Nevada-Reno Seismological Laboratory. Catalog includes events from 1852 to 1999. See Plate 4 for complete source information.

Purpose: Show location and magnitude of seismic events.

Revision History: No Changes.

Number of records: 26183

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Point.
YR	Long Integer	Four digit year, yyyy format. GMT
MAG	Double	Event magnitude.

Feature Class: waypoints_sw_mina

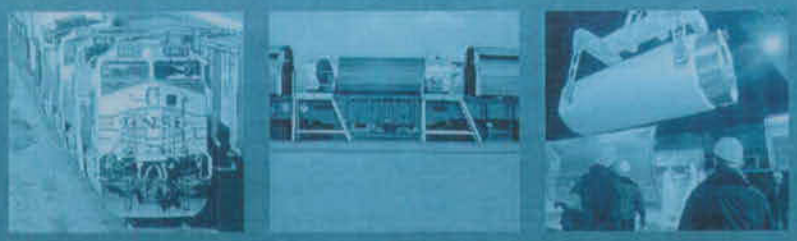
Description: This point feature class represents areas of interest collected by Shannon & Wilson, Inc. in the field by teams investigating the Mina Corridor.

Purpose: To identify areas visited in various team field reconnaissance trips.

Revision History:
No Changes.

Number of records: 606

Field Name	Data Type	Description of field
OBJECTID	Object ID	Unique identifier generated by the software. This identifier will act as a primary key.
SHAPE	Geometry	Point.
WaypointID	Text	Field assigned name of point feature. 'M'=Mina, 'T#'=Team and trip number, '###'=sequential number of feature per trip.



Geotechnical Report
Mina Rail Corridor
Volume 1 of 2

SRCT:
07-00025

Task 1.4a: Preliminary Geotechnical Analysis Report (Submittal No. 7.28)

Rev. 1

Prepared by:

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

In Association With:

JACOBS

Ninyo & Moore

Prepared for:

BECHTEL SAIC COMPANY, LLC

Nevada Rail Corridor
Yucca Mountain Project
Geotechnical Analysis
NN-HC4-00197

July 24, 2007

Preliminary Geotechnical Report
Rev. 1
Mina Rail Corridor
Yucca Mountain Project, Nevada

Subcontract No. NN-HC4-00197

24 July 2007

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

Submitted To:
Bechtel SAIC Company
1180 Town Center Drive
Las Vegas, Nevada 89144

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-20102-214

Prepared using MS-WORD 2003

CHANGE HISTORY

Revision Number	Date	Description of Change
00	24 April 2007	Initial Issue
01	24 July 2007	Revised Appendix F

TABLE OF CONTENTS

Page

VOLUME 1

ACRONYMS AND ABBREVIATIONS v

1.0 INTRODUCTION 1
- 1.1 Project Description 1
- 1.2 Purpose and Scope 2
- 1.3 Acknowledgements 3
- 1.4 Authorization 3

2.0 LITERATURE AND DATA REVIEW 3
- 2.1 Review of Existing Project Data 3
- 2.2 Literature Search and Review 4

3.0 GEOTECHNICAL RECONNAISSANCE 5

4.0 REGIONAL GEOLOGY AND TECTONIC SETTING 6
- 4.1 Geographical Description of the Mina Rail Corridor 6
- 4.2 Geologic Setting 11
- 4.3 Tectonics and Regional Seismicity 14
- 4.4 Hydrogeology 18

5.0 STRATIGRAPHIC NOMENCLATURE AND DESCRIPTION OF GEOLOGIC UNITS 20
- 5.1 Quaternary Mining Waste (Qmw) 21
- 5.2 Quaternary Stream Channel and Floodplain Alluvium (Qc) 22
- 5.3 Quaternary Eolian Deposits (Qe) 23
- 5.4 Playa and Spring Deposits (Qp) 23
- 5.5 Quaternary Lacustrine Deposits (Ql) 24
- 5.6 Quaternary Basin-Fill Deposits (Qbf) 25
- 5.7 Younger Alluvial Fan Deposits (Qay) 26
- 5.8 Older Alluvial Fan Deposits (Qao) 27
- 5.9 Quaternary Basalt Flows and Cinder Cones (Qb) 29
- 5.10 Quaternary-Tertiary Alluvium (QTa) 29
- 5.11 Pliocene to Middle Miocene Sedimentary Rocks (Tsy) 31
- 5.12 Late to Middle Miocene Lava Flows of Intermediate Composition (Ta4) 32
- 5.13 Middle Miocene Rhyolite to Rhyodacite Ash-Flow and Ash-Fall Tuffs (Tt4) 32
- 5.14 Early Miocene Lava Flows of Intermediate Composition (Ta3) 33
- 5.15 Early Miocene Rhyolite to Rhyodacite Ash-Flow and Ash-Fall Tuffs (Tt3) 33
- 5.16 Miocene Rhyolite Lava Flows and Related Intrusive Rocks (Tvr) 34

Page

5.17 Miocene and Oligocene Sedimentary and Volcanic Rocks (Tsv) 34
5.18 Oligocene Silicic to Intermediate Ash-Flow and Ash-Fall Tuffs (Tt2) 35
5.19 Cretaceous and Jurassic Granitic Rocks (KJg) 36
5.20 Cretaceous and Jurassic Mafic Intrusive Rocks (KJm) 37
5.21 Jurassic and Triassic Sedimentary Rocks (JTrs) 37
5.22 Triassic and Permian Metamorphosed Sedimentary and Volcanic Rocks (TrPvs) 38
5.23 Upper Cambrian Carbonate Rocks (Cc) 38
5.24 Middle and Lower Cambrian and Late Proterozoic Sedimentary Rocks (CZs) 39

6.0 CHARACTERIZATION OF SOILS WITHIN THE CORRIDOR 39

7.0 GEOLOGIC HAZARDS 40
7.1 Rock Slope Hazards 41
7.2 Earthquake Hazards 42
7.3 Surface Fissures 43
7.4 Scour and/or Flood 43
7.5 Mined Land Subsidence 44
7.6 Debris Flows 45
7.7 Soil Collapse 46
7.8 Soft Soil (Low Bearing Capacity) 46
7.9 Blowing Sand 47

8.0 PRELIMINARY ENGINEERING AND CONSTRUCTION CONSIDERATIONS 47
8.1 Ballast and Subballast 48
8.2 Excavations 48
8.3 Cut Slopes 48
8.4 Embankments 49
8.4.1 Subgrade Preparation 49
8.4.2 Subgrade Stabilization 50
8.4.3 Sources of Fill Material 50
8.5 Drainage and Erosion Protection 51
8.5.1 Surface Drainage 51
8.5.2 Subsurface Drainage 52
8.5.3 River and Streambank Erosion 52
8.5.4 Erosion at Culverts 52
8.5.5 Erosion of Cut–and-Fill Slopes 53
8.6 Structures 53
8.6.1 Bridges 53
8.6.2 Buildings 53
8.6.3 Retaining Walls 54
8.6.3.1 Rigid Gravity and Semi-gravity Walls 55
8.6.3.2 Prefabricated Modular Gravity Walls 55

Page

8.6.3.3 Mechanically Stabilized Earth Walls 56
8.6.3.4 Reinforced Soil Slopes....57
8.6.3.5 Non-gravity Cantilevered and Anchored Walls 57
8.6.3.6 In Situ Reinforced Walls....58

9.0 CONCLUSIONS....59

LIST OF PLATES

Plate No.

1 Project Alignment Map
2 Regional Geology Compilation Map (4 sheets)
3 Geologic Cross-Sections
4 Faults and Seismic Activity Map

LIST OF APPENDICES

Appendix

A Preliminary Geotechnical Design Criteria Manual (under separate cover)
B Ballast Sourcing Cost Analysis (under separate cover)
C Preliminary Construction Aggregate Report (under separate cover)
D Ballast Quarry Report (under separate cover)
E Preliminary Mineral and Energy Resource Occurrence Report (under separate cover)
F Shannon & Wilson Field References – Soil and Rock Classification
G Photographs From Field Reconnaissance (DVD)

VOLUME 2

LIST OF TABLES

Table No.

1 Project Bibliography
2 Generalized Stratigraphic Columns
3 Description of Geologic Units
4 Soil Survey Data by Station Interval
5 Summary of Field Observations
6 Summary of Geologic Conditions and Engineering Considerations Along Alignments

LIST OF FIGURES

Figure No.

1 Corridor Location Map
2 Index and Legend to Geologic Mapping
3 Geologic Mapping Along Alignments

ACRONYMS AND ABBREVIATIONS

A	insufficient evidence for certainty rating (as relates to mineral potential)
AASHTO	American Association of State Highway and Transportation Officials
Ag	silver
ANSI	American National Standards Institute
AREMA	American Railway Engineering and Maintenance-of-Way Association
As	arsenic
ASTM	American Society for Testing and Materials
Au	gold
AWWA	American Water Works Association
B	low certainty rating (as relates to mineral potential)
Ba	barium
BAH	Booz, Allen, Hamilton
BBE	Busted Butte East
BCFG	billion cubic feet of gas
Be	beryllium
BGRR	Bullfrog Goldfield Railroad
Bi	bismuth
BLM	U.S. Bureau of Land Management
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe Railway Company
BSC	Bechtel SAIC Company, LLC
C	moderate certainty rating (as relates to mineral potential)
CAPP	Chemical Accident Prevention Program
Cd	cadmium
CFR	Code of Federal Regulations
cm	centimeter
Co	cobalt
CPT	cone penetrometer test
Cr	chromium
CRC	Caliente Rail Corridor
CS	common segment
Cu	copper
D	high certainty rating (as relates to mineral potential)
DCM	Design Criteria Manual
deg C	Degree Celcius
deg F	Degree Farenheit
DEIS	Draft Environmental Impact Statement
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy

ACRONYMS AND ABBREVIATIONS (cont.)

E.	East
EIS	Environmental Impact Statement
EOR	engineer of record
EPA	U.S. Environmental Protection Agency
EWDP	Early Warning Drilling Program
F	fluorine
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FOB	free on board
FR	Federal Register
FRA	Federal Railroad Administration
FY	fiscal year
GCMC	Goldfield Consolidated Mines Company
G-DCM	Geotechnical Design Criteria Manual
GF3	Goldfield 3 Route
GIS	Geographic Information System
gpm	gallons per minute
GPS	global positioning system
GROA	Geologic Repository Operations Area
g/t	grams per ton
H	high mineral potential
HASP	Health and Safety Plan
Hg	mercury
HSA	hollow-stem auger
H:V	horizontal to vertical
HSU	hydrostratigraphic units
IDW	investigation-derived waste
in/sec	inches per second
ISRM	International Society of Rock Mechanics
Jacobs	Jacobs Engineering, Inc.
K	potassium
KGRA	known geothermal resource area
km	kilometer
L	low mineral potential
LR2000	Legacy Rehost 2000, a BLM land and minerals records system
LV&TRR	Las Vegas and Tonopah Railroad
M	moderate mineral potential
Ma	million years old or million years ago or million years before present
MGR	Managed Geologic Repository
MILS	mineral property location database, compiled by the U.S. Bureau of Mines
mm	millimeter

ACRONYMS AND ABBREVIATIONS (cont.)

mm/sec	millimeters per second
mm/yr	millimeters per year
MMBO	million barrels of oil
Mn	manganese
MnO	manganese oxide
Mo	molybdenum
M&O	Maintenance and Operation
mph	miles per hour
MPR	Mineral Potential Report
MRC	Mina Rail Corridor
MRDI	Mineral Resource Development, Inc.
MRDS	mineral resource dataset, compiled by U.S. Geological Survey
MS	mineral survey
MSE	mechanically stabilized earth
MVGI	Metallic Ventures Gold, Inc.
MW	megawatt
N.	North
N&M	Ninyo & Moore, Inc.
Na	sodium
NAC	Nevada Administrative Code
NBMG	Nevada Bureau of Mines and Geology
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NEPA	National Environmental Policy Act
Ni	nickel
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRL	Nevada Rail Line
NRP	Nevada Rail Partners
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range (formerly Nellis Air Force Base and Testing Range)
NVT	Nevada Transportation
NWRPO	Nuclear Waste Repository Project Office
O	no mineral potential
OCRWM	Office of Civilian Radioactive Waste Management
O.D.	outside diameter
opt	ounces per ton
oz	ounce, specifically troy ounce in this report
oz/t	ounces per ton
P	phosphorous

ACRONYMS AND ABBREVIATIONS (cont.)

Pb	lead
PGA	peak ground acceleration
PGR	Preliminary Geotechnical Report
PM	particulate matter
POC	Point-of-Contact
ppb	parts per billion
ppm	parts per million
PSHA	probabilistic seismic hazard analysis
psi	pounds per square inch
PV	prefabricated vertical
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
R.	Range
RA DEIS	Rail Alignment Draft Environmental Impact Statement
RFI	Request for Information
RFP	Request for Proposal
ROD	Record of Decision
ROE	right-of-entry
ROW	right-of-way
RQD	Rock Quality Designation
Rs.	Ranges
RSS	reinforced soil slope
S.	South
S&W	Shannon & Wilson, Inc.
Sb	antimony
Sc	scandium
SCS	Soil Conservation Service
Se	selenium
sec.	section
secs.	sections
SFRS	steel fiber-reinforced shotcrete
SI	International System of Units
Sm	samarium
Sn	tin
SPT	Standard Penetration Test
Sr	strontium
SR	State Route
SSURGO	Soil Survey Geographic Database
T&TRR	Tonopah and Tidewater Railroad
TBM	Tunnel Boring Machine

ACRONYMS AND ABBREVIATIONS (cont.)

T.	Township
Tl	thallium
tpd	tons per day
Tps.	Townships
tpy	tons per year
tsf	tons per square foot
U	uranium
UPRR	Union Pacific Railroad Company
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USBM	U.S. Bureau of Mines
USBR	U.S. Bureau of Reclamation
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
V	vanadium
W	tungsten
W.	West
WPCP	Water Pollution Control Permit
WSA	Wilderness Study Area
wt%	weight percent
YMP	Yucca Mountain Project
Zn	zinc

PRELIMINARY GEOTECHNICAL REPORT

MINA RAIL CORRIDOR
YUCCA MOUNTAIN PROJECT, NEVADA

1.0 INTRODUCTION

This report summarizes the results of preliminary geotechnical engineering evaluations to support the selection of a route for a possible rail line within the Mina Rail Corridor (MRC) for the Yucca Mountain Project (YMP). This report examines several alternative rail segments, as shown on the map provided by Bechtel SAIC Company, LLC (BSC), dated 13 October 2006.

1.1 Project Description

The U.S. Department of Energy (DOE) is studying two corridors in Nevada for possible construction of a rail line to transport spent nuclear fuel and high-level radioactive waste to a proposed repository at Yucca Mountain, Nevada. The corridors, both 0.25-mile-wide, are referred to as the Caliente and Mina corridors. DOE may eventually select one alignment within one of these corridors for the rail line. This report identifies and examines geotechnical considerations for the Mina corridor.

The MRC originates at the terminus of the Union Pacific Railroad (UPRR) at the Fort Churchill siding near Wabuska, Nevada (Plate 1). From that point, the corridor extends southeastward along various alternate alignments until it intersects with the Caliente Rail Corridor (CRC) either along the Caliente Alternative Alignment GF4 at CRC Station 42710+00 or along Caliente Common Segment CS4 at CRC Station 14146+54. From these intersections, the segment, common to both the Caliente and Mina corridors would continue southeastward where it would terminate at Yucca Mountain near the southwest corner of the Nevada Test Site (NTS). Geotechnical and other studies of the segment common to both the Caliente and Mina corridors have already been completed and are contained in several reports, as referenced in subsequent sections.

It is anticipated that approximately 2.7 million in-place[1] tons of crushed rock ballast would be required for new track construction. In addition, approximately 2.4 million tons of subballast would be required for roadbed construction. These quantities are based on project information available during preparation of this report (NRP, 2007) and may be revised.

1.2 Purpose and Scope

The geotechnical engineering scope of work for the project is phased to correspond with evolving levels of project development as follows:

- Preliminary geotechnical engineering to support initial route selection and alignment optimization, the conceptual design of the railroad, and the environmental impact statement (EIS).
- Geotechnical engineering to support final alignment optimization, preliminary engineering, and final design.
- Geotechnical engineering analysis and testing support during construction.

This report includes descriptions of the data reviewed and results of initial field reconnaissance. It provides a description of the regional geologic conditions and geologic hazards that occur within the corridor. Information is provided on the route alignment within the corridor with respect to the geologic hazards and difficult soil conditions based on the data review and field reconnaissance. Local geologic conditions along the corridor are summarized, and preliminary geotechnical engineering and construction considerations are provided to support conceptual design studies.

In addition to presenting preliminary, yet detailed, geologic data and geotechnical considerations for the MRC, this report summarizes all of the preliminary geotechnical engineering activities by including deliverables prepared for other subcontract tasks. These deliverables include:

- Preliminary Construction Aggregate Report
- Ballast Quarry Report
- Preliminary Mineral and Energy Resource Occurrence Report

During the earlier evaluation of the CRC, the following deliverables were prepared, which are also applicable to the MRC:

[1] "In-place" denotes quantity based on design dimensions and does not include losses or other contingencies.

- Preliminary Geotechnical Design Criteria Manual (G-DCM)
- Ballast Sourcing Cost Analysis

These documents are included in Appendices A through E, under separate covers, and should be referenced for specific subject information. The remainder of this report specifically addresses geologic data and geotechnical considerations.

1.3 Acknowledgements

This report was prepared by Shannon & Wilson, Inc. (S&W). Paul Godlewski (Project Manager) provided oversight for the work. Will Hultman (Task Manager) managed the field reconnaissance. Scott Shimel managed report preparation. The geologic reconnaissance along the Mina Route was performed by four two-person teams. Art Geldon and Scott Pawling worked between Wabuska and Blair Junction, which included the Schurz Bypass alternatives (S-1, S-2, and S-3) and MCS-0 and MCS-1. Paul Zehfuss and Nell Beedle performed field reconnaissance on the Schurz Bypass alternatives S-4, S-5, and S-6. South of Blair Junction, three teams (Bill Laprade and William Lewis, Elizabeth Karcheski and Keith Rauch, and Bill Laprade and Scott Shimel) performed field reconnaissance on MN-1, MN-2, and MN-3. All team members participated in data review and report preparation. Dex McCulloch, Principal-in-Charge, reviewed this report.

1.4 Authorization

This work was performed in general accordance with YMP Technical Services contract No. NN-HC4-00197, Nevada Rail Corridor Geotechnical Analysis. The Mina Corridor studies were authorized by Subcontract Modification 17, effective 15 August 2006. This document was prepared under Work Item 1.4a of the contract and this version is submittal number 7.28.

2.0 LITERATURE AND DATA REVIEW

2.1 Review of Existing Project Data

BSC provided maps and reports previously developed for portions of the MRC. Our review of these materials provided an understanding of the rail corridor selection process and the current level of development of the MRC as an alternative route. The principal project documents reviewed included engineered plan and profile drawing sets (BSC, 2006 and 2007). The BSC

study included rail alignment plan and profile sheets for the MRC. Sheets for alignments MCS-1, MN-1, MN-2, S-1, S-2, and S-3 are dated June and July 2006; and sheets for alignments MN-3, S-4, S-5, and S-6 are dated January 2007.

BSC also provided various maps and geographical information systems (GIS) files that included data on the alignment, geology, soils, environmental studies, land use, hydrology, transportation routes, and other data related to the project. Topographic surveying done by other subcontractors to BSC was unavailable during the time of our fieldwork and engineering analysis. Thus, U.S. Geological Survey (USGS) 7.5-minute (1:24,000 scale) and 30 x 60-minute (1:100,000 scale) topographic maps were used during our work.

2.2 Literature Search and Review

We performed an extensive literature search to identify published references that contain information relevant to the corridor. S&W technical library staff conducted the literature search using keywords determined by project technical staff. Searches were conducted on publication databases from the USGS, Nevada Bureau of Mines and Geology (NBMG), Nevada Department of Transportation (NDOT), the DOE, the USGS Mercury Core Library, the State of Nevada Agency for Nuclear Projects, the Center for Nuclear Waste Regulatory Analyses, the Office of Civilian Radioactive Waste Management (OCRWM), the Desert Research Institute, and others.

S&W engineers and geologists reviewed the publication lists generated from the searches. References believed to contain relevant information were identified and obtained if available. The collected references are catalogued in the Project Bibliography, Table 1, and most are kept in our project library. Additional references are identified in the other reports referenced in the appendices.

The purpose of the literature review was to develop an understanding of the geologic conditions in the vicinity of the MRC. The intent was to begin building a project reference library that would be useful not only for current tasks, but for subsequent phases as well. We expect that additional references will be identified and obtained as the project develops. Therefore, it is desirable that the project bibliography be maintained and updated through all phases of the project.

Another purpose of the data review was to plan the geotechnical reconnaissance. Using the maps and profiles provided by BSC (BSC, 2006 and 2007), and GIS overlays of soil and geologic data, we identified areas of differing geology and locations of features such as deep cuts and bridge locations. Based on this information, we developed reconnaissance trip itineraries. The itineraries were refined as we obtained more recent or more detailed information.

3.0 GEOTECHNICAL RECONNAISSANCE

To facilitate planning of our field reconnaissance program, we reviewed geologic information and plan and profile drawings to assess the geologic conditions and anticipated construction activities along the MRC. Geologic features that could require special engineering consideration (e.g., faults, playa deposits, or mining districts), and locations of bridges, deep cuts, and high fills, were identified on the maps and designated for further investigation during the field reconnaissance.

Three teams conducted the field reconnaissance between 2 and 16 October 2006. Field team MT1, comprised of Arthur Geldon (team leader) and Scott Pawling, started at the north end near Schurz/Wabuska and worked southward. Field team MT2, consisting of Bryan Keith Rauch (team leader) and Elizabeth Karcheski, started in the south end near Goldfield and worked northward. Field team MT3, comprised of William Laprade (team leader) and William Lewis, provided supervisory leadership to the field effort, provided training and support for Global Positioning System (GPS) equipment, and performed geologic mapping for a short interval of the MN1 alignment. Between 13 and 16 November 2006 field team MT5, comprised of Bill Laprade (team leader) and Will Hultman, visited critical areas of the alignment between Lida Junction and Wabuska to review geologic conditions along the MRC and assess work performed by the other teams. Finally, a fifth and sixth team, comprised of Bill Laprade and Scott Shimel (MT-7) and Paul Zehfuss and Nell Beedle (MT8) performed field reconnaissance along MN-3, S-4, S-5, and S-6. Their field reconnaissance was completed between 20 February 2007 and 7 March 2007. The teams collected information on geology, landforms, geotechnical properties and issues (cut, fills, subsidence, and mines), ballast potential, and subballast potential.

We accessed sites via established roads and existing two-wheel tracks, or by hiking short distances. Only four-wheel-drive pickup trucks and sport utility vehicles were used and no

off-road driving was performed. Each geotechnical reconnaissance team consisted of a S&W engineer and a S&W engineering geologist or two engineering geologists.

While in the field, the teams determined their positions relative to the alignment using a Juniper Systems Archer unit coupled with a Trimble GPS Pathfinder XC receiver. The Archer unit displayed topographic maps and the MRC alignment and aided teams to navigate through the corridor. This system enabled the field personnel to know their location relative to the MRC at all times. Typical data collection procedures at each stop during the reconnaissance included taking digital photographs, recording a GPS waypoint, classifying the soil and rock materials, and recording information regarding geologic hazards, and design and construction considerations, as appropriate. Discrete GPS waypoint designations were identified for each team, beginning with the team number (i.e., MT1) followed by a sequential three digit number. For instance, the 24th waypoint recorded by Team 1 would be recorded as MT1024. A summary of information recorded at each waypoint is presented in Table 5. Reconnaissance photographs are presented in Appendix F.

Daily work activities were planned each evening. The S&W Point-of-Contact (POC), Samuel Bernofsky, was informed of the field team's itinerary for the next day. Before entering the field each day, team members contacted the POC; discussed the planned work activities; conducted and documented a pre-shift safety meeting; and inspected the vehicle, field equipment, safety equipment, and the other team members' physical and mental condition. Each evening, the team contacted the POC to report all field personnel were accounted for, reviewed daily progress, reconciled field notes, and reviewed safety issues that came up in the course of the fieldwork. The observations and collected field data were backed up each day by making photocopies of field notebooks and downloading photographs into laptop computers.

4.0 REGIONAL GEOLOGY AND TECTONIC SETTING

4.1 Geographical Description of the Mina Rail Corridor

The portion of the MRC not common with the CRC lies within the Great Basin section of the Basin and Range physiographic province (Castor, 2004). Information on sections of the MRC that are common to the CRC (i.e. BC-2, BC-3, CS-5, OV-1, OV-3, and CS-6) is found in the CRC Preliminary Geotechnical Report (S&W, 2006d). The terrain consists of relatively narrow

mountain ranges, surrounded by broad sediment-filled basins, each about 10 to 15 miles wide (Plate 1). Most of the ranges are approximately 50 to 75 miles long and rise between 3,000 and 5,000 feet above the adjacent basin flats. Broad alluvial fans mark the transition between the mountain uplands and basin flats. Elevations along the corridor range from about 6,520 feet at an un-named pass in the Montezuma Range along the MN1 segment to about 4,160 feet at the southern end of segment S1 on the Walker River Indian Reservation.

Most of the basins in the study area have interior drainage from which there is no surface water outflow. Water can only leave by evapotranspiration or groundwater flow. The floors of these basins may host shallow, salty lakes during wetter years that become completely dry during years with little precipitation. The closed nature of this water flow often leads to concentration of salts and other minerals in the lake bed through evaporation. The low parts of the basins where the intermittent lakes form are known variously as playas, salt marshes, salt flats, or alkali flats.

The MRC generally trends northwest-southeastward through Lyon, Churchill, Mineral, and Esmeralda counties (Plate 1). The initial design preferentially locates the MRC within the intermontane basins but away from dry lake beds and playas where possible. This corridor is commonly parallel with existing highways, roadways, and railways.

The Wabuska yard segment of the MRC represents an approximately three-mile-long section of alignment along the existing Union Pacific line located about five miles northeast of the town of Yerington. The segment extends eastward from U.S. Highway 95 (alternate) across the relatively level floor of Mason Valley. The eastern end of the Wabuska yard segment lies approximately five miles west of the northern extent of the MRC and the start of segment S1.

MRC segment S1 begins where it diverges from the existing Union Pacific line southeast of Parker Butte in Lyon County. The segment extends east-northeast through low-lying Campbell Valley, crossing into the Walker River Indian Reservation and over the Walker River (Plate 1). Walker River is one of Nevada's principal rivers and is the only perennial river or stream crossed by the MRC. The corridor follows the northern margin of Sunshine Flat as it turns gradually southeastward and continues along the valley floor east of the Weber Reservoir. The corridor passes into Mineral County near the northern end of Weber Reservoir. South of Weber Reservoir, segment S1 turns eastward to cross U.S. Highway 95 before traversing the surfaces of

alluvial fans emanating from the south side of the Calico Hills. The corridor then gradually turns southward to cross the low-lying basin floor between the Calico Hills to the south and the Gillis range to the north. The alignment passes to the west of the Gillis range where is connects with the existing Union Pacific line south of the town of Schurz.

The MRC segment S2 is coincident with segment S1 from where it leaves the existing Union Pacific line southeast of Parker Butte, to a point southeast of Weber Reservoir and approximately one mile west of U.S. Highway 95. After diverging from S1, segment S2 continues southeast to cross U.S. Highway 95 north of Schurz. The alignment roughly parallels the Walker River as it traverses the floor of Walker River basin east of Schurz. MRC segment S2 rejoins segment S1 and the existing Union Pacific line south of Schurz.

The S3 corridor diverges southeastward from the existing Union Pacific line between Reservation Hill and White Mountain where it is adjacent to US Highway 95 (alternate). The alignment turns northeastward over the southern portion of Reservation Hill, crosses the Walker River, and then turns eastward to join MRC segment S1 on the south side of the Calico Hills. Segment S3 is coincident with S1 to where it merges with the existing Union Pacific line south of Schurz (Plate 1).

The MRC segment S4 is coincident with segment S1 from where it leaves the existing Union Pacific line, to the border between Lyon and Mineral counties east of Weber Reservoir. After diverging from S1, segment S4 turns eastward to pass over the floor of a narrow, un-named valley between Painted Mesa and the Calico Hills. The corridor then crosses U.S. Highway 95 and turns southeastward to traverse the floor of Long Valley along the eastern front of the Calico Hills. At the southern end of Long Valley, segment S4 continues generally southeastward to traverse a pass of moderate relief between the Calico Hills and the Terrill Mountains. Once over the pass, the alignment bends east to cross alluvial fan and bedrock surfaces south of the Terrill Mountains. Segment S4 continues until it reaches the western front of Red Ridge, where it curves southward to parallel the western front of the ridge and traverses over an extensive dune field. South of Red Ridge, the corridor begins a southwesterly course across the relatively level valley floor north of the Gillis Range and intersects with an old railroad grade. Segment S4 continues southwesterly and follows the old railroad grade north of the Gillis Range and eventually joins segment S1 and the existing Union Pacific rail line south of Schurz.

MRC segment S5 is coincident with S1 from where it leaves the existing Union Pacific line southeast of Parker Butte until just after crossing the Walker River. After diverging from S1, segment S5 roughly parallels the southern perimeter of the Desert Mountains on the valley floor north of Sunshine Flat. The corridor then winds through the hilly pass situated between Painted Mesa to the south and the Desert Mountains to the north before entering the north end of Long Valley. Segment S5 closely parallels the east front of Painted Mesa as it continues southeastward through Long Valley, then crosses over U.S. Highway 95, and into Mineral County. The corridor continues southward over the basin floor west of the Terrill Mountains where it joins segment S4 north of the pass situated between the Calico Hills and the Terrill Mountains. Segment S5 is coincident with S4 to where it joins segment S1 and the existing Union Pacific line south of Schurz.

MRC segment S6 is coincident with segment S5 until it enters the northern part of Long Valley. There, the alignment diverges from segment S5 to follow the western front of a small range that extends southward from the Desert Mountains. The alignment turns sharply northeast around the southern tip of this range, crosses U.S. Highway 95, and then parallels the east side of the highway along the floor of a narrow valley that separates the small range from the Terrill Mountains. The alignment then curves sharply southeast over the northern tip of the Terrill Mountains while crossing a series of valleys deeply incised into bedrock. The corridor continues its southeasterly course and closely parallels the eastern front of the Terrill Mountains at the boundary between the bedrock highlands and the valley floor (Rawhide Flat) to the east. Segment S6 extends southeastward through the low pass between Red Ridge and the Terrill Mountains before joining segment S4 west of Red Ridge. Segment S6 is coincident with S4 to where it joins segment S1 and the existing Union Pacific line south of Schurz.

Segment MCS1 begins along the existing Union Pacific line at Thorne yard, located on the valley floor east of southern Walker Lake and north of Hawthorne. The corridor generally follows an east-southeast course until it intersects with U.S. Highway 95 in the narrow pass situated between the Gillis Range and Garfield Hills. The alignment then trends eastward through Soda Springs Valley. After crossing State Route 23, the alignment turns south-southeastward to traverse the surfaces of coalescing alluvial fans on the west side of the Gabbs Valley Range and the Pilot Mountains. Near the south end of the Pilot Mountains, segment MCS1 bends around the east side of Rhodes Salt Marsh and then climbs into a narrow valley between the Candelaria Hills and the Pilot Mountains, where it crosses the border between

Mineral and Esmeralda Counties. The alignment continues southeastward traversing alluvial fans emanating from the western front of the Monte Cristo Range. U.S. Highway 95 and the Columbus Salt Marsh lie west of MRC1 along this stretch. The alignment turns eastward at Coaldale, near the intersection of U.S. Highways 95 and 5. At Blair Junction, MRC1 turns sharply south and terminates just before crossing combined U.S. Highways 95 and 5.

In general, MRC segment MN1 extends southeast from Blair Junction across the grain of the Basin and Range topography and meanders through or around several northeast-trending mountain ranges. The alignment begins at the terminus of MCS1 at Blair Junction and extends southward across combined US Highways 95 and 5. The corridor roughly parallels Nevada State Route 265 to the town of Silver Peak. This stretch of the alignment passes over numerous physiographic features, including relatively flat-lying alluvial and playa surfaces as well as small bedrock knobs. South and east of Silver Peak the MN1 alignment crosses broad alluvial fans draining the uplands into playas in western Big Smoky Valley and Clayton Valley. A large-scale brine production facility dominates Clayton Valley near Silver Peak, east of the MRC (Plate 1). South of Silver Peak, the alignment crosses into Clayton Valley, where it turns east-northeast to traverse alluvial fan surfaces along the west side of Clayton Ridge. East of Clayton valley, MN1 passes between Clayton and Paymaster Ridges before turning sharply south and southwest across alluvial fan surfaces along the west side of the Montezuma Range. The alignment then bends eastward to traverse a low pass in the Montezuma Range. Once over the Montezuma Range, segment MN1 generally meanders in a southeastward course through the Goldfield and Cuprite Hills. The alignment intersects with U.S. Highway 95 on the east side of the Culprite Hills, and then continues southeast to Lida Junction where it terminates into segment CS4.

The MN2 corridor is initially coincident with segment MN1 where it crosses combined U.S. Highways 95 and 5. It diverges from MN1 south of the highway and continues generally eastward across the distal edge of alluvial fan surfaces emanating from the south side of the Monte Cristo Range. The alignment roughly parallels U.S. Highway 95 eastward as it descends into Big Smokey Valley. At the northern tip of Lone Mountain, segment MN2 turns southeastward and enters Montezuma Valley. As the alignment ascends to the south across the older alluvial fans south of Lone Mountain, it crosses numerous drainages which flow northward toward Big Smoky Valley. The alignment then passes over a local drainage divide, at an elevation of approximately 5,300 feet, located west of Mount Butte. The route continues southeastward through Montezuma Valley between Lone Mountain to the west and several

isolated buttes and mountains surrounding Tonopah to the east (Plate 1). The alignment, while generally following an abandoned railroad grade, crosses numerous drainages that empty into Alkali Lake on the floor of Alkali Flat. North of Goldfield, MRC segment MN2 extends southeastward to the Esmeralda county line, across the distal ends of several coalescing alluvial fans surrounding Alkali Flat.

MRC segment MN3 is coincident with segment MN2 from Blair Junction to a point approximately 5 miles north of Goldfield (Plate 1). Where it diverges from MN2, segment MN3 continues westward across alluvial fan surfaces and bedrock of the northern Montezuma Range. The alignment joins segment MN1 on the west side of the Montezuma Range. Segment MN3 is coincident with MN1 to its terminus at Lida Junction.

4.2 Geologic Setting

The MRC is located between latitudes 37° 27' and 39° 15' north and longitudes 117° 08' and 119° 15' west (Plate 1). The rail corridor traverses the Great Basin section of the Basin and Range physiographic province (Castor, 2004). Typical of this geographic area, the terrain consists of relatively narrow mountain ranges having a variety of trends, surrounded by broad sediment-filled basins (Ross, 1961; Moore, 1969; Albers and Stewart, 1972; Workman et al., 2002a). Regional geology compilation maps are provided on Plate 2, Sheets 1 through 4, for Lyon, Mineral, Esmeralda, and Churchill Counties, respectively. Representative geologic cross sections are presented in Plate 3.

The oldest exposed rocks in the MRC area are Late Proterozoic to Middle Cambrian thinly bedded argillite, claystone, siltstone, fine-grained sandstone, feldspathic sandstone, and quartzite with subordinate thinly to thickly bedded limestone and dolomite (see, for example, Albers and Stewart, 1972; Workman et al., 2002a; Oldow et al., 2003). Deposition of these sedimentary rocks marked the beginning of alternating marine shelf, littoral, and terrestrial sedimentation, that continued without lengthy interruption into the Permian period in southern and eastern parts of present-day Nevada. To the west of the MRC, in what is now northern and western Nevada and California, deep-sea deposition of graywacke, feldspathic, and quartz sandstone, chert, and argillite between eruptions of basalt began occurring in island arc settings as early as the Cambrian period (Castor, 2004).

During the Antler orogeny in late Devonian and early Mississippian time, deep-sea sedimentary and volcanic rocks were thrust eastward over shallow marine rocks in the study area along the Roberts Mountain Fault and related thrust faults (Castor, 2004). The Antler orogeny also caused structural uplifts that forever changed depositional patterns (Cole and Cashman, 1999). Deformation during the Sonoma orogeny at the end of the Permian period produced structural and depositional changes resembling those that occurred during the Antler orogeny (Castor, 2004).

The Mesozoic Era, between 245 and 65 million years ago (Ma), was characterized in the MRC area by the end of continuous sedimentation since the Late Proterozoic, widespread intrusion of granitic plutons, large-scale structural disturbance, and metamorphism. In northwest Esmeralda County and Mineral County, nearly continuous terrestrial, marine shelf, and island arc sedimentation occurred from Permian to Cretaceous time, as recorded by the occurrence of limestone, cherty limestone, dolomite, calcareous mudstone, shale, argillite, sandstone, and conglomerate in the Diablo, Mina, Candelaria, Luning, Gabbs, Sunrise, Volcano Peak, and Dunlap Formations (Ekren and Byers, 1985a; Oldow and Speed, 1985; Oldow and Dockery, 1993; Stewart et al., 1994). In Lyon County, sedimentation continued, but not on the same scale as in Mineral County (see, for example, Bingler, 1978; Utterback, 2002). In Esmeralda County, except for the Monte Cristo Range and Candelaria Hills, Mesozoic sedimentary rocks are absent (Albers and Stewart, 1972).

Intrusion of quartz monzonite, granodiorite, and granite plutons over wide areas in the Jurassic and Cretaceous periods marked the beginning of regional tectonic disturbances in the Mesozoic that culminated in large-scale thrust faulting by the end of the era. At Mineral Ridge in the Silver Peak Range, the combined effects of tectonic and plutonic disturbances have resulted in both regional and contact metamorphism of Late Proterozoic clastic and carbonate rocks. Metamorphism at Mineral Ridge is almandine-amphibolite grade, whereas metamorphism resulting from the intrusion of plutonic rocks tends to be greenschist grade. At Mineral Ridge, siltstone, sandstone, and sandy limestone of the Late Proterozoic Wyman Formation have been converted to calc-silicate skarn, calcite marble, and mica schist (Craig, 2003). Rocks resulting from greenschist facies metamorphism nearby typically include slate, phyllite, hornfels, quartzite, marble, and skarn (see, for example, Wendt, 2003).

During the Middle Jurassic to Late Cretaceous Sevier Orogeny, major thrust faults, such as those mapped in the Gabbs Valley Range by Ekren and Byers (1985a), and related faults, created significant structural disturbance on the North American continent. In the Garfield Hills, for example, thrusting near Black Dyke Mountain resulted in Triassic rocks overlying Jurassic rocks (Frost, 1984). The thrust-faulting, also, accreted pieces of land from widely different areas onto the continent (see, for example, Castor, 2004). As a result, similarly aged rocks deposited in terranes that were tens or hundreds of miles apart, now are situated in seemingly impossible conjunctions because of incongruent lithologies.

Following erosion throughout most of the early Tertiary period (65 to about 38 Ma), the MRC region began to be pulled apart along low-angle normal faults and northwesterly striking strike-slip faults associated with the Walker Lane Belt (Faunt, 1997). Regional extension was accommodated, also, by listric-normal faults stair-stepping down into calderas and topographic basins (Scott, 1990; Minor et al., 1993), by intra-block grabens (Fridrich et al., 1999), and by wrench faulting between strike-slip faults (Blakely et al., 1999).

Episodic eruptions of tuffaceous rocks and rhyolitic to basaltic lava flows began in Oligocene time, 34 Ma, (Castor, 2004). Several major ash-flow tuff sheets, such as the Monotony, Mickey Pass, Metallic City, Redrock Canyon, Castle Peak, Candelaria Junction, and Fraction Tuffs (Table 3), were emplaced. Volcanism continuing into middle to late Miocene time (about 16 to 6 Ma) resulted in bimodal emplacement of mafic lava flows and rhyolitic tuffs (Castor, 2004). The youngest eruptions emplaced the Tuff of Stonewall Flat on the southeast side of the study area 7.5 to 7.6 Ma (Minor et al., 1993) and the Silver Peak volcanics on the southwest side of the study area about 5.9 to 6.3 Ma (Oldow et al., 2003).

Substantially reduced and much less frequent eruptive events and tectonic activity continued into Pliocene and Pleistocene time. The youngest known volcanic rocks in the MRC area are the crater and lava flows at Blair Junction and the cinder cone and related flows in the northwest corner of Clayton Valley (Brown, 2003).

From Oligocene to Quaternary time, coarse-grained detritus shed from uplifted areas and fine-grained and calcareous lacustrine sediments alternately filled syntectonic basins, together with lesser amounts of eolian sand and silt, evaporite deposits, and marsh and playa sediments (see, for example, Papke, 1976; Zampirro, 2004). The older, deeper basin-fill sediments typically are

indurated to lithified, whereas the younger basin-fill sediments become progressively less indurated with decreasing depth and age. The basin-fill sediments can be more than 4,000 feet thick (Lacznaik, et al., 1996). Quaternary sediments typically are unconsolidated. Some basins contain basalt flows intercalated with sediments or active faults. Active faults, indicated by pronounced scarps in alluvial fan sediments occur on both sides of Walker Lake (Stewart et al., 1981b).

4.3 Tectonics and Regional Seismicity

The study area is located in the southern part of the Great Basin section of the Basin and Range physiographic province (Castor, 2004). The Basin and Range is a region of Cenozoic extensional deformation that extends nearly 1,600 miles from Idaho and Montana south to central Mexico (Dickinson, 2003). Tectonic evolution of the Great Basin has resulted from two distinctly different styles of deformation - thrust faulting and folding that occurred during the Paleozoic and Mesozoic eras, and extensional normal and strike-slip faulting, which began early in the Cenozoic era and has continued into the present (TRW Environmental Safety Systems, Inc., 2000). Ongoing extension in the southern Great Basin has doubled its width in the last 20 million years (Thatcher et al., 1999).

Major recognizable, post Proterozoic, compressional deformation began in the region with episodic uplift and thrust faulting during the late Devonian to Mississippian Antler orogeny (Kleinhampl and Ziony, 1985). This folding and faulting created a mountainous region and a foreland marine basin to the east, into which detritus shed from the rising mountains was deposited (Stewart, 1980; Trexler et al., 1996).

Growth of north-northwest- to north-northeast-trending overthrust belts during Permian to Cretaceous time terminated marine deposition in the region (TRW Environmental Safety Systems, Inc., 2000). From west to east, these deformational features include the Death Valley thrust belt (Snow, 1992), the Sevier orogenic belt (Snow, 1992; Taylor et al., 1993; Trexler et al., 1996), and the Central Nevada thrust belt (Taylor et al., 1993). In most of these belts, thrust faults were accompanied by overturned or dismembered folds, and most thrusts displaced rocks eastward (TRW Environmental Safety Systems, Inc., 2000). Most major thrust faults from this time can be traced along strike for more than 60 miles (Workman et al., 2002b) even though subsequent Cenozoic crustal extension and strike-slip displacement along younger faults has laterally offset and rotated older fault segments.

Starting in the Oligocene, magmatism characterized by shallow intrusion and development of calderas and stratavolcanos occurred in belts that paralleled subduction along the western edge of the North America plate (Burchfiel et al., 1992; Christiansen and Yeats, 1992; Lipman, 1992). Magmatism was accompanied by secondary faulting during this period of extension (Rowley, 1998). Most of the faults that developed during this period either strike northeast with a left-lateral strike-slip component or strike northwest with a right-lateral strike-slip component (Ekren et al., 1968). The Goldfield Caldera (Workman, et al., 2002b; Albers and Stewart, 1972; Cornwall, 1972) formed during this period.

In the early Miocene epoch, prior to about 20 Ma, plate motion between the Pacific and North American tectonic plates resulted in predominately right-lateral transtensional motion along the plate boundary and oblique extension over much of the Basin and Range province (Bohannon and Parsons, 1995; Atwater and Stock, 1988; Atwater, 1970; Hamilton and Myers, 1966). Some of the right-lateral motion between the North American and Pacific Plates transferred across the Sierra Nevada-Great Valley block into the Great Basin, resulting in a pattern of right-lateral and normal faulting in the western part of the Great Basin and predominantly normal faulting in the eastern part (Bennett et al., 1999 and 2003; Thatcher et al., 1999; Oldow et al., 2001).

The Basin and Range structural domain is characterized by northwest- to northeast-trending, relatively narrow mountain ranges separated by broad structural and topographic basins that are filled with alluvium from erosion of the surrounding uplands. This structurally controlled Basin and Range topography dominates the entire MRC region. The topography results primarily from differential movement along north- to northeast-trending normal faults. Mountain ranges generally are composed of tilted fault blocks, with range-bounding faults defining one or both sides of mountain ranges and adjacent basins, such that these basins are either grabens or half-grabens (Stewart, 1980). Many of these faults have been inactive since at least middle to late Quaternary time and are buried beneath basin-fill sediments (Workman et al., 2002b), but some normal faults displace upper Pliocene to Quaternary surficial deposits (Simonds et al., 1995). Major faults in this structural domain include Lone Mountain fault (Barron and Wesnousky, 2003), Clayton Ridge fault, Montezuma Range fault, Clayton and Montezuma Valley faults, Paymaster Ridge fault, and Stonewall Flats fault (Anderson, 1998a, 1998b, 1999a through 1999c). During Basin-and-Range extension, magmatism was secondary to faulting (Workman et al., 2002b). Nevertheless, prominent calderas developed in the Southwest Nevada Volcanic Field from 13.7 to 7.5 Ma (Workman et al., 2002b).

The continued development of the Pacific – North American transform plate boundary during the last 20 million years includes the development of the eastern California shear zone south of the Garlock fault and the Walker Lane (shear zone) north of the Garlock fault (Wesnousky, 2005a and 2005b). Walker Lane is a 60-mile-wide, northwest-trending, deformation zone that lies subparallel to the Nevada-California state line from the vicinity of Las Vegas, Nevada, to northern California (Wesnousky, 2005a; Stewart, 1988). Wesnousky (2005a) further suggests that while the San Andreas fault system and the Walker Lane both accommodate right-lateral motion, the San Andreas exhibits primarily transpressional faulting and the Walker Lane primarily transtensional faulting.

Walker Lane is characterized by an assemblage of crustal blocks separated by discontinuous, northwest-striking, right-lateral faults and northeast-striking, left-lateral faults (Carr, 1990; Stewart, 1988). Active northwest-trending Walker Lane faults in the MRC area include Fish Lake Valley fault, Wassuk Range fault, Gumdrop and Indian Head faults, Benton Springs fault and Petrified Springs fault (Wesnousky, 2005b). Particularly between the Wassuk and Gabbs Valley Ranges, northeast-trending faults appear to accommodate block rotations in the shear zone (Wesnousky, 2005a). These faults include the Rattlesnake fault, Excelsior Mountains fault, Coaldale fault and faults in the Candelaria Hills (Wesnousky, 2005b; Bradley, et al., 2003; Speed and Cogbill, 1979a).

Consistent with east-west extension across the Great Basin and northwesterly right-lateral shear in its western part, Quaternary surface faults tend to strike north-northwesterly toward the western part of the region and northerly elsewhere (Plate 4). Geodetic measurements indicate about 0.35 to 0.51 inch per year (9 to 13 millimeters per year [mm/yr]) of deformation in the western fourth of the Great Basin (Bennett et al., 1999 and 2003; Thatcher et al., 1999). The majority of the faults in the region surrounding the MRC typically have slip rates of less than 0.008 inches per year (<0.2 mm/yr). Few of the numerous Quaternary faults in the MRC region have been shown to have Holocene surface rupture, and none of these faults cross the alignment.

Numerous earthquakes occur within the Great Basin as a result of ongoing extensional deformation across the region. Regional epicenter distribution patterns (Plate 4, inset map) and geodetic data indicate that strain presently is concentrated primarily north of Yucca Mountain in a zone along latitude 37°N (the intermountain seismic belt), in the eastern California shear zone, and in the north-trending central Nevada seismic zone (Bennett et al., 1999). Plate 4 also

illustrates the generally diffuse pattern of seismicity in the immediate area surrounding the MRC, where epicenters are primarily located along active faults within the Walker Lane fault system.

The largest recorded earthquake close to the MRC was the 1959 Schurz event (magnitude 6.3) with an epicenter location approximately 2.3 miles east of segments S1 and S2. Most of the alignment corridor is relatively seismically quiet, as shown in Plate 4. The area with the densest concentration of small earthquakes occurs at the northern end of segment MCS1, between a northwestern-trending zone of activity in the Garfield Hills and a cluster of epicenters along the southern part of the Benton Springs fault zone (Plate 4).

Besides the Schurz event, other magnitude 6 or larger earthquakes have occurred within the region, including the magnitude 7.2 Cedar Mountain event in December 1932. Even though the Cedar Mountain event is considered a major earthquake, the sparse population at that time meant there were no reported fatalities. Damage included two destroyed cabins (one stone, one adobe); toppled chimneys in Mina, Luning, and Hawthorne; and damage to area mine properties. Extensive and complicated surface faulting occurred northeast of Mina in the valley between the Cedar and Pilot Mountains (Stover and Coffman, 1993).

A magnitude 6.5 earthquake centered in the Excelsior Mountains occurred about a year later, in January 1934. The main event and several foreshocks, including a magnitude 5.5 foreshock that occurred about an hour prior to the main event, caused damage in Mina and collapse of several adobe buildings in Marietta. A fault scarp approximately 5 inches high and 0.9 mile long formed on the south slope of the Excelsior Mountains (Stover and Coffman, 1993).

Three earthquakes of magnitudes 6.4 to 6.8 occurred in July and August 1954, with epicenters in the Rainbow Mountain vicinity of the Stillwater Range, approximately 15 miles east of Fallon. These events plus aftershocks caused damage in Fallon. Surface fault rupture associated with the quakes was traced for about 25 miles. (Stover and Coffman, 1993)

In December 1954, a magnitude 7.1 earthquake occurred about 30 miles east of Rainbow Mountain, near Frenchman's Station. A magnitude 6.8 aftershock followed 4 minutes after the main event. As with the 1932 Cedar Mountain quake, zero fatalities and few property damages were reported due to the sparse population in proximity to the epicenter. Still, some toppled chimneys were reported in Fallon and Austin. In the city of Sacramento, California, approximately 165 miles from the epicenter, damage to a large underground water tank at a

filtration plant occurred; damages to Sacramento's sewage disposal plant were also reported. Surface fault ruptures extended north and south of the epicenter over a total distance of about 55 miles. Ground ruptures were primarily observed in two fault zones: one on the west side of Dixie Valley at the eastern base of the Stillwater Range, and the other on the east side of Fairview Valley in the Clan Alpine Range. Vertical displacements on the order of 5 to 15 feet were measured in the Dixie Valley fault zone. Vertical and horizontal displacements of 6 to 20 feet and 3 to 13 feet, respectively, were measured near Fairview Peak (Stover and Coffman, 1993).

4.4 Hydrogeology

The MRC passes through a series of interconnected hydrographic basins that comprise the Great Basin regional aquifer system (Prudic et al., 1993; Plume, 1996). All basins within the study area have interior drainage at the surface; except the Walker River, which flows through several basins before ultimately terminating in Walker Lake. East of a hydrologic divide extending from the Goldfield Hills to the Palmetto Mountains, groundwater in regional circulation flows toward Death Valley (Workman et al., 2002a). West of this divide, groundwater flows toward internally drained (closed) basins, diverging at some point into flow paths directed southwestward to Owens Valley and flow paths directed southeastward to Death Valley (Maurer et al., 2004) show the hydrographic basins between the Goldfield Hills and the White Mountains.

In the region containing the MRC, groundwater moves at local, intermediate, and regional scales through multiple aquifers (Maurer et al., 2004). Hydraulic connection between basins filled with thousands of feet of sediment most commonly is maintained through sediments that were deposited across inter-basin divides. In many of these basins, such as Rhodes Salt Marsh, Clayton Valley, Big Smoky Valley, and Alkali Spring Valley, groundwater occurs abundantly at shallow depths in basin-fill sediments (see, for example, Papke, 1976; Bunch and Harrill, 1984; Zampirro, 2004; U.S. Geological Survey, accessed 2007). Tertiary lava flows, ash-flow tuff sheets, and bedded tuff deposits can be very transmissive (Maurer et al., 2004). However, transmissive intervals in the volcanic rocks are laterally discontinuous, and regional flow through these rocks is sustained mostly by faults and fracture networks (Geldon, 2004). Deep interbasin flow occurs primarily through Paleozoic carbonate rocks (Dettinger et al., 1995).

Within the MRC and Death Valley regions, faults are the largest influence on groundwater flow through bedrock aquifers (Faunt, 1997). Faults disrupt stratigraphic continuity, which can divert

water in regional circulation to local and subregional outlets. Notable subregional outlets within the MRC area are Walker Lake, Double Springs playa, Rhodes Salt Marsh, Columbia Salt Marsh, Silver Peak Marsh, and Alkali Spring playa. Faults enhance the permeability of Tertiary volcanic rocks and act as either barriers or conduits to groundwater flow in these rocks (Geldon, 2004). Typically, springs issue along range-bounding faults, because the faults juxtapose permeable rock and alluvial fan sediments in the mountains against less permeable, fine-grained sediments in the basins. There are numerous places in the MRC area where a direct connection between faults and springs can be observed. One such place is Clayton Valley, where springs on both sides of the valley are related to fault zones (Zampirro, 2004).

Less important than structure, but also an influence on groundwater flow is the lithology of rocks along flow paths. In basin-fill sediments, facies changes over short distances affect transmissivity and hydraulic conductivity, particularly where silt and clay are intermixed or interbedded with sand and gravel (Plume, 1966; Bunch and Harrill, 1984). In volcanic rocks, a characteristic change from lava flows to welded tuffs and, ultimately, nonwelded and bedded tuffs with increasing distance from eruptive centers can cause the same stratigraphic units to have substantially different hydraulic properties in different areas (Geldon, 2004). Lateral facies changes within Paleozoic rocks (e.g., from cherty limestone to shaly limestone or from limestone to dolomite) might affect permeability, but a westward facies change in Mississippian rocks from predominantly limestone and dolomite to predominantly argillite and quartzite produced a sinuous barrier to regional groundwater flow extending northerly from the Amargosa Valley to Elko, Nevada (Mifflin and Hess, 1979). Outcrops of Cambrian and Proterozoic metamorphic and igneous rocks force water into overlying aquifers and create flow-system boundaries throughout the region (Winograd and Thordarson, 1975).

Hydrostratigraphic or hydrogeologic units are composed of geologic units that have similar lithologic and hydraulic properties over laterally extensive areas (Geldon, 2004). Geldon (2004) recognized 11 hydrostratigraphic units in the region traversed by the MRC. Maurer et al. (2004) recognized 12 hydrogeologic units for the state of Nevada. Regardless of the nomenclature scheme, all hydrostratigraphic or hydrogeologic units have in common ranges in hydraulic properties that vary non-uniquely over several orders of magnitude (values depend on the analytical methods chosen, all of which require subjective judgments). The hydrogeologic units of Maurer et al. (2004), which specifically address geologic units in the MRC area, are:

- Alluvial slope sediments, hydraulic conductivity (K) = 0.0002 to >150 feet/day
- Valley floor sediments, K = 2 to 90 feet/day
- Fluvial sediments, K = 4 to 2,200 feet/day
- Playa sediments, K = 0.00003 to 2 feet/day
- Basalt lava flows, K = 0.0002 to 1,300 feet/day
- Rhyolite lava flows, K = 0.00002 to 260 feet/day
- Andesite lava flows, K = 0.0002 to 60 feet/day
- Tertiary tuffaceous and sedimentary rocks, K = 0.0002 to 20 feet/day
- Volcanic breccias, tuffs, and volcanic rocks older than Tertiary age, K = 0.0000003 to 600 feet/day
- Paleozoic and Mesozoic carbonate rocks, K = 0.00003 to 3,300 feet/day
- Late Proterozoic to Mesozoic clastic rocks, K = 0.000000002 to 18 feet/day
- Intrusive and metamorphic rocks, K = 0.00000007 to 30 feet/day.

5.0 STRATIGRAPHIC NOMENCLATURE AND DESCRIPTION OF GEOLOGIC UNITS

Geologic units present within and near the MRC range in age from Holocene to Late Proterozoic. Table 2 presents generalized stratigraphic columns for six principal areas along the MRC. The many stratigraphic names compiled in this table from different parts of the study area were combined into 26 regional geologic units and sub-units in this report to facilitate presentation of data. In sorting through the local stratigraphic names, emphasis was placed on nomenclature consistent with currently accepted hypotheses for the structural evolution of the study area, such as collisional tectonics near plate boundaries and Basin-and-Range extensional tectonics. Recently published reports were given more weight than older reports in deciding between acceptable and obsolete nomenclature. Radiometric ages available from many reports helped to distinguish time-equivalent stratigraphic names used in different parts of the study area.

Initial selection of regional and local geologic units for this report involved searching for all stratigraphic names found on 1:250,000-scale geologic maps of the study area. Among the maps used in this winnowing process were those for Mineral County (Ross, 1961), Lyon and Douglas Counties (Moore, 1969), Esmeralda County (Albers and Stewart, 1972), southern Nye County (Cornwall, 1972), the Walker Lake 1° x 2° quadrangle (Stewart et al., 1982), the Tonopah 1° x

2° quadrangle (Whitebread and John, 1992), and the Death Valley regional groundwater flow system (Workman et al., 2002a). Refinement of regional and local stratigraphic nomenclature was based on examination of 1:24,000 to 1:125,000-scale geologic maps that generally were prepared between 1975 and the present (see Table 1 for listed maps). These larger-scale maps cover all but a small part of Esmeralda County and part of Lyon County north of the Walker River Indian Reservation.

We conducted reconnaissance geologic mapping at a scale of 1:24,000 from October 2006 to March 2007 to validate or modify information obtained from published maps about geologic units. Results of the literature searches and field reconnaissance were combined to finalize the geologic unit names that are used throughout this report. Table 3 lists most local geologic unit names included in the regional geologic units and briefly describes the regional units. Figure 3 shows the distribution of regional geologic units within about 0.1 to 0.25 mile of MRC common and alternate segments, and Figure 2 presents an index and legend for this geologic mapping. Shannon & Wilson field reference guides used to describe the physical and engineering properties for soil and rock are presented in Appendix F.

5.1 Quaternary Mining Waste (Qmw)

Mining waste is present near mines, prospects, and mills in every mining district. The waste is as varied in appearance as the rock that was mined, the ore minerals that were recovered, and the chemicals used to process the ore. At the Nevada Eagle mine, in the Montezuma Range (Albers and Stewart, 1972), the waste exists as yellow-green mounds of cyanide-treated tailings near fenced-in shafts that descend from a leveled working area. In a group of mines, near the ghost town of Gilbert in the Monte Cristo Range (Stewart et al., 1994), mounds of orange, green, and white tailings extend between mining shafts and ore chutes. In Clayton Valley, evaporation ponds contain pumped brines from which lithium minerals are concentrated and extracted (Zampirro, 2004). In the San Antonio Mountains, a river of solidified sludge now pours down the aptly named Slime Wash from the silver and gold mines at Tonopah (Bonham and Garside, 1974, 1979). Even when reclaimed, a mine, such as the New Santa Fe mine in the Gabbs Valley Range (Fiannaca, 1987) remains unchanged, except for a thin layer of grass now growing on linear piles of tailings and the disturbed ground around them.

5.2 Quaternary Stream Channel and Floodplain Alluvium (Qc)

Holocene and late Pleistocene alluvium occurs in channels and floodplains of the Walker River, the only perennial stream in the study area (U.S. Geological Survey, 2007). The two forks of the river flow out of the Sierra Nevada southwest of Wellington, Nevada and join near Yerington (Moore, 1969). From there, the river gradually ceases to exist. Diminished by irrigation in Mason Valley, Campbell Valley, and Sunshine Flat and plugged near Schurz by Weber Dam, the river disappears in most years into mud flats north of Walker Lake, its historical terminus. Walker Lake, one of the few remnants of glacial Lake Lahontan, has no outlet and becomes increasingly saline from north to south (Ross, 1961). Since it was surveyed in 1909, Walker Lake has been getting smaller (Ross, 1961). The lake level in 1955 was at 3,993 feet AMSL, but in 2006, it fluctuated between 3,934 and 3,939 feet AMSL (U.S. Geological Survey, 2007).

South and east of Walker Lake, in Mineral, Esmeralda, and Nye Counties, there are many washes draining mountain ranges and alluvial fans, but most of these are unremarkable, and few have recorded names. Some of the larger washes are Wildhorse Canyon, Gillis Canyon, Pamlico Canyon, New York Canyon, Volcano Canyon, Cinnabar Canyon, Dunlap Canyon, Telephone Canyon, Paymaster Canyon, Indian Springs Canyon, Coyote Hole Wash, Lida Wash, Mt. Jackson Wash, Slime Wash, and Big Wash (Ross, 1961; Moore, 1969; Albers and Stewart, 1972). All of these washes and the smaller, less prominent ones transmit water ephemerally, although in any of these drainages, months, years, or decades might pass between runoff events.

The detritus left behind in channels after the water recedes typically consists of unconsolidated, stratified, loose to medium-dense, grayish-brown, silty, sandy gravel and variably silty, gravelly sand (Dohrenwend, 1982a). Cobbles and boulders up to 3 feet in diameter commonly are intermixed with the sand and gravel or occur at the surface in channels. Desiccated silt and silty, fine-grained sand, which commonly are present between channels, indicate that overbank flow occurs during some runoff events. Floodplain deposits vary in character according to geologic and geomorphic settings, but they typically consist of loose to dense, reddish-brown, brown, and light-brown, variably silty, gravelly, fine- to coarse-grained sand, and sandy gravel. Near the facies transition between floodplain and lakebed deposition at the distal edge of alluvial fans, floodplain deposits tend to be finer grained and may contain interbedded silt or clay (Bingler, 1978). Soils of this unit exposed along the alignment corridor tend to be fine-grained, distal deposits of fluvial sand and silt with lesser amounts of fine gravel.

5.3 Quaternary Eolian Deposits (Qe)

Holocene to early Pleistocene eolian deposits cover large areas (see, for example, Stewart et al., 1981b; Dohrenwend, 1982a), but they generally are too thin to show on field reconnaissance maps. They consist of unconsolidated, very loose to loose, brown, grayish-brown, and light yellowish-brown, clean to silty, fine to medium-grained sand with scattered fine gravel. The eolian deposits most commonly occur as sand sheets 6 inches to less than 2 feet thick that overlie alluvial fan and valley-floor sediments. Eolian sand also occurs as dunes less than 10 feet high that were reworked from weak sandstone and siltstone, sand sheets, and lacustrine littoral and beach deposits. In areas interpreted to have been the bottom of ancestral (probably Pleistocene) Walker Lake, sand discontinuously overlies and encloses clay and silt in playa-like depressions and forms hills several feet high that surround these depressions (see description, below, of Quaternary basin-fill deposits).

5.4 Playa and Spring Deposits (Qp)

As discussed previously, the Walker River and its tributaries drain to Walker Lake. All washes in canyons emerging from the Wassuk and Gillis Ranges along the shores of Walker Lake also flow into the lake. All other drainages along the MRC lack external outlets from their watersheds and, thus, discharge ephemerally to playas. From north to south, prominent playas (see Figure 1) include Wabuska Marsh, Double Springs Marsh, three playas in Soda Spring Valley, Rhodes Salt Marsh, Columbus Salt Marsh, Big Smoky Valley playa, Alkali Flat playa, Silver Peak Marsh, Lida Valley playa, and Stonewall Flat playa.

Playa deposits examined in Walker Lake Valley (Hardyman, 1980) and Soda Springs Valley (Dohrenwend, 1982a; Ekren and Byers, 1985b) consist of stiff to hard, brown, yellowish-brown, and reddish-brown clay and silt and dense, silty to clayey, fine-grained sand. At the land surface, these sediments are tan to light brownish-gray, desiccated, and covered discontinuously with loose, eolian sand, lag gravel, and sparse, moisture-intolerant shrubs. Tufa mounds (in place and fragmented) and travertine terraces are present at former spring sites.

Three of the playas that were examined – Columbus Salt Marsh, Rhodes Salt Marsh, and Double Springs playa – are relatively unusual salt marshes (Dohrenwend, 1982a). Salt marshes (also called wet playas) have shallow water tables, which result in springs, flowing wells, marsh grass, and salt-tolerant shrubs around the edges of the playa and a puffy, saline crust on the playa

surface. At Double Springs playa, a flowing well was discharging lukewarm, sulfurous-smelling water at a rate estimated to exceed 5 gal per minute when the playa was visited in October 2006. During this same visit, at least three brackish-looking springs, were issuing from playa sediments near the well.

In salt marshes, the fine-grained sediments typical of most playas are interbedded abundantly with evaporite deposits (Papke, 1976). At Columbus Marsh, for example, the playa sediments consist of stiff to hard (soft where wet), tan, light-gray, light-green, and reddish-brown clay and silt and dense, fine-grained sand, with beds of halite, thenardite (sodium sulfate), and ulexite (a borate mineral that can be refined to produce borax). Once mined commercially for halite and borax, Columbus Salt Marsh and Rhodes Salt Marsh still contain evaporation ponds and trenches excavated into playa surfaces.

5.5 Quaternary Lacustrine Deposits (Ql)

Lacustrine beach, littoral, and bottom deposits of glacial Lake Lahontan and Walker Lake occur around the southern part of Walker Lake below an altitude of 4,360 feet AMSL, where a prominent shoreline of Lake Lahontan is preserved (Stewart et al., 1981b). Alternating strandline and littoral deposits underlie a plain extending southeast from Walker Lake between Thorne yard and the town of Hawthorne. Remnant lacustrine deposits also occur on the north and east sides of Double Spring playa, about 15 miles northeast of the modern inlet to Walker Lake (Hardyman, 1980).

The strandline deposits around Walker Lake typically consist of well-sorted (poorly graded), well-rounded beach sand. Littoral deposits typically consist of interbedded sand and sandy silt with scattered traces of shell fragments. At Thorne yard, lacustrine deposits believed to be mostly littoral consist of interbedded loose to medium-dense, tan, slightly silty to silty, fine- to medium-grained sand and soft to medium-stiff, sandy silt, which are covered with patches of eolian sand or lag gravel, and tufa deposits. Tufa deposits, interpreted to have formed where streams and springs entered a higher predecessor of Walker Lake, are associated with bouldery alluvial fans on terraces above the modern lake (Stewart et al., 1981b). Additionally, alluvial fan debris-flow deposits consisting of silty gravel with cobbles are interbedded within the beach and lacustrine soil in the Thorne yard area.

5.6 Quaternary Basin-Fill Deposits (Qbf)

As modified from Dohrenwend (1982a), Quaternary basin-fill deposits consist of undifferentiated eolian, playa, lacustrine, floodplain, and distal alluvial-fan deposits that occur together in low areas of modern basins. Contacts between the types of deposits occurring within and adjacent to Quaternary basin-fill deposits typically are gradational and poorly defined.

In areas adjacent to the Walker River, such as Mason Valley and Campbell Valley, Quaternary basin-fill deposits underlie broad, alluvial plains between the distal fringes of alluvial fans and the margins of active floodplains (Moore, 1969; Utterback, 2002). On the alluvial plains, hills, dunes, and sheets of loose, grayish-brown, eolian sand covered sparsely with moisture-intolerant shrubs and lag gravels alternate with bare areas underlain by interbedded soft to very stiff, brown and light-brown, variably clayey, sandy silt and loose to medium-dense, silty to clayey, fine-grained sand. At the surface of these alluvial plains, the fine-grained sediments typically are desiccated or encrusted with salt.

In closed basins, Quaternary basin-fill deposits either underlie broad, gently sloping alluvial plains between the distal fringes of alluvial fans and the margins of playas, or they occur as narrow aprons around the periphery of playas (Dohrenwend, 1982a). The first type of these closed basin deposits occurs in Walker Lake Valley between the Calico Hills, Gillis Range, and Walker Lake (Hardyman, 1980). The valley floor is characterized by depressions filled with fine-grained sediments that are enclosed by sand hills. The sand hills are underlain by very loose to loose, brown, reddish-brown, and grayish-brown, fine- to coarse-grained sand and silty sand, weakly cemented below a depth of about 4 inches. The depressions are filled with interbedded reddish-brown, yellowish-brown, and light-brown, medium-stiff to hard, silty clay, clayey silt, and sandy silt, and dense, slightly silty, gravelly, fine- to coarse-grained sand. The fine-grained sediments are weakly to well-indurated with limonite and calcium carbonate, and they locally contain thin beds of these minerals. At the surface of depressions, the fine-grained sediments typically are desiccated and covered discontinuously with several inches of very loose to loose, locally silty, fine- to medium-grained, eolian sand.

Closed basin deposits that form a narrow apron around playas occur throughout most of Soda Spring Valley (Speed, 1981; Ekren and Byers, 1985a, 1985b; Oldow and Speed, 1985; Oldow and Dockery, 1993; Bell, 1995). These deposits consist of medium-dense to dense, reddish-brown to brown, silty, fine-grained sand and stiff sandy silt. The sediments are weakly to

moderately cemented with calcium carbonate near the surface, where lag gravels and cobbles of scoria and other volcanic rocks commonly occur.

5.7 Younger Alluvial Fan Deposits (Qay)

Alone or interfingered with older alluvial fan deposits, younger alluvial fan deposits comprise the lower slopes of buttes, hills, and mountain ranges throughout most of the MRC (Dohrenwend, 1982a; Workman et al., 2002a). Younger fan alluvium is more common than older fan alluvium north of Walker Lake (see, for example, Moore, 1969; Bingler, 1978; Hardyman, 1980). Younger fan alluvium also dominates the lower parts of composite alluvial fans flanking Soda Spring Valley (see, for example, Stewart et al., 1981b; Ekren and Byers, 1985a; Oldow and Speed, 1985; Bell, 1995). South of Rhodes Marsh, younger fan alluvium becomes less common than older fan alluvium, but the younger alluvial fans comprise most of the sediments on lower slopes of the San Antonio Mountains, Lone Mountain, and the northern Silver Peak Range (see, for example, Robinson et al., 1976; Bonham and Garside, 1979). The younger fan alluvium generally is considered to be Holocene to late Pleistocene in age, although these ages are not constrained well by dating techniques.

In the absence of absolute age data, it is difficult consistently to distinguish younger fan alluvium from older fan alluvium. In this study, geomorphic and lithologic criteria were used to differentiate younger from older alluvial fan deposits. In general, younger alluvial fans are undissected to slightly dissected by shallow washes. Drainage is distributary, with poorly defined channels radiating from fan apices. Constructional surfaces, which are unweathered to incipiently weathered, contain little or no soil cover and poorly developed desert pavements. Clasts generally are sub-rounded to angular and are derived from rock cropping out in the drainage basins from which the fans emanate. The upper parts of these fans are poorly sorted, but sorting increases from the top to the bottom of the fans, as clast sizes decrease. Calcium carbonate in the form of calcrete layers or coatings on clasts is minimal to absent.

Younger alluvial fans flanking the Calico Hills, Gillis Range, and Pilot Mountains, that were examined in October 2006, are composed of thinly to medium-bedded, loose to very dense, grayish-brown, brown, and reddish-brown, variably silty and gravelly, fine to medium-grained sand and sandy gravel. Clasts in the sand and gravel intervals consist of rounded to angular cobbles and boulders up to 3 feet in diameter, that are derived from nearby outcrops of volcanic, pyroclastic, and sedimentary rocks. The fan deposits are unconsolidated to moderately cemented

with limonite. Fan surfaces, which contain poorly developed desert pavements, are undissected to slightly dissected by washes generally less than 20 feet deep.

Scattered patches of gravel- to boulder-size tufa clasts are found on younger alluvial fan surfaces in the vicinity of the Walker River Indian Reservation and approximately 3 miles east of Thorne in the Walker Lake Valley. The presence of the clasts on the ground surface suggests that more extensive and massive tufa deposits may have existed at one time, and could be locally buried by alluvium. In the project area, such deposits are found generally below 4,380 feet, the elevation of the high stand of Pleistocene Lake Lahontan.

5.8 Older Alluvial Fan Deposits (Qao)

Older alluvial fans, which are middle to early Pleistocene in age, interfinger with younger fans flanking the Wassuk and Gillis Ranges adjacent to Walker Lake (Dohrenwend, 1982a). Older fan alluvium dominates the upper parts of composite alluvial fans flanking Soda Spring Valley (see, for example, Stewart et al., 1981b; Ekren and Byers, 1985a; Oldow and Speed, 1985; Bell, 1995). South of Rhodes Marsh, older fan alluvium becomes more common than younger fan alluvium, particular on lower slopes of the Monte Cristo Range (Stewart et al., 1994), the Goldfield Hills and Montezuma Range (Workman et al., 2002a), the Palmetto Mountains (McKee, 1985), and the southern part of the Silver Peak Range on the west (Davis, 1981).

In general, older alluvial fans are moderately to deeply dissected by well-developed, sub-parallel washes that head on the fan surfaces (Dohrenwend, 1982a). Relief caused by wash incision typically ranges from 20 to 100 feet. Constructional fan surfaces are strongly weathered and contain moderately to well-developed soils and desert pavements. Clasts are rounded to angular and are derived from diverse geologic units not necessarily restricted to the drainage basins from which the fans presently emanate. In general, calcium carbonate in the form of calcrete layers or coatings on clasts is commonplace enough in older alluvial fans to differentiate them from younger fans. The older alluvial fans are weakly to strongly indurated in many places by limonite and/ or calcium carbonate. The upper parts of these fans are poorly sorted, but sorting improves from the top to the bottom of the fans, as clast size decreases.

Although interbedded and gradational, the older alluvial fan deposits were grouped into four categories for descriptive purposes:

1. **Sand and silty sand**: Thinly interbedded, weakly to strongly cemented with calcium carbonate or limonite, loose to very dense, light-brown, reddish-brown, grayish-brown, and white, silty sand and fine- to coarse-grained and locally gravelly sand, with generally sparse, gravel to small boulder-sized clasts (up to 15 inches in diameter), desiccation cracks in areas of exposed fine-grained sediments, and areas of sand that probably are reworked periodically by wind

2. **Gravelly, silty sand**: Medium-dense to dense, yellowish-brown to light-grayish-brown, gravelly, slightly silty to silty, fine- to coarse-grained sand, with generally sparse rounded to angular, calcium-carbonate-coated cobbles

3. **Gravelly sand and sandy gravel**: Interbedded, well-stratified, medium-dense to very dense, brown to reddish-brown, sandy gravel and gravelly, locally slightly silty, fine to coarse-grained sand, with abundant angular to sub-rounded, calcium-carbonate-coated cobbles, white, gravelly calcrete layers 3-plus-inches thick; covered with well-developed desert pavement or up to 4 inches of eolian, loose, brown, fine- to medium-grained sand

4. **Sandy gravel**: Medium dense to very dense, reddish-brown, grayish-brown, light-brown, and brown, locally slightly silty, sandy gravel, with abundant angular to subrounded, calcium-carbonate-coated cobbles and scattered boulders up to 18 inches in diameter of volcanic and sedimentary rocks; covered with well-developed desert pavement or up to 6 inches of eolian, loose, brown, fine- to medium-grained sand

Seemingly out-of-place, claim stakes and conical mounds of dirt excavated in prospecting for minerals stick up from many fan surfaces, particularly on the east flanks of the Gabbs Valley Range and Pilot Mountains, and the north flank of the Montezuma Range. A mine shaft, surrounded by blue and green float diagnostic of the supergene copper ore minerals chrysocolla, malachite, and possibly turquoise, protrudes down through the Gabbs Valley Range alluvial fan in the vicinity of New York Canyon, where most of the land between the Garfield Hills, west of Soda Spring Valley, and the summit of the Gabbs Valley Range is claimed by Aberdene Mines Ltd. The mine shaft on the Gabbs Valley Range alluvial fan descends to drifts that lead to the Mildred and Copper Queen mining claims (NBMG, unpublished report accessed 2006, at http://www.nmbg.unr.edu.)

Scattered patches of gravel- to boulder-size tufa clasts are found on older alluvial fan surfaces in the vicinity of the Walker River Indian Reservation. The presence of the clasts on the ground surface suggests that more extensive and massive tufa deposits may have existed at one time, and could be locally buried by alluvium. In the project area, such deposits are found generally below 4,380 feet, the elevation of the high stand of Pleistocene Lake Lahontan.

5.9 Quaternary Basalt Flows and Cinder Cones (Qb)

Basalt of Quaternary age has limited exposure in the study area. Pleistocene (?) [USGS, 1991] basalt flows, cinders, and bombs are associated with a small crater occur south of Blair Junction in Big Smoky Valley (Robinson et al., 1976). A late Pleistocene or Holocene cinder cone, known as The Crater, and small lava flows occur in the northwest corner of Clayton Valley, a few miles north of Silver Peak, Nevada (Albers and Stewart, 1972).

The rock is medium strength black basalt, but most of the ground surface is a lag deposit comprised of ejecta. There are no suitable outcrops from which to judge the geotechnical qualities of the basalt flows through which the corridor is proposed.

5.10 Quaternary-Tertiary Alluvium (QTa)

Quaternary-Tertiary alluvium occurs as fluvial deposits, remnant alluvial fan deposits, and pediment deposits. The alluvium has limited distribution within the study area. No absolute dates exist, but relations to other geologic units and geomorphic factors indicate that these deposits probably are Pleistocene to Pliocene in age.

Quaternary-Tertiary Fluvial Deposits **(QTf):** Quaternary-Tertiary fluvial deposits occur in two places: (a) an ancestral channel of the Walker River incised into Tertiary lake beds in Sunshine Flat; and (b) unconsolidated sediments folded into a plunging syncline in the Candelaria Hills, just north of the Mineral County-Esmeralda County line.

Deposits of an ancestral (probably Pleistocene) Walker River that are incised into Tertiary lake beds in Sunshine Flat between Campbell Valley and Weber Dam (a distance of about 13.5 miles) were examined to determine their origin and distinguishing characteristics. The deposits clearly are fluvial, based on composition, sorting, and stratification. They consist of thinly interbedded, loose to dense, light-brown, brown, reddish-brown, and grayish-brown, silty sand; fine- to coarse-grained sand; gravelly, locally silty, fine- to coarse-grained sand; and sandy, locally silty, gravel, which are weakly to strongly cemented by calcium carbonate and limonite. In places, calcrete and limonite seams are present sub-parallel to bedding. Cobble-gravel channels are incised locally into bedded intervals. Eolian sand discontinuously covers the fluvial sediments, which erode readily by gullying.

In the Candelaria Hills, folded, weakly to moderately cemented sediments dip at angles of 20 to 34 degrees, which is unusual for non-lithified material. However, these sediments clearly are fluvial, based on their composition, sorting, and stratification. The sediments consist of thinly interbedded, loose to dense, orange- to reddish-brown, brown, and gray, sandy silt; silty, fine to coarse-grained sand; gravelly, silty sand; and silty, sandy gravel.

Quaternary-Tertiary Remnant Alluvial Fan Deposits **(QTg):** An isolated remnant of an alluvial fan that formerly sloped eastward from the Wassuk Range, is preserved at Reservation Hill, on the west bank of the Walker River downstream from Weber Dam (Bingler, 1978). The alluvium consists of very dense, interbedded, brownish-gray, reddish-brown, and brown, sandy, clast-supported cobble-gravel; slightly gravelly to gravelly, coarse-grained sand, with gravel- to cobble-sized clasts partly coated with calcium carbonate; white calcrete layers; and weak limonite induration. The well-stratified deposits are capped by a surface lag of gravel- to boulder-sized clasts (≤18 inches in diameter) of plutonic, volcanic, and metamorphic rocks that crop out in the Wassuk Range (Bingler, 1978), from which the lag deposit most likely was derived.

Scattered patches of gravel- to boulder-size tufa clasts are found on remnant alluvial fan surfaces in the vicinity of the Walker River Indian Reservation. The presence of the clasts on the ground surface suggests that more extensive and massive tufa deposits may have existed at one time, and could be locally buried by alluvium. In the project area, such deposits are found generally below 4,380 feet, the elevation of the high stand of Pleistocene Lake Lahontan.

Quaternary-Tertiary Pediment Deposits **(QTp):** Quaternary-Tertiary pediment deposits underlie an alluvial plain in Montezuma Valley, between Malpais Mesa on the west and the town of Goldfield and the Goldfield Hills on the east (Ashley, 1975; Workman et al., 2002a). Another coarse pediment deposit is clearly exposed along the east edge of a prominent channel to the north of "The Monocline," north of Clayton Valley. These sediments were deposited on shallowly to deeply eroded bedrock surfaces extending outward from adjacent highlands. The deposits consist of medium dense to dense, brown to brownish-yellow, slightly gravelly, medium- to coarse-grained sand, gravelly sand, and sandy gravel. The deposits are unconsolidated to poorly cemented with limonite and are covered by a gravel-cobble pavement.

5.11 Pliocene to Middle Miocene Sedimentary Rocks (Tsy)

This Pliocene to middle Miocene geologic unit is composed of predominantly clastic sedimentary rocks that accumulated in topographic basins between 5.8 and 15.7 Ma. Component geologic units include lacustrine and fluvial sedimentary rocks and landslide deposits in the Excelsior and Pilot Mountains, the Silver Peak, Gabbs Valley, Wassuk, and Gillis Ranges, and the Candelaria, Weepah, and Garfield Hills. Named units in this geologic group include the Esmerelda, Seibert Tuff, and Pozo Formations. These, and additional component geologic units are listed in Table 3.

These sedimentary rocks consist of tan, light-gray, light-orange, green, brownish- to greenish-yellow, yellowish- to reddish-brown, red, and pink, poorly to moderately consolidated, thinly to very thickly bedded, conglomerate, gravelly sandstone, sandstone, siltstone, shale, limestone, diatomite, and gypsum of fluvial and lacustrine origin. These deposits are locally intercalated with non-welded to welded, bedded tuff, playa sediments, and lakebeds. This geologic unit also includes spring-deposited tufa mounds and landslide deposits consisting of boulder-size volcanic rocks in sand and gravel. Typically, sandstone, gravelly sandstone, and conglomerate grade into each other and erode easily into gravelly sand and sandy gravel colluvium. Sedimentary rocks comprise most of the misnamed Siebert Tuff, but in the Goldfield Hills, sandstone and conglomerate in the Siebert are intercalated with a prominent light-gray to white, nonwelded, biotite-rich, lithic-rich ash-fall tuff.

Basin-fill sediments in Campbell Valley, the Candelaria Hills, and Weepah Hills generally have moderate to medium-high strength and have very closely-spaced fractures. Colluvium, which is a dense to very dense, basalt lag of sand, gravel, and boulders, generally covers most of the surface area where these basin-fill sediments are present. Sedimentary rocks in the Esmeralda Formation have low to high strength, very-closely spaced fractures, and weather into rounded hills and badlands-type topography. Basin-fill sediments in the Campbell Valley and Candelaria Hills typically consist of loose to very dense gravel interbedded in variable proportions with soft (spongy) to hard high plasticity clay soil. The younger Tertiary sedimentary rocks, in general, are weak to moderately resistant and characteristically form benches.

5.12 Late to Middle Miocene Lava Flows of Intermediate Composition (Ta4)

This 5.8 to 17 Ma geologic unit includes the upper unit of the Blair Junction sequence (Stewart et al., 1994), latite lava flows, plugs, and dikes in the Gabbs Valley and Gillis Ranges and in Garfield Hills (Ekren and Byers, 1985b); basaltic andesite, andesite lava flows and intrusive rocks in the Garfield and Candelaria Hills and Wassuk Range; and intermediate composition lava flows, lahars, and intrusives in the Candelaria and Garfield Hills, Excelsior and Pilot Mountains, and Gillis and Wassuk Ranges. Additional formations included within this geologic unit are shown on Table 3. The geologic unit consists of black, gray, purple, and reddish-brown, commonly glassy, commonly foliated, locally hydrothermally altered, dacite, andesite, and basaltic andesite lava flows and flow breccia, with mudflow breccia and subordinate tuffaceous and sedimentary rocks.

On the south side of the Desert Range on Sunshine Flat, a very high strength, dark gray, moderately weathered, porphyritic, basaltic andesite flow has very closely to widely spaced fractures and weathers to rounded gravel- to boulder-size clasts. This flow is of limited thickness and has disintegrated to an andesite lag deposit overlying sedimentary rocks.

Along the north flank of the Garfield Hills, 5.8 Ma latite lava flows (Ekren and Byers, 1985b) were observed near the project corridor. These rocks consist of low- to medium high strength, dark gray to black, glassy to finely crystalline, fresh to moderately weathered, latite flows. Based on field observations, the latite flows are not suitable for ballast.

Extrusive andesite flows, breccia, lahars, and local hypabyssal intrusive bodies, locally interbedded with thin volcanigenic sedimentary units, are mapped by Oldow and Dockery (1993) along the west flank of the Gabbs Valley Range. Observations of these rocks indicate medium-high to high strength, dark gray, porphyritic, fresh to slightly weathered, 10- to 20-foot-thick flows interbedded with gravel- to boulder-rich lahar deposits.

5.13 Middle Miocene Rhyolite to Rhyodacite Ash-Flow and Ash-Fall Tuffs (Tt4)

Middle Miocene (approximately 13 to 17 Ma) rhyolite to rhyodacite ash-flow and ash-fall tuffs are exposed near the rail corridor along the west side of the Gabbs Valley Range. Included within this geologic unit are the rhyolite ash-fall tuff and tuff breccia in the Mt. Jackson Ridge area, rhyolite and rhyolite tuff in the Gabbs Valley Range, and the middle unit of the Blair

Junction sequence as interpreted by Stewart et al. (1994). Unit Tt4 consists of crystal-rich ash-flow tuff, rhyodacite, and rhyolite volcanics of the Gabbs Valley Range (Oldow and Dockery, 1993); and water laid tuff, welded tuff, pumice breccia, and glassy to dense porphyritic flows within the Mina quadrangle (Ferguson, 1954). Stewart et al. (1994) define the middle unit of the Blair junction sequence as a lithic- and pumic-rich, vitric, nonwelded, pyroclastic tuff.

5.14 Early Miocene Lava Flows of Intermediate Composition (Ta3)

Early Miocene (approximately 19 to 22 Ma) lava flows and intrusives of intermediate composition with subordinate pyroclastic rocks have good exposure from the Goldfield Hills north to the Candelaria Hills and Monte Cristo Range. Included within this geologic unit are the dacite at Goldfield, Milltown Andesite, lower unit (andesite and dacite) of the Blair Junction Sequence (Stewart et al., 1994), and other formations listed in Table 3. Unit Ta3 consists mostly of dark gray to brown, fine-grained to porphyritic, andesite to dacite lava flows, flow breccia, lahars and intrusive rocks. The lava flows of intermediate composition locally are intercalated with tuff, clastic rocks, or basalt lava flows, or underlain by grayish-green to black perlite layers. Lava flows and intercalated tuff in the Goldfield Hills have been altered extensively to clay and clayey megabreccia by hydrothermal solutions. Lava flows, perlite, intrusive bodies, and volcanic mudflow breccia typically have high to very high strength, but strength decreases to very low to low where the rocks have been hydrothermally altered to clay or clayey megabreccia. Very closely to widely spaced fractures were observed in outcrops of unaltered andesite and dacite lava flows, perlite, and moderately weathered diorite. Unaltered rocks are resistant and tend to form hills and cliffs.

5.15 Early Miocene Rhyolite to Rhyodacite Ash-Flow and Ash-Fall Tuffs (Tt3)

Early Miocene (approximately 17.1 to 23.8 Ma) rhyolite and rhyodacite ash-flow tuff and ash-fall tuff have widespread exposure from the Goldfield Hills north to the Monte Cristo Range. Included within this geologic unit are the Fraction, Candelaria Junction, and Belleville Tuffs, Tuffs of Chispa Hills, Candelaria, and the Eastside Mine, and the ash-flow and air-fall tuff as mapped by Hambrick (1984) within the lower unit of the Blair Junction Sequence (Stewart et al., 1994). Additional formations included within this geologic unit are listed in Table 3. This geologic unit consists of pink, reddish-brown, orange, greenish-gray, gray, and black, nonwelded to densely welded, locally vitrophyric, variably porphyritic, variably lithic, rhyolite to rhyodacite

ash-flow tuff with subordinate intervals of tuff breccia, vitrophere, volcaniclastic rocks, and lava flows. Tuff beds locally are hydrothermally altered.

Welded outcrops have high to very high strength, but nonwelded to partially welded tuff and hydrothermally altered rock can have low to medium-high strength. At a site in the northern Goldfield Hills, moderately welded tuff breaks readily perpendicular to foliation planes. Conversely, nonwelded to partially welded tuff in the Montezuma Range tends to form massively rounded cliffs. Fractures typically are very closely to widely-spaced, but they can be widely to very widely spaced where the rock is especially resistant. Because of variable lithology and induration, this geologic unit forms cliffs, ledges, and slopes.

5.16 Miocene Rhyolite Lava Flows and Related Intrusive Rocks (Tvr)

Small to moderate exposures of Miocene (8.5 to 20.7 Ma) rhyolite lava flows and related intrusives are common in the south part of the study area. They include the rhyolite and/or rhyodacite of the Montezuma Range, Rhyolite of Wildhorse Spring (Goldfield Hills), Rhyolite of Klondike, rhyolite in the Gabbs Valley, Wassuk, and Gillis Ranges, and other geologic units listed in Table 3. They consist of gray, yellowish-gray, pale-orange, pink, purple, reddish-brown, and black, commonly flow-banded, porphyritic rhyolite, rhyodacite, and dacite lava flows, flow breccia, domes, plugs, and dikes. In the Montezuma Range, outcrops of dark gray to black rhyolite lava flows overlie Cambrian rocks and were found to have low to moderate strength and very closely to closely spaced fractures.

5.17 Miocene and Oligocene Sedimentary and Volcanic Rocks (Tsv)

The Miocene and Oligocene (7.2 to 28.6 Ma) volcanic, volcaniclastic, and sedimentary rocks include tuff, sedimentary rocks, and rhyolite domes in the Monte Christo Range; younger volcanic and sedimentary rocks in the Silver Peak Range, Candelaria and Garfield Hills, and Excelsior Mountains; older volcanic and sedimentary rocks in the Silver Peak and Gabbs Valley Ranges and Excelsior Mountains; landslide deposits, fluvial deposits and flow breccia in the Goldfield Hills; and the Sandstorm, Siebert, and Esmeralda Formations (refer to Table 3).

Rocks of this geologic unit consist of fluvial and lacustrine conglomerate, sandstone, siltstone, shale, limestone, and lignite; landslide deposits; volcanic and tuff breccia; ash-fall and ash-flow

tuff; flow-banded rhyolite domes with black vitrophere; and basalt, andesite, dacite, rhyodacite, and rhyolite lava flows and flow breccia.

Rocks of the Esmeralda Formation as defined by Stewart, et al. (1994) exist proximal to the alignment near the Candelaria Hills and along the southwestern portion of Big Smokey Valley. Outcrops of these rocks consists of low to high strength, light gray, gray, and tan, fresh to moderately weathered to orange, brown and white, moderately welded, crystal-poor, lithic-poor to lithic-rich, rhyolite ash-flow and ash-fall tuff. Most outcrops observed on the north flank of the Candelaria Hills and at Big Smokey Valley had variable strengths, with the degree of welding influencing rock strength significantly. In general, this geologic unit has very close to medium-spaced fractures. Bedding ranges from laminated to indistinct (massive).

5.18 Oligocene Silicic to Intermediate Ash-Flow and Ash-Fall Tuffs (Tt2)

Oligocene (approximately 24 to 33 Ma), silicic to intermediate ash-flow tuff, ash-fall tuff, and volcaniclastic rocks have good exposure in the Goldfield Hills, Garfield Hills, and Quinn Canyon Range. Included within this geologic unit are the Kendall and Sigatse Tuffs, the Tuffs of Candelaria, Miller, and Cedar Mountains; ash-flow tuff in the Candelaria and Garfield Hills, and Excelsior and Wassuk Mountains; and other formations listed in Table 3. This geologic unit consists of gray, light-gray, greenish-gray, green, brown, grayish-brown, yellow, buff, pale-purple, red, brownish-red, pink, pinkish-tan, orange, and white, nonwelded to densely welded, variably porphyritic, variably lithic, dacite, trachyte, and rhyolite ash-flow tuff, with bedded lithic-rich tuff and volcaniclastic rocks, tuff breccia, mudflow breccia, andesite lava flows, and diorite plugs. Locally, as in the Goldfield Hills, unit Tt2 is altered hydrothermally to predominantly clay minerals or mixtures of chlorite, sericite, amorphous silica, and carbonate minerals.

Unaltered ash-flow tuff has very high strength where densely welded and medium to high strength where partially welded. Where chloritized or argillized, the strength of ash-flow tuff can be expected to decrease to moderate to low. Observed fracture spacing was very close to wide in unaltered and altered ash-flow tuff.

Bedded, reworked tuff and volcaniclastic rocks are friable in outcrop and exhibit moderate to medium-high strength. Outcrops of reworked tuff and volcaniclastic rocks have thickly to very

thickly spaced bedding, as do outcrops of volcanic mudflow breccia. Observed fracture spacing was very close to wide in reworked tuff and volcaniclastic rocks.

Because of variable lithology and induration, unit Tt2 tends to form cliffs, ledges and slopes. Locally, as in the west end of Soda Springs Valley, bedded tuff weathers to knobs and buttes.

5.19 Cretaceous and Jurassic Granitic Rocks (KJg)

Cretaceous to Jurassic (66 to 208 Ma) quartzo-feldspathic ("granitic") plutons are widespread in the study area. Some of the more prominent plutons, such as those underlying the Wassuk Range, White Mountain, and Lone Mountain (Bingler, 1978; Stewart et al., 1981c; Maldonado, 1984), are listed in Tables 2 and 3. Minor gradations in chemistry aside, the plutons in this geologic unit are composed mostly of quartz monzonite, granite, or granodiorite. The intrusive mass underlying Todd Mountain is a composite pluton, which laterally grades from quartz monzonite to monzonite to granite (Ekren and Byers, 1985a). Composite plutons are uncommon in this geologic unit.

The most resistant plutonic rock in the geologic unit appears to be granite, which was examined in the Montezuma and Wassuk Ranges, at Todd Mountain, in the Gabbs Valley Range, and at Lone Mountain. The granite in these mountains has high to very high strength. It is light-gray to white, medium-grained phaneritic, and contains up to 10 percent biotite. The rock generally is fresh, except for a thin weathering rind. Where the rock is slightly to moderately weathered , it is mottled yellow, orange, red, brown, and light-gray several inches from exterior surfaces, and feldspar, biotite, and mafic accessory minerals are partly or wholly replaced by sericite, epidote, and chlorite. Weathering along rectangular fracture sets typically results in rounded to subrounded outcrops. Fractures in the granite are closely to very widely spaced (up to 6 feet apart). In places, intrusion of the granites caused contact-metamorphism of the wall rocks, of particular note west of the North Clayton ballast quarry site.

Granite and granodiorite were examined in the Montezuma, Wassuk and Gabbs Valley Ranges. The granite and granodiorite in this geologic unit have moderate to high strength (decreasing in shear zones), and, thus, are less resistant to erosion than the quartz monzonite. Where examined, the granite and granodiorite were pale-pink, gray, and reddish-gray and medium to coarsely phaneritic or porphyritic. Near a prominent fault, the granite was less sheared than the granodiorite, but the former was more weathered. The granite readily decomposes to grus-

covered slopes surrounding knobs and ledges of remnant granite. Slightly to moderately weathered outcrops of the granite, in general, are mottled orange, brown, and white. Pegmatitic dikes within the granite and granodiorite in the vicinity of Mineral Ridge are included within this geologic unit (Albers and Stewart, 1972). Some of the dikes are less resistant to weathering than the surrounding formation. Propylitic alteration of biotite to chlorite, instead of pronounced weathering, was observed in the granodiorite. Both the granite and granodiorite have very closely to widely spaced fractures, with a maximum spacing of 6 feet. The more closely spaced fractures in the granite seemed to be related to shear zones. Unaltered, unjointed blocks of 6 to 10 feet in diameter were observed in the granodiorite of the Montezuma Range.

5.20 Cretaceous and Jurassic Mafic Intrusive Rocks (KJm)

Dikes, plugs, stocks, and irregularly-shaped bodies of greenish-gray, dark green, and greenish-black diorite, tonalite, gabbro, serpentinite, and lamprphyre occur in the vicinity of Lone Mountain (Bonham and Garside, 1979; Maldonado, 1984) Mineral Ridge (Craig, 2003), and many other areas.

5.21 Jurassic and Triassic Sedimentary Rocks (JTrs)

The sedimentary rocks of this unit consist of variable proportions of interbedded limestone, cherty limestone, dolomite calcareous mudstone, shale, argillite, sandstone, and comnglomerate which are locally metamorphosed into marble, calc-silicate skarn, hornfels, and schist. Named formations within this unit include Sunrise, Gabbs and Luning Formations, in addition to others listed on Table 3. Ekren and Byers (1985a) describe the Lower Jurassic Sunrise Formation as interbedded black and brown shale and argillaceous cherty limestone. The Gabbs Formation consists of three members: a fossiliferous upper member and nonfossiliferous middle member of brown, shaly, and sandy limestone, and a lower member of dark gray, thinly bedded carbonaceous shale containing interbeds of black impure limestone (Ekren and Byers, 1985a). Oldow and Dockery (1993) describe the Luning Formation as thin to medium bedded, gray to black limestone and dolomite interbedded with terrigenous clastic rocks comprised of chert-quartz sandstone, chert-pebble conglomerate, and argillite.

Rocks of this geologic unit encountered along the west flank of the Gabbs Valley Range consist of medium high to very high strength, interbedded white, light gray, and dark gray, laminated to thickly bedded, fresh, fine to coarse crystalline dolomitic limestone with thin seams of reddish-

orange and yellow-weathered, silty limestone of low to moderate strength. Other outcrop observations exhibited very close to medium-spaced fractures and some hydrothermal alteration.

5.22 Triassic and Permian Metamorphosed Sedimentary and Volcanic Rocks (TrPvs)

This geologic unit includes metamorphosed sedimentary and volcanic rocks exposed in the Gillis and Wassuk Ranges, Garfield Hills, and Excelsior Mountains (Garside, 1982; Oldow and Speed, 1985; Oldow and Steuer, 1985, Ekren and Byers, 1985b). Many of the rocks formerly were assigned to the Excelsior Formation, and though to be Triassic-aged. However, the name "Excelsior Formation" is now considered to be obsolete and these rocks are considered to be a Permian to Triassic-aged structural mélange. The Pamlico and Black Dyke Formations are included in this regional unit. In general, the rocks of this unit consist of submarine lava flows, volcanic breccia, and intrusive rocks of mostly intermediate to mafic composition commonly metamorphosed to greenstone and serpentine; silicic to intermediate ash-flow tuff, sedimentary breccia, conglomerate, sandstone, greywacke, siltstone, mudstone, limestone, and chert, which are metamorphosed to hornfels, argillite, slate, and marble.

Metamorphosed and altered rhyolite lava flows crop out in the Garfield Hills (Ekren and Byers, 1985b). The flow-banded rhyolite was deposited subaerially, contains ubiquitous epidote and is typically brecciated. Where observed on the north flank of the Garfield Hills, the extensively altered rhyolite flows had very low to moderate strengths, were mottled red, green, purple and white in color, were very fractured and contained gypsum-filled fractures.

5.23 Upper Cambrian Carbonate Rocks (Cc)

Upper Cambrian carbonate rocks are present near the alignment in the Goldfield Hills of southern Esmeralda County. Named formations within this unit include the Mule Spring Limestone and the Emigrant Formation. These rocks are characterized by gray, fine to medium-grained limestone with cherty and limy siltstone layers; olive- to greenish-gray, thinly laminated shale, and interbedded limestone and siltstone (Albers and Stewart, 1972).

Field observations in the Goldfield Hills indicate the limestone of this unit is very high strength, fine and fine to medium grained, bedded with cherty layers, and slightly weathered.

5.24 Middle and Lower Cambrian and Late Proterozoic Sedimentary Rocks (CZs)

The oldest rocks encountered in the study area are comprised of argillite, claystone, siltstone, thinly bedded sandstone, and quartzite interstratified with thin to thick bedded, fine to coarse-grained limestone and dolomite. Many of the rocks of this unit are slightly to significantly metamorphosed. Named formations included within this unit include the Harkless, Poleta, Campito, Deep Spring, Reed, and Wyman Formations of Late Proterozoic to Cambrian age (Albers and Stewart, 1972). Within the study area, rocks of this unit exist within the Goldfield Hills, Clayton Ridge, and the Montezuma Range.

The variably metamorphosed sedimentary rocks of this unit range in strength from very low to very high, with strength affected by differences in fracture geometry, bedding, and the degree of weathering. Generally, the carbonate and quartzite rocks of this unit exhibit relatively high strengths.

Unfavorable bedding orientations exist adjacent to the alignment near Clayton Ridge. Interbedded phylitic siltstone, dolomite, limestone and sandstone of the Poleta and Harkless Formations have bedding orientations that dip toward the alignment corridor and exhibit past instability in the form of block sliding along relatively weak, fine-grained interbeds of siltstone, shale, and claystone.

6.0 CHARACTERIZATION OF SOILS WITHIN THE CORRIDOR

Soil comprises the surficial material over approximately 90 percent of the MRC. Soils consist of unconsolidated alluvium, colluvium, lacustrine, and fluvial deposits. Some poorly indurated bedrock units such as the Tertiary Lake bed deposits (Tsy) exhibit characteristics more like soil than rock in some locales.

Descriptions and area limits of soil deposits were initially determined based on the locations of unconsolidated Quaternary and Tertiary sediments shown on geologic maps obtained during the literature search. During the field reconnaissance, soils within each geologic unit were visually classified in accordance with the Unified Soil Classification System (USCS), as described in American Society for Testing and Materials (ASTM) D 2487, Standard Procedure for Classification of Soils for Engineering Purposes (USCS). A field reference sheet for soil classification is included in Appendix F.

Soil properties within the same geologic unit would vary depending on the location within the geologic unit and other factors. Therefore, classifications at a few easily accessible locations would not necessarily be representative of soil conditions throughout the corridor as it traverses the unit. To map soil deposits in greater detail, we performed a search of soils data obtained from the USDA/NRCS. The USDA/NRCS maintains a nationwide database of soil survey information in the Soil Survey Geographic Database (SSURGO Version 2.2). This database is organized by state, county, and soil area within each county. Tabular data available for each soil area includes soil layers, layer thicknesses, soil classifications, engineering and index properties, physical and chemical properties, and other related data. Spatial data defining the extents of the map units described above are also available in common GIS formats. The SSURGO database template and tabular data were downloaded in Microsoft Access™ format and the spatial data were downloaded in ESRI ArcView shapefile format from the USDA/NRCS Soil Data Mart web site http://soildatamart.nrcs.usda.gov/.

Data from the following areas, covering most of the Mina Rail Corridor, were downloaded.

Area Symbol	Area Name
NV770	Churchill County Area, Nevada, Parts of Churchill and Lyon Counties
NV796	Esmeralda County Area, Nevada
NV799	Hawthorne Ammunition Plant, Nevada, Part of Mineral County
NV625	Lyon County Area, Nevada
NV774	Mineral County Area, Nevada

GIS soil survey map units were overlain onto the MRC alignment maps. The alignment stations at contacts between different soil map units were determined and listed in a table. After tabulating station intervals and the corresponding soil map units, soil properties associated with each unit were linked to the tabular data downloaded from the Soil Survey Geographic Database and added to the table. The resulting summary of soil survey data along the MRC is presented in Table 4.

7.0 GEOLOGIC HAZARDS

Several types of geologic hazards occur throughout the corridor that could impact route selection, design, construction, and operation. These hazards are discussed in general terms in the following sections. Typical mitigation methods are also discussed. Specific hazards that were identified during the geologic reconnaissance effort are listed in Table 6.

7.1 Rock Slope Hazards

Rock slope hazards could occur along discrete segments in the MRC depending on the geologic conditions within each segment, orientation of the rail alignment and cut slopes relative to geologic structure, and the distance from the alignment to existing or constructed slopes. Because of the steep and rugged terrain through which the corridor extends, rock slope hazards would likely be a significant geologic hazard affecting the alignment through the corridor. Like landslides, rock slope failures occur when the driving forces (gravity) exceed the resisting forces (friction and cohesion).

Rock slope failures can result from a wide range of mechanisms, such as circular failures, structurally controlled failures (i.e., plane shear, wedge, and toppling), buckling, key block, and differential erosion, among others. Rock slope failures typically occur where rock discontinuities, including joints, bedding and foliation, are adversely oriented with respect to the natural or constructed slope face. Slope stability could be further reduced by natural processes of weathering (freezing and thawing, precipitation, vegetation, and erosion by humans and animals), which contributes to the mechanical breakdown of the rock mass within the rock matrix and along the discontinuities. Groundwater seepage, earthquake-induced ground shaking, and construction vibrations further reduce rock slope stability.

Mitigation of rock slope hazards could be accomplished using one or, more likely, a combination of mitigation measures, loosely defined as stabilization, protection, and instrumentation. Generally, stabilization measures reduce the driving forces or increase the resisting forces. Typically this includes either removing the potential rockfall hazard by hand, mechanical or blast scaling, or controlled blasting, or by providing external support to the rock slope using rock bolts/dowels, shotcrete, retaining walls and buttresses, cable lashing, or other methods.

In some situations, implementation of stabilization methods is not appropriate because of cost, accessibility, environmental constraints, or other factors. Consequently, protection measures can be considered that do not improve the stability of the rock slope, but provide measures that reduce the hazard to rail traffic. Protection measures include relocation of the track away from the hazard (increased ditch widths/depths), draped mesh barriers, diversion berms, mid-slope benches, catchment fences, rock sheds, and tunnels.

Railroads have for a number of years employed instrumentation to alert approaching trains to rockfall events. Typically, the instrumentation system consists of a multi-wire slide fence of varying heights and configurations. When a falling rock breaks a wire in the slide fence, it results in a signal indication that alerts approaching trains. There are numerous situations where slide fences augment the stabilization and protection measures described above.

7.2 Earthquake Hazards

Earthquake hazards in the project area include ground shaking, surface fault rupture and displacement, and liquefaction and lateral spreading. Seismic activity could also initiate rockfalls and landslides as described above. Ground shaking of sufficient intensity could conceivably cause a train derailment. Strong ground motion is discussed in the G-DCM (Shannon & Wilson, Inc., 2005b) that includes Peak Ground Acceleration maps. Surface fault rupture could have a significant impact on the railway alignment, and displacement of tens of feet is possible along numerous faults. Best available fault data indicate three principal zones of active faulting along the alignment: the Wassuk Range, Lone Mountain, and Benton Spring fault zones. The Wassuk Range fault zone is intersected by segments S1/S2. Segment MN2 crosses the Lone Mountain fault zone (at two locations) and segment MCS1 crosses the Benton Spring fault zone (at two locations). These faults are identified on Plate 4. Seismic activity could also induce liquefaction and lateral spreading of the subsurface soils, and potentially impact the alignment. No hazard maps assessing liquefaction and lateral spreading hazards exist for the MRC, so assessment of the hazard level for these seismic conditions is deferred to subsequent studies.

Mitigation of earthquake-related hazards would likely consist of avoidance, warning, and adequate infrastructure design and construction. Avoidance of active faults would reduce the hazard of fault rupture impacts to the tracks; however, because of the potential number of faults and their uncertain return periods, complete avoidance is probably not feasible. Earthquake warning could include the installation of seismometers to supplement seismographs already installed in the vicinity of the MRC. The operating plan for the railroad should include procedures to inspect the railroad prior to continuing train operation following significant earthquakes to locate and correct any problems with the track structure. Structures (such as bridges and retaining walls) should be designed to American Railway Engineering and Maintenance-of-Way Association (AREMA) seismic standards, as discussed in the G-DCM.

7.3 Surface Fissures

Surface fissures are both naturally occurring and man-made tension cracks in the ground that range in size from about 90 feet to several miles long and up to 15 feet wide (Swadley, 1995). Naturally occurring fissures are widest near the ground surface and narrow quickly at a depth of 9 to 15 feet, making measurement of total depth difficult. The large amount of sediment that is accommodated in the subsurface part of the fracture suggests that the total depth could be considerable (Swadley, 1995). Fissures develop from erosion of material by water into existing cracks in the ground. Man-made fissures result from land subsidence as a consequence of groundwater withdrawal, dissolution of soluble rocks, and underground mining. Subsurface piping of material into a crack eventually leads to collapse of the roof. The fissures enlarge as water runoff erodes material into the crack from the edges of the fissure. Fissures may become inactive when the cracks fill up with material. We understand that surface fissures have been observed in the Quaternary deposits within Clayton Valley, but it is not known if they developed as a result of natural or man-made activities.

Mitigation of surface fissures would consist of avoidance or design of remedial measures to repair existing fissures that would impact the alignment. Fissures that are identified prior to construction could be filled with appropriate backfill material. Existing fissures could be instrumented to provide warning if they become active in such a way that might impact the tracks. Test pit explorations in areas that have a history of surface fissures could help identify fissures that have not opened to the ground surface or that could become active in the future.

7.4 Scour and/or Flood

Surface erosion hazards along the alignment are primarily those associated with water flowing overland and within existing channels. Flash floods can cause substantial erosion and scour of the loose sediments commonly found in the stream and river channels and in their banks within the project area. Floods across alluvial fans can cause channel avulsions, resulting in floodwaters and debris diverted away from bridges or culverts, and instead, passing over and depositing debris on the railway. Floods, as well as lesser channel flow events, can also cause bank erosion that allows the channel to migrate toward the railway over a period of time such that eventually, the railway can be undermined. Potential scour hazard areas are identified on Table 6, for known bridge sites, areas where existing channels parallel and are in proximity to the proposed alignment, and significant erosion features that we observed that cross the

alignment. In addition, lowland areas occupied by the playas and dry lakes are particularly susceptible to flooding during significant precipitation events. Consequently, for this study, low-lying areas occupied by Quaternary playa (Qp) and lake bed deposits (Ql) have been identified in Table 6 as potential flood hazard areas.

Avoidance would be the primary method to reduce risk associated with scour and flood hazards; however, this may not always be feasible. Bridges and culverts should be designed and constructed for specific design events, including potential scour. River banks could be armored with rock to resist erosion. Structures, such as barbs or groins, could also be built to redirect river or stream flow away from the track structure. Channels on alluvial fans could be monitored to assess their trends and potential future behavior so that preventive measures could be planned and implemented. Dikes could be constructed and/or new channels excavated in an attempt to channelize and contain streamflow on these fans. Detection systems for high water, track displacement, movement of the embankment, or loss of embankment materials could be used in conjunction with or in place of these mitigation methods.

7.5 Mined Land Subsidence

Collapse of ground overlying mine works is a potential hazard at localized areas along the MRC. Depending on the size and depth of the mine and the engineering geology of the overlying rock, ground collapse could be significant. With time, support structures in abandoned mines deteriorate, and rock masses weather and continue to open along discontinuities so that eventually, mine roofs and walls collapse. If the mines are relatively deep, the overlying rock could bridge the collapse. However, if the mine is relatively shallow or the overlying rock is weak, the collapse could progress to the ground surface. Ground collapse beneath the track structure could cause significant damage to the track alignment and adversely impact train operations. The potential for a mine subsidence hazard is identified on Table 6 for sections of the alignment that are in proximity to present or past mining activity as shown on USGS 1:24,000 scale maps and from reconnaissance observations.

Avoidance of active and abandoned mining areas is the primary measure to mitigate the risk of mine collapse. The alignment should be assessed for known underground mine sites. Where these sites cannot be avoided, the mined ground should be evaluated for evidence of past instability and potential for future collapse. This would include an evaluation of the geology and topography. Geophysical methods could be used to evaluate the size and depth of the mine

features and, in conjunction with borings, the condition of the overlying rock. Measures to reduce the potential for mine collapse could include stabilization of the mine with additional support or backfilling all or portions of the mine with an appropriate backfill material. Generally, mine subsidence below railroad embankments and fills could be accommodated by placement of additional fill, allowing restoration of track geometry with relatively low impacts to train operations. However, mine subsidence that could impact structures should be carefully assessed and structures should be appropriately designed and positioned to reduce the associated risks. In some cases, this might require that the railroad alignment be relocated to an alternative alignment.

7.6 Debris Flows

Debris flows, which for the purposes of this report include debris torrents, mud flows, and debris avalanches, are rapidly moving mixtures of water, soil, rock, and sometimes organic material. A debris flow can start during or after intense rainfall where a temporarily dammed stream is suddenly breached. After the dam fails, the saturated debris can travel downslope for several miles within a steep, confined channel. Debris flows lose energy and begin to deposit material when the stream gradient flattens or when the channel widens.

Significant reaches of the MRC cross alluvial fans and ephemeral stream channels which may be impacted by debris flows over the operational life of the railroad. For the purposes of this study, debris flow hazard potential is indicated for MRC segments that traverse relatively steep sections of alluvial fans, generally described as older and younger Quaternary alluvium (Qao and Qay, respectively), or where the alignment crosses fan channels (Qc).

Avoidance of debris flow hazards is not feasible; therefore, measures to reduce the impacts from debris flows should be developed. Channels in which debris flows could occur and impact the railway should be identified. Approximate sizes of debris flows could be estimated given the size of the drainage basin, channel characteristics, types of material involved, and evidence of past debris flow events. Structural measures, such as appropriately sized bridges, culverts, and overgrade debris flow chutes, could be constructed so that a given design debris flow could pass the tracks with no significant impacts. Alternatively, measures could be constructed to trap and retain the debris prior to its reaching the tracks. These measures could include debris dams, debris basins, debris racks, and flexible barriers. Measures to both trap debris and to allow debris to pass the railway could be constructed where the estimated debris flow volumes are too

large for a single type of measure. Instrumentation and warning systems could be installed to alert approaching trains of debris flows that have impacted the railway.

7.7 Soil Collapse

Soil collapse, also known as hydrocollapse or hydroconsolidation, can occur in certain arid soils upon wetting. The phenomenon is discussed in more detail in the G-DCM. Soils in arid regions are often rapidly deposited as debris flows, as alluvial fans, dune deposits or basin fill deposits. Consequently for this study, we have indicated in Table 6 the potential for soil collapse for Quaternary eolian (Qe), basin fill (Qbf), and in very loose to loose younger alluvium (Qay) and fluvial (QTf) deposits These soils may have a weakly cemented soil structure that breaks down upon an increase in moisture content. The effects of soil collapse are a decrease in volume and loss of shear strength. Soils deposited by wind also tend to have a high potential for collapse. Some engineered fills can also collapse if compacted to a low density and dry of optimum moisture content.

The data in Table 4 could be used to identify soils that may potentially exhibit volume changes upon fluctuations in moisture content. Correlation to index properties would need to be conducted to determine the potential for a soil unit to collapse, to exhibit high swell pressures due to an increase in volume upon wetting, and other moisture sensitivities.

Potential methods of soil improvement to mitigate soil collapse are presented in the G-DCM.

7.8 Soft Soil (Low Bearing Capacity)

In some areas, new embankment construction could cross soft, wet, or otherwise unsuitable soils. Poor subgrade conditions would most likely be encountered in Quaternary lakebed deposits (Ql), Playa Deposits (Qp), basin-fill deposits (Qbf) where described as cohesive, channel alluvium (Qc) where described as silt, and in highly weathered Tertiary fluvial and lacustrine deposits (Tsy) .

Where fill is to be placed in these areas for embankment construction, subgrade treatment or stabilization could be required. Appropriate methods could include over-excavation of the soft soils and replacement with compacted fill, treatment with a chemical additive, or bridging with a rock fill and/or geosynthetic, such as geogrid or geocell. Preloading of the subgrade could also be used to increase soil strength and decrease settlement of soft soils.

7.9 Blowing Sand

Loose, fine-grained soils present across much of the MRC are subject to erosion by wind. While we anticipate that blowing sand may be encountered at various places throughout the corridor, this condition will require special attention in Quaternary eolian deposits (Qe) in the Big Smoky Valley area of alignment MN-2 (Stations 5295+00 to 5486+00) and the southern extents of alignments S-1, S-2 and S-3, northeast of Walker Lake (Stations 10780+00 to 11699+65, 11387+00 to 11618+81, and 10111+00 to 11012+35, respectively). We understand that NDOT cautions vehicle drivers that a blowing sand hazard exists along the highways North from Silver Peak and West from Tonopah to Blair Junction (portions of MN-1 and MN-2). While a blowing sand hazard may exist, we did not observe active or inactive eolian deposits during our geologic reconnaissance in these areas.

The impacts from blowing sand consist of sand dune migration and fugitive dust. Sand dunes are natural features and consist of migrating mounds of blowing sand. There is also the potential that dunes that are stable at present could be reactivated by natural causes or construction-induced changes. Migrating sand dunes could bury the track. Other problems associated with blowing sand and dust include rail-seat abrasion, loosening of track fasteners, excessive rail wear, and fouled ballast.

Typical measures used to stabilize dunes and control fugitive dust include the following: (a) change of alignment to avoid dune areas, (b) barriers (fences, concrete barriers, etc.), (c) desert pavement (gravel placed over the erodible surface soil), (d) application of adhesives and soil stabilizers, and (e) vegetation.

8.0 PRELIMINARY ENGINEERING AND CONSTRUCTION CONSIDERATIONS

The following text presents preliminary engineering and construction considerations for earthwork, drainage, erosion protection, and geotechnical design for structures. This discussion is intended to supplement the information provided in the G-DCM. Preliminary recommendations for cut and embankment fill slopes angles, as well as excavation methods are presented in Table 6 by station interval for each alignment segment.

At this time, the locations and characteristics of cuts, fills, and structures are not known with certainty. General references to cut-and-fill heights, bridge lengths, and other engineering

features are based on plan and profile drawings provided by BSC. The engineering considerations presented in Table 6 are based on generalized conditions within a geologic segment. Therefore, recommended cut–and-fill slope angles presented in Table 6 are preliminary; cut and fill slopes could be steeper or flatter than indicated as design of the MRC progresses.

8.1 Ballast and Subballast

Preliminary recommendations for ballast and subballast are discussed in detail in the Preliminary Construction Aggregate Report included in Appendix C.

8.2 Excavations

Excavations would be required to construct drainage ditches, to remove unsuitable soils in fill placement areas, and to construct cuts. Most soils encountered along the alignment could likely be excavated using conventional earthmoving equipment such as dozers, scrapers, graders, rubber-tired backhoes, and track-mounted excavators. Excavation of caliche, older cemented alluvium, and highly weathered rock could require the use of rippers attached to conventional equipment. Unweathered rock encountered along the alignment would likely require drilling and blasting. Excavation methods for the geologic units encountered along the MRC are identified in Table 6.

8.3 Cut Slopes

Preliminary cut-slope recommendations are presented in Table 6. The recommendations were developed from a combination of field observations of the stability of existing cut slopes and our experience with slopes in similar materials. Actual cut-slope angles excavated during construction could vary significantly depending on the engineering properties of the soil and rock contained within the cut. Appropriate cut-slope angles in rock would depend on the orientation of the discontinuities with respect to the track alignment, and the engineering characteristics of the discontinuities such as length, spacing, roughness, infilling/coating, and groundwater conditions. In general, the use of mid-slope benches is not recommended. They tend to accumulate water and are a common cause of shallow slope failure in soil slopes. They can sometimes serve as launching features, adding to the run-out of falling rocks in rock slopes. However, mid-slope benches, slope flattening, or stabilization/protection methods discussed in

Section 7.0 could be necessary to improve the stability and reduce the rockfall hazard of cut slopes in some areas.

8.4 Embankments

Embankment fills along the corridor would be constructed of both soil and rock, depending on the proximity of suitable material source. Embankment slope angles and fill base widths would depend on the material used to construct the fills and the properties of the subgrade materials. Foundation preparation and compaction of the fill material would be critical to control the internal settlement of the embankment. In soft subgrade areas, ground improvement, geotextiles, prefabricated vertical (PV) drains, preloading, staged construction, or other mitigation methods could be required depending on height of fill, anticipated settlement, and other factors to obtain the desired factor of safety or to limit post-construction settlement.

Three embankment slope inclinations are proposed in this level of design. For embankments constructed on coarse-grained alluvial deposits or fresh to moderately altered/weathered rock, 2 Horizontal to 1 Vertical (2H:1V) cut slopes are proposed. Flatter embankment slopes (3H:1V and 4H:1V) are proposed for fine-grained soil deposits composed of silt and clay material. Within the MRC, thick sequences of silt and clay deposits are found in Playa deposits (Qp), Quaternary lake bed deposits (Ql), cohesive Quaternary basin fill channel deposits (Qbf and Qc, respectively), and weathered portions of Tertiary sedimentary rocks (Tsy). Although nearly any of the soil deposits could be a suitable source of material for embankment fill, the fine-grained deposits would likely require moisture conditioning prior to placement in the fills. Embankment fills constructed of shot rock over coarse-grained soil or rock subgrade could likely be constructed at 1.5H:1V. However, there is insufficient information to precisely locate possible shot-rock embankments, so embankment slopes steeper than 2H:1V are not shown in Table 6 .

8.4.1 Subgrade Preparation

We recommend the following procedure for subgrade preparation in fill areas:

- Establish erosion-control barriers as necessary.
- Strip vegetation, organics, and topsoil to expose the subsoil.
- Stockpile topsoil for later placement over areas to be seeded.

- A geotechnical professional should evaluate the subsoil to determine suitability, need for stabilization, and/or over-excavation depth and limits.
- Construct site drainage-control features such as ditches or drains in wet areas.
- Slope or crown the subgrade surface to shed water.
- Proof-compact the subgrade surface to at least 95 percent of the maximum dry density.

8.4.2 Subgrade Stabilization

Soft, weak, and moisture-sensitive soils are present along portions of the alignment and most likely would be encountered in Qp, Ql, cohesive units of Qbf and Qc, and weathered portions of Tsy. Where fill is to be placed in these areas for embankment construction, subgrade treatment or stabilization could be required. The appropriate method could include over-excavation of the soft soils and replacement with appropriate compacted fill, treatment with a chemical additive, or bridging with a rock fill and/or geosynthetic, such as a geogrid or geocell.

Fills constructed on soft subgrade or where soft soils are present at a depth less than or equivalent to the height of the proposed fill would likely require slopes of 3H:1V or flatter. Flatter slopes would distribute the stresses in the underlying soft soils, reducing settlement and providing an improved factor of safety for global stability compared with embankments with steeper slopes. The minimum factor of safety for global stability of fills on soft subgrades should be 1.5.

8.4.3 Sources of Fill Material

Much of the soil along the alignment could be used as fill for embankment construction. Fine-grained soil, typically associated with Ql, Qp, and possibly Qc, Qbf, and Tsy deposits, might be suitable as fill with appropriate handling and moisture conditioning. Topsoil and organic soils should not be used as fill. These materials should be stockpiled and then spread over finish-grade areas. No snow or ice should be incorporated into fill soils. Field test sections should be constructed using various fill materials to determine appropriate lift thickness and compactive effort to obtain the required compaction. Upon completion of subgrade preparation, fill should be placed and compacted up to the appropriate track roadbed elevation. All fill should be placed in layers and compacted to a dense and unyielding condition. In general, the thickness of fill layers before compaction should not exceed 12 inches for heavy compaction equipment. Where hand-operated compaction equipment would be used, such as backfill adjacent to

culverts, the layer thickness should not exceed 6 inches. We recommend that each layer of fill be compacted to a dry density that is at least 95 percent of the maximum dry density, as determined by ASTM D 1557. All fill placement and compaction should be monitored and tested by an experienced geotechnical professional.

Fill soils encountered along the alignment could require wetting or aerating to adjust moisture contents to levels suitable for compaction.

8.5 Drainage and Erosion Protection

The alignment crosses numerous alluvial fans with complex drainage patterns. Careful design of site drainage and erosion protection would help prevent washouts and damage to the track structure during rainfall events. Groundwater could impact design and construction of cuts, fills, and other structures. Subsurface drainage improvements and dewatering could be required. In addition to erosion caused by water, the loose, fine-grained soils present across most of the alignment are subject to erosion by wind. Measures would be necessary to maintain drainage and protect the soils from water and wind erosion both during and after construction.

Typically, sandy soils on steep slopes subject to high-velocity water flow or non-vegetated areas are susceptible to erosion. The arid climate of the MRC area does not normally experience prolonged rainfall events. When rainfall does occur, it is typically brief, but can be very intense. During periods of heavy rainfall, the erodible soils are deposited into the normally dry washes. Water could also carry a significant amount of sediment and debris in the wash channels, resulting in scour along the banks and at bridge crossings. During significant precipitation events, surface water flow may over top existing channels and flow across the alluvial fan surface. While flow was generally confined to the channels, we have observed isolated instances where high flows may have extended as much as 150 feet beyond each side of the defined channel.

8.5.1 Surface Drainage

Surface ditches, berms, culverts, and grading in conjunction with preparing the base of cuts and the final layer of fill should have a minimum 2 percent slope to promote drainage away from the track. The maximum grade of ditches would be determined by the erosion

susceptibility of the material that lines the ditch. Periodic inspection and maintenance of ditches and culverts would likely be required following significant rainfall events.

8.5.2 Subsurface Drainage

Trench drains, interceptor drains, horizontal drains, and drainage galleries could be suitable means for providing subsurface drainage depending on the depth to the water. For relatively shallow groundwater control, trench drains are commonly used to promote drainage away from the roadbed and to improve the stability of landslides driven by groundwater. Interceptor drains are used to reduce the flow of groundwater toward the roadbed below the surface, and are also best suited for shallow groundwater control. Horizontal drains could be used where relatively steep slopes are adjacent to the roadbed, the depth to groundwater is relatively deep (on the order of 25 feet deep or deeper) but still needs to be controlled, and the use of trench drains is not practical. Drainage galleries could be appropriate for providing groundwater control for long cuts. Although no areas were specifically identified during our fieldwork that may require subsurface drainage, further evaluations could be necessary during subsequent design phases.

8.5.3 River and Streambank Erosion

Riverbanks and drainages adjacent to the railroad could be armored with rock to resist erosion. Structures, such as barbs or groins, could also be built to redirect flow away from the track structure. Channels on alluvial fans could be monitored to assess their trends and potential future behavior so that preventive measures could be planned and implemented. Dikes could be constructed and/or new channels excavated in an attempt to channelize and contain streamflow on these fans. Established washes parallel the MRC in several areas. Riprap protection or similar mitigation measures would likely be required to protect the embankment toe within these areas. During final design, erosion protection of embankment slopes needs to be evaluated for specific sites.

8.5.4 Erosion at Culverts

The inlets and outlets of culverts should be armored to protect the embankment from scour. Culvert outlets should be adequately armored or tight-lined to an appropriate discharge area away from the embankment toe.

8.5.5 Erosion of Cut–and-Fill Slopes

Erosion control measures such as interceptor ditches, erosion control blankets, terracing, selective plantings, or desert armor could be required for some slopes depending on slope height, material type, and other factors. Slopes in erosion-susceptible areas can be armored with angular rock fragments, such as 6- to 12-inch quarry spalls.

8.6 Structures

8.6.1 Bridges

Where competent bedrock is present at a shallow depth and when the foundations are outside the channel floodplain, bridges could be supported on shallow foundations. However, given the aggressive scour conditions of some of the washes, it is likely that most of the bridge structures would be supported on a deep foundation system, such as driven piles or drilled shafts. However, because many of the bridges would cross existing stream channels and washes where the subsurface soil would contain cobbles and boulders, drilled shaft foundations would likely be the preferred alternative. Although sufficient axial and lateral capacities could be achieved using driven piles in some instances, the potential for encountering cobbles and boulders could significantly complicate the installation of driven foundation elements.

Although many factors influence drilled shaft foundation design that are not known at this time (i.e., height of bridge, dead and live load factors, seismic loads, scour depth, and engineering properties of the subsurface material), drilled shaft diameters would likely range from 3 to 5 feet.

8.6.2 Buildings

Building type, size, and locations are presently unknown. We assume that most of the buildings would be single or two-story structures, and that such buildings could be founded on shallow foundations or thickened (at edges) slab foundations.

Recommendations for allowable bearing pressures would be based on soil type and density. Minimum depth of footing is determined by maximum depth of frost penetration. Estimates of differential settlements would be based on footing subgrade conditions.

Floors would typically be constructed as slab-on-grade. Placement of compacted structural fill could be required to establish a prepared surface for the slab. Under-slab and perimeter drainage recommendations would be based on specific-site conditions.

8.6.3 Retaining Walls

A number of options are available for constructing retaining walls along the project alignment. Factors affecting the selection of the most appropriate wall type would include the available right-of-way, excavation slopes, performance considerations, cost, and aesthetics. An example of wall performance would be its flexibility or ability to accommodate differential settlements. In addition, selection of an appropriate wall type could be affected by the geometry of the retained slope and the underlying soil conditions.

The following section provides a brief discussion of various standard wall types, which could be considered for use along the project alignment for retaining cut–and-fill slopes. As mentioned previously, subsurface conditions, aesthetics, right-of-way (ROW) considerations and restrictions, and cost would be the primary factors dictating the wall type(s) that would ultimately be selected. Retaining wall systems could be divided into several categories, which are listed below:

- Rigid Gravity and Semi-gravity Walls
  - Cast-in-place and Precast Concrete Gravity Wall
  - Cast-in-place Concrete Cantilevered Wall
- Prefabricated Modular Gravity Walls
  - Crib Wall
  - Bin Wall
  - Gabion Wall
  - Lock-block/Ecology Block Wall
- Mechanically Stabilized Earth Walls (MSEW)
  - Segmental Precast Facing
  - Modular Block Facing
  - Geotextile/Geogrid/Welded Wire Facing
- Reinforced Soil Slopes (RSS)
- Non-gravity Cantilevered and Anchored Walls
  - Sheetpile Wall
  - Soldier Pile and Lagging Wall
  - Slurry Wall
  - Tangent Pile and Secant Pile Wall

- In Situ Reinforced Wall
  - Soil-nailed Wall

8.6.3.1 Rigid Gravity and Semi-gravity Walls

Concrete gravity and cantilever retaining walls are commonly used for walls with heights up to 30 feet. These types of wall generally provide a high level of performance with minimal lateral wall movement. The concrete retaining walls are not very flexible and cannot tolerate significant differential settlements without damage, compared with mechanically stabilized earth (MSE) wall systems. Consequently, this type of wall needs to be constructed on stable foundation soils. Concrete gravity walls are commonly used for retained fills, bridge abutments, and slope stabilization.

8.6.3.2 Prefabricated Modular Gravity Walls

Prefabricated modular gravity walls are externally stabilized fill walls that are constructed with interlocking reinforced or unreinforced concrete elements, timber, steel bins, or wire baskets that are fabricated on site and filled with select backfill material.

Concrete crib walls are manufactured by Criblock and timber crib walls by Permacrib. These crib walls are constructed using timber or concrete elements that are stacked parallel and perpendicular to the length of the wall to form an open bin. Assembly is analogous to constructing a log cabin in that the concrete and timber elements are stacked and interlocked to form rectangular or square bins. Wall construction is completed by filling the space within the crib framework with rock or compacted structural fill. Depending on the height of the wall, lateral pressure, bearing capacity, and other factors, multiple bins can be assembled in various configurations to increase the footprint of the wall.

A bin wall is similar to a crib wall except that the bins are typically fully enclosed and the backfill material is not exposed. Depending on the height of the wall, lateral pressure, bearing capacity, and other factors, multiple bins can be constructed to increase the footprint of the wall.

Gabion walls are compartmentalized rectangular containers (baskets) made of galvanized steel wire mesh, which are filled with stone. Similar to other prefabricated modular

gravity wall systems, gabion baskets could be arranged and wired together to achieve a stable configuration of a desired wall height.

Lock-block and ecology block walls are stacked concrete units that create a gravity wall structure. Typically, the blocks are cast using return concrete at a ready-mix facility. Blocks are typically 2.0 to 2.5 feet high and wide and 4 to 6 feet long. Like other prefabricated modular gravity wall systems the concrete blocks can be arranged in various configurations to accommodate wall heights up to about 30 feet. However, wall heights above 12 to 15 feet are generally not practical.

8.6.3.3 Mechanically Stabilized Earth Walls

MSE walls are typically flexible, and can tolerate reasonable settlements if properly installed. Examples of these structures are outlined in the following paragraphs.

There are a variety of segmental, precast facing, MSE walls. Typically, these systems use metal strips, bars, geosynthetic grids, or textile reinforcement that are connected to precast concrete or prefabricated metal facing systems to form a reinforced soil mass. The reinforcement is installed in layers within the soil mass. The length of the reinforcing elements is typically about 70 percent of the wall height. Segmental precast facing systems are offered by Reinforced Earth, VSL Retained Earth, and Georgia Stabilized Embankment, among others.

Modular block walls consist of geogrid- or geosynthetic-reinforced fill with modular-block facing units. The geosynthetics are connected to the modular blocks with structural pins, which also serve as a shear connection between the blocks. The vertical spacing of the geosynthetic reinforcing typically varies from 1.0 to 2.5 feet. The modular units typically consist of masonry blocks that are 18 inches wide and 8 inches high. The faces of these walls are usually vertical or are constructed with a 1H:8V batter. Modular-block walls could be designed and used in applications with wall heights up to about 30 feet. Proprietary modular-block systems include Genesis, Allen, and Mesa.

Construction of MSE walls using geotextile, geogrid, or wire facing is similar to other MSE wall systems except that the wall facing is constructed by wrapping each layer of reinforcement around the overlying layer of backfill and then re-embedding the free end into the backfill. Permanent facings could consist of shotcrete, or could simply be left as rock or gravel-

filled galvanized wire baskets. Tilt-up panels, or cast-in-place concrete facings could also be used with fasteners that are incorporated into the reinforced soil mass.

8.6.3.4 Reinforced Soil Slopes

A reinforced soil slope (RSS) consists of embedding geosynthetics in spaced layers at predetermined lengths as the embankment is constructed. The geosynthetics generally extend horizontally behind the face of the slope equal to 70 percent of the embankment height. When construction slopes are steeper than about 45 degrees, the geosynthetics are wrapped around the face of the slope. Erosion protection is placed over the finished slope face and anchored into place.

8.6.3.5 Non-gravity Cantilevered and Anchored Walls

Non-gravity cantilevered and anchored walls are particularly well suited for retaining cuts, supporting bridge abutments, stabilizing landslides, and providing excavation support. Certain wall types within this category (i.e., soldier pile and sheetpile walls) could also be used in retained fill applications such as sidehill railroad embankments. Common types of non-gravity cantilevered and anchored walls are discussed below.

Sheetpile walls are particularly suited for retained-cut applications and consist of interlocking steel sections that are driven, vibrated, or pushed into the soil to create the wall. Sheetpile walls can either be constructed as cantilevered walls or supported with permanent tiebacks. It is usually not practical to drive sheetpiles into soil containing cobbles, boulders, very dense to hard soils, or weathered rock.

Cantilever and tied-back soldier pile wall systems are also suited to retain cuts. However, cantilever soldier pile walls could also be used to retain fill soils where the fill heights do not exceed 10 to 15 feet. This type of system would typically consist of placing a steel, wide-flanged beam into a predrilled, 24- to 30-inch-diameter hole and then backfilling the hole with structural concrete up to the base of the wall, and then using lean concrete to backfill the remainder of the hole. Soldier pile spacing typically varies between 5 and 12 feet. Pressure-treated wood lagging is typically used to provide temporary support of the retained soil of the excavation. A permanent cast-in-place or precast concrete fascia panel could then be placed over

the face of the wall to provide the required architectural finish. Walls with heights of 15 feet or greater could require permanent tiebacks for additional structural support.

A slurry wall is a continuous concrete wall consisting of either steel-reinforced, cast-in-place concrete or precast panels that are constructed within an excavated trench. The trench is constructed from the ground surface and is supported for its full depth by a mineral or polymer slurry as the excavation is advanced. For cast-in-place applications, reinforcing elements consisting of reinforcing bar cages or structural steel members are positioned in the hole. Once the reinforcement is in place, the final concrete is tremmied into the hole, which displaces the slurry. A slurry wall can be either cantilevered or tied-back, depending on the height of the wall, the soil conditions, and other loading conditions.

Tangent pile walls consist of a single row of tangentially touching, reinforced concrete piles. The reinforcement can consist of reinforcing steel cages or structural steel sections centered in the drilled holes. Depending on soil and water conditions, the drilled holes can be open, slurry supported, or cased, or a combination of methods. A secant pile wall consists of alternatively drilled and overlapping reinforced and unreinforced piles. Secant pile installation commences by installing alternating unreinforced piles. After a short period of time to allow the concrete to set, a reinforced concrete pile is installed between and overlapping the previously installed piles. Tangent and secant pile walls can be either cantilevered or tied back, depending on the height of the wall, the soil conditions, and other loading conditions.

8.6.3.6 In Situ Reinforced Walls

Unlike the previous walls discussed above, which provide external support to a slope or fill, a soil-nailed wall is an in situ reinforcement system for the soil mass. Prior to making a cut excavation, the soil mass is internally reinforced by installing closely spaced, typically cement-grouted steel dowels into the soil mass. Soil between the rock dowels (nails) is supported with an initial steel-reinforced shotcrete. Commonly, a permanent facing of precast concrete panels or cast-in-place panels, or an architecturally finished final shotcrete facing, is installed over the initial facing. Soil nail walls are used for excavation support, slope stabilization, and widening under existing bridges.

9.0 CONCLUSIONS

Preliminary geologic observations and engineering considerations are presented in Tables 5 and 6 for the common and alternative alignments of the MRC. Information presented in these tables is based on available technical literature and reports, field reconnaissance along the corridor, preliminary engineering studies, and our experience working on similar projects. Table 5 is a compilation of geologic observations by waypoint along each segment of the corridor. Segments in Table 6 were established primarily by dividing the corridor into segments by geologic unit. Preliminary geotechnical recommendations (i.e., cut-and-fill slope inclinations, excavation methods, potential geologic hazards, etc.) for each segment are presented in Table 6.

With regards to significant observations, conclusions, and recommendations for the MRC, we believe that ephemeral channel erosion and soft subgrade soils would pose the most concern. However, we do not believe that these geologic hazards or soft subgrade soil conditions are so adverse or widespread that a specific segment or reach within a segment should be removed from further consideration.

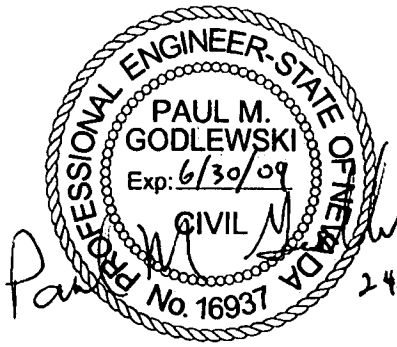
The majority of the soil and rock that would be encountered in excavations along the corridor would be suitable as embankment fill. However, fine-grained alluvium, and lakebed deposits would likely require moisture conditioning prior to use. We do not anticipate significant excavation volumes in soft subgrade soil because these materials typically occur in low-lying, potential embankment fill areas. Bedrock encountered in excavations would also generally be suitable as fill and riprap, although the highly altered volcanic deposits in the vicinity of Goldfield would likely be unsuitable, due to their high clay content.

All excavations in rock would likely require drilling and blasting. The length of alignment requiring drilling and blasting covers about 5 percent of the corridor (common and alternative alignments). Older cemented alluvium and lakebed deposits that could require ripping cover approximately 48 percent of the corridor. The remaining 47 percent of the corridor consists of soil (i.e., alluvial, eolian, and fluvial) that can be classified as common excavation and could be excavated using conventional excavation techniques and equipment.

Based on our engineering studies and field reconnaissance, we have identified no fatal flaws along any of the common or alternative alignments. During subsequent design studies, the actual

siting of the track within a selected alignment would likely be based on operational considerations (i.e., grade and curvature), as well as geologic and drainage conditions.

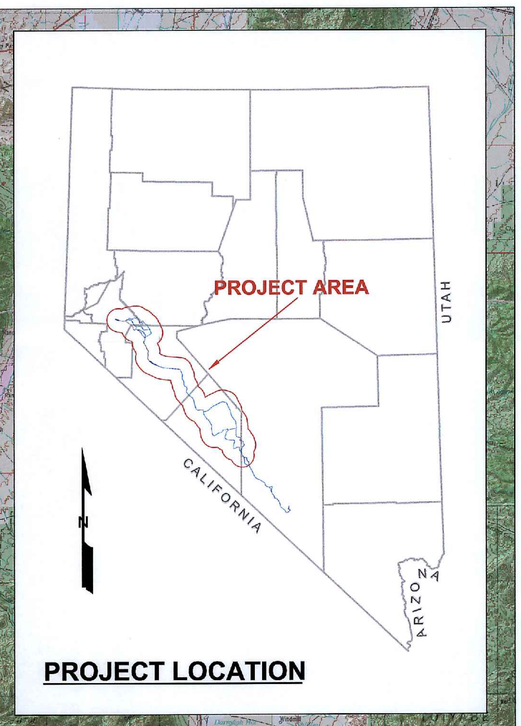
SHANNON & WILSON, INC.



Paul M. Godlewski, P.E.
Vice President
Project Manager

William A. Hultman
Senior Associate
Task 1 Manager

DEX:PMG:WAH/smp



PROJECT LOCATION

S1/S2
S5/S6
S6
S5
MCS0
S4
S1/S2/S4
S4/S5/S6
S3
S2
S1/S3
MCS1
MN2
MN1
MN3
CRC 42710+00
GF4
CS4
CRC 14146+54
MCS2
BC3
BC2
CS5

LEGEND

- 45 — Figure 3 Sheet Index
- Approximate Location of Waypoint (Also shown on Figure 3)
- MT3013 — Approximate Location and Designation of Waypoint (Outside limits of Figure 3)

JURISDICTION

- City and County Parks
- U.S. Department of Defense
- U.S. Department of Energy
- Fish and Wildlife Service
- Native American Reservation
- National Park Service
- Nevada State Lands
- Private Lands / Allotments
- U.S. Forest Service
- Wilderness Study Area
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation

RAIL STUDY RELATED FEATURES

- Existing Rail
- Mina Corridor Potential Alignments
- Mina/Caliente Corridor Potential Alignments
- MN1 — Mina Alignment Designator
- SR3 — Mina/Caliente Alignment Designator

SOURCES AND NOTES

1. Rail Study Related Features provided by BSC - T06-00-238 rev09 (10/13/06).
2. Jurisdictional GIS data provided by BSC - GIS Baseline Data Dictionary (October, 2006) .
3. Coordinates and projection in UTM, NAD 83, zone 11, feet.
4. Please refer to Table 5, Summary of Observations and Appendix G, Photographs from Field Reconnaissance, for field observations at waypoint locations.

N

0 5 10 15 20

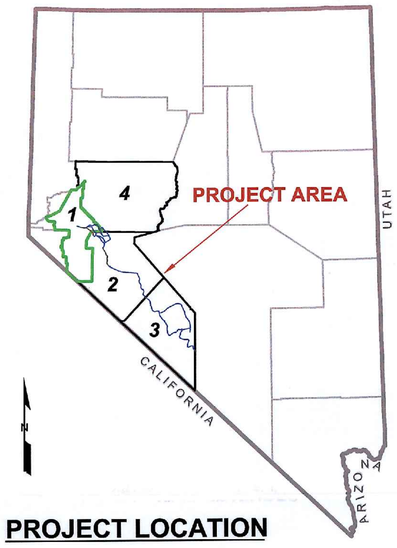
Scale in Miles

YUCCA MOUNTAIN PROJECT
NEVADA RAIL CORRIDOR
PHASE 1a MINA ROUTE

Geotechnical Report

PROJECT ALIGNMENT MAP
PLATE 1

Filename: 21-1-20102_GEOTECH_Plate-1_Project-Alignment-Map.mxd Created Using: ArcMap 9.2 Date: 04/24/07 BRL



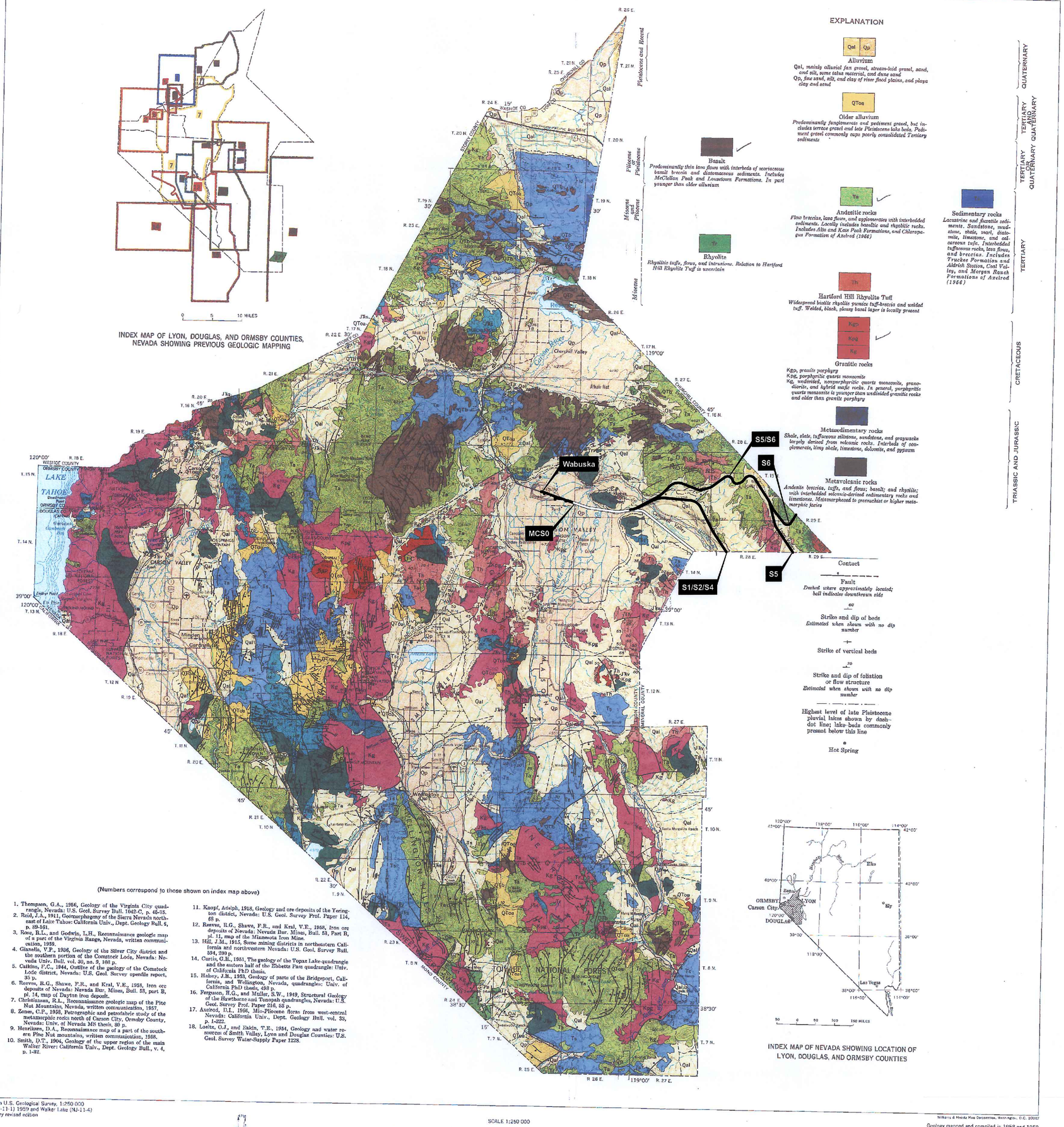
PROJECT LOCATION

NEVADA BUREAU OF MINES

PREPARED COOPERATIVELY BY
THE U.S. GEOLOGICAL SURVEY

BULLETIN 75, PLATE 1

INDEX MAP OF LYON, DOUGLAS, AND ORMSBY COUNTIES, NEVADA SHOWING PREVIOUS GEOLOGIC MAPPING



(Numbers correspond to those shown on index map above)

1. Thompson, G.A., 1956, Geology of the Virginia City quadrangle, Nevada: U.S. Geol. Survey Bull. 1042-C, p. 45-65.
2. Reid, J.A., 1911, Geomorphogeny of the Sierra Nevada northeast of Lake Tahoe: California Univ., Dept. Geology Bull. 6, p. 89-161.
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16. Ferguson, H.G., and Muller, S.W., 1949, Structural Geology of the Hawthorne and Tonopah quadrangles, Nevada: U.S. Geol. Survey Prof. Paper 216, 55 p.
17. Axelrod, D.I., 1956, Mio-Pliocene flora from west-central Nevada: California Univ., Dept. Geology Bull. vol. 33, p. 1-322.
18. Loeltz, O.J., and Eakin, T.E., 1954, Geology and water resources of Smith Valley, Lyon and Douglas Counties: U.S. Geol. Survey Water-Supply Paper 1228.

INDEX MAP OF NEVADA SHOWING LOCATION OF LYON, DOUGLAS, AND ORMSBY COUNTIES

Base from U.S. Geological Survey, 1:250 000
Reno (NJ-11-1) 1959 and Walker Lake (NJ-11-4) preliminary revised edition

SCALE 1:250 000
5 0 5 10 15 MILES
5 0 5 10 15 KILOMETERS
CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN LAKE TAHOE IN FEET—DATUM IS LOWEST LAKE LEVEL—6223 FEET

Williams & Heintz Map Corporation, Washington, D.C. 20027
Geology mapped and compiled in 1958 and 1969

GEOLOGIC MAP OF LYON, DOUGLAS, AND ORMSBY COUNTIES, NEVADA

By
James G. Moore

1969

RAIL STUDY RELATED FEATURES

- Existing Rail
- Mina Corridor Potential Alignments
- MN1 Mina Alignment Designator

YUCCA MOUNTAIN PROJECT
NEVADA RAIL CORRIDOR
PHASE 1a MINA ROUTE

Geotechnical Report

REGIONAL GEOLOGY COMPILATION MAP
PLATE 2 (Sheet 1 of 4)

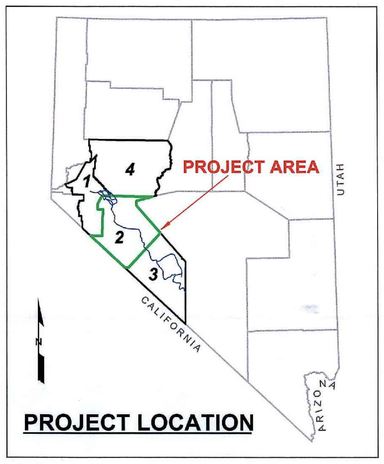
N

0 5 10 15 20
Scale in Miles

SOURCES AND NOTES

1. Rail Study Related Features provided by BSC - T06-00-238 rev09 (10/13/06).
2. Coordinates and projection in UTM, NAD 83, zone 11, feet.
3. Geologic map obtained from Moore (1969).

Filename: 21-1-20102-214_GEOTECH_Plate-2_Sheet-1_Regional-Geology-Compilation-Map_Lyon.mxd Created Using: ArcMap 9.2 Date: 04/24/07 BRL



PROJECT LOCATION

NEVADA BUREAU OF MINES

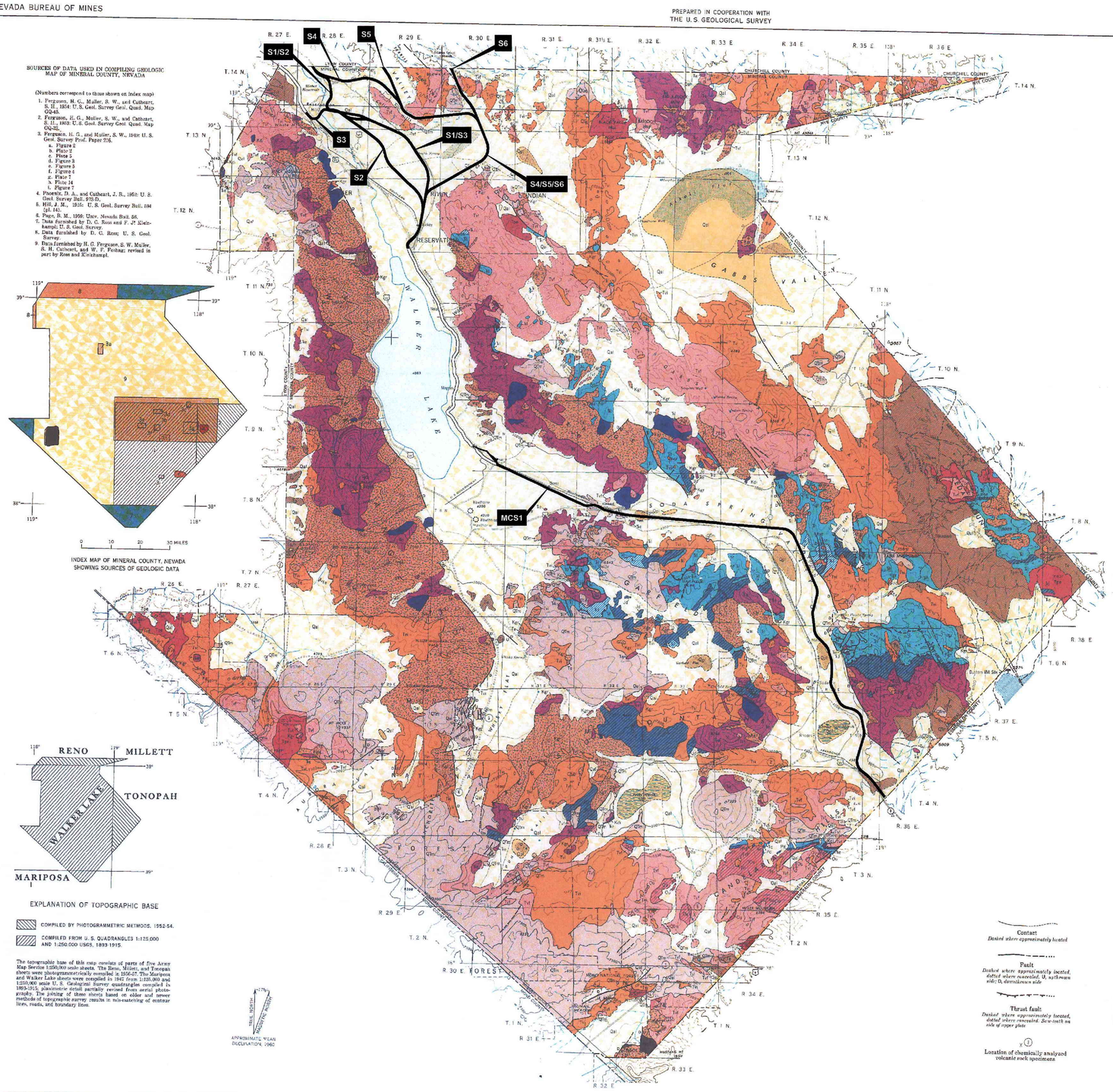
PREPARED IN COOPERATION WITH THE U.S. GEOLOGICAL SURVEY

BULLETIN 58, PLATE 2

SOURCES OF DATA USED IN COMPILING GEOLOGIC MAP OF MINERAL COUNTY, NEVADA

(Numbers correspond to those shown on index map)

1. Ferguson, H. G., Muller, S. W., and Cathcart, S. H., 1954: U. S. Geol. Survey Geol. Quad. Map GQ-48.
2. Ferguson, H. G., Muller, S. W., and Cathcart, S. H., 1953: U. S. Geol. Survey Geol Quad. Map GQ-25.
3. Ferguson, H. G., and Muller, S. W., 1949: U. S. Geol. Survey Prof. Paper 216.
   a. Figure 2
   b. Plate 2
   c. Plate 3
   d. Figure 3
   e. Figure 5
   f. Figure 6
   g. Plate 7
   h. Plate 14
   i. Figure 7
4. Phoenix, D. A., and Cathcart, J. B., 1952: U. S. Geol. Survey Bull. 972-D.
5. Hill, J. M., 1916: U. S. Geol. Survey Bull. 594 [pl. 14].
6. Page, R. M., 1950: Univ. Nevada Bull. 58.
7. Data furnished by D. C. Ross and F. J. Kleinkampf, U. S. Geol. Survey.
8. Data furnished by D. C. Ross; U. S. Geol. Survey.
9. Data furnished by H. G. Ferguson, S. W. Muller, S. H. Cathcart, and W. F. Fosdag; revised in part by Ross and Kleinkampf.



EXPLANATION OF TOPOGRAPHIC BASE

- COMPILED BY PHOTOGRAMMETRIC METHODS, 1952-54.
- COMPILED FROM U. S. QUADRANGLES 1:125,000 AND 1:250,000 USGS, 1893-1915.

The topographic base of this map consists of parts of five Army Map Service 1:250,000 scale sheets. The Reno, Millett, and Tonopah sheets were photogrammetrically compiled in 1956-57. The Mariposa and Walker Lake sheets were compiled in 1947 from 1:125,000 and 1:250,000 scale U. S. Geological Survey quadrangles compiled in 1893-1915; planimetric detail partially revised from aerial photographs. The plotting of these sheets based on older and newer methods of topographic survey results in mis-matching of contour lines, roads, and boundary lines.

EXPLANATION

- Qal — Alluvial deposits. *Qal, chiefly valley fill, but includes older gravel, slope wash, and Pleistocene lake beds. Qsl, clay and saline playa deposits*
- Qfm — Mafic volcanic rocks. *Chiefly Quaternary flows that are in part trachydolerite and latite*
- Tvi — Intermediate volcanic rocks. *Chiefly rhyodacite to andesite flows, tuffs, and breccia, in part correlative with Gilbert andesite; interbedded sequence commonly within felsic sequence but reversals of this relationship and correlation of the two rock types and contact relationships in north and west parts of county permit no county-wide age relationships*
- Tvf — Felsic volcanic rocks. *Mostly rhyolite and quartz latite crystal welded tuff, in part correlative with Oddie rhyolite and probably also in part correlative with Fogus quartz latite*
- Tes — Esmeralda formation. *Chiefly shale, sandstone, conglomerate, and rhyolite tuff included in this unit are the Aldrich Station, Coal Valley, and Morgan Ranch formations of Ekren (1968) on the west flank of the Wassuk Range, and clastic beds called Humboldt by F. C. Schrader (written communication, 1916) in the northeast part of the county*
- Tpe — Pre-Esmeralda volcanic rocks. *Intermediate to felsic in composition and commonly altered and mineralized*
- Tgr — Granitic rocks. *Chiefly quartz monzonite, lesser granodiorite, alkalic granite and related rocks locally*
- Kd — Diorite and related rocks. *Probably Cretaceous in age but may also be Triassic or Permian; includes serpentine of Candelaria district*
- Jd — Dunlap formation. *Sandstone, conglomerate, and volcanic rocks*
- Jg — Gabbs and Sunrise formations. *Interrelated shale and limestone, commonly thin-bedded*
- Tl — Luning formation. *Diverse lithology, but chiefly limestone, dolomite, and shale*
- Pe — Excelsior formation. *Intermediate to felsic volcanic rocks; in east-central part of county predominantly fine-grained clastic and tuffaceous rocks; limestone present locally and particularly abundant east of Candelaria. At least in part Middle Triassic, but may also be in part correlative with Permian volcanic rocks east of the county*
- Pc — Candelaria formation. *Interbedded shale and sandstone*
- Pd — Diablo formation. *Coarse sandstone and grit*
- Ordovician rocks. *Dark-colored graptolitic shale and chert with lesser limestone and sandstone*
- Cm — Miller Mountain formation. *Marble, siliceous hornfels, calc-hornfels, shale, and spotted hornfels*
- Mica schist of White Mountains

Contact — *Dashed where approximately located*

Fault — *Dashed where approximately located, dotted where concealed. U, upthrown side; D, downthrown side*

Thrust fault — *Dashed where approximately located, dotted where concealed. Saw-teeth on side of upper plate*

Location of chemically analyzed volcanic rock specimens

QUATERNARY	Holocene, Pleistocene
TERTIARY	Pliocene, Miocene
CRETACEOUS(?)	
JURASSIC	Lower Jurassic, Upper Triassic
TRIASSIC	Lower Triassic
PERMIAN	
ORDOVICIAN	
PRECAMBRIAN CAMBRIAN OR LOWER PALEOZOIC	

Base from Army Map Service 1:250,000 quadrangle sheets

Geology mapped at intervals from 1922 to 1956 (See text for mapping credit)

GEOLOGIC MAP OF MINERAL COUNTY, NEVADA

Compiled by
Donald C. Ross

SCALE 1:250,000

5 0 5 10 15 20 25 MILES

CONTOUR INTERVAL 500 FEET
DATUM IS MEAN SEA LEVEL

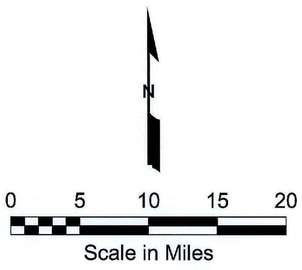
RAIL STUDY RELATED FEATURES

- Existing Rail
- Mina Corridor Potential Alignments
- MN1 — Mina Alignment Designator

YUCCA MOUNTAIN PROJECT
NEVADA RAIL CORRIDOR
PHASE 1a MINA ROUTE

Geotechnical Report

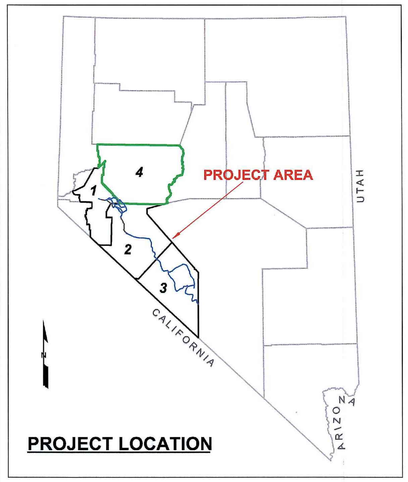
REGIONAL GEOLOGY COMPILATION MAP
PLATE 2 (Sheet 2 of 4)



SOURCES AND NOTES

1. Rail Study Related Features provided by BSC - T06-00-238 rev09 (10/13/06).
2. Coordinates and projection in UTM, NAD 83, zone 11, feet.
3. Geologic map obtained from Ross (1961).

Filename: 21-1-20102-214_GEOTECH Plate-2 Sheet-2 Regional-Geology-Compilation-Map Mineral.mxd Created Using: ArcMap 9.2 Date: 04/24/07 BRL



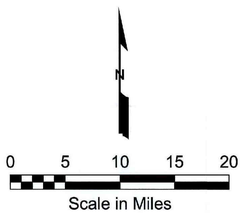
PROJECT LOCATION

RAIL STUDY RELATED FEATURES

- Existing Rail
- Mina Corridor Potential Alignments
- MIN1 Mina Alignment Designator

SOURCES AND NOTES

1. Rail Study Related Features provided by BSC - T06-00-238 rev09 (10/13/06).
2. Coordinates and projection in UTM, NAD 83, zone 11, feet.
3. Geologic Map obtained from Willden and Speed (1974).



YUCCA MOUNTAIN PROJECT
NEVADA RAIL CORRIDOR
PHASE 1a MINA ROUTE

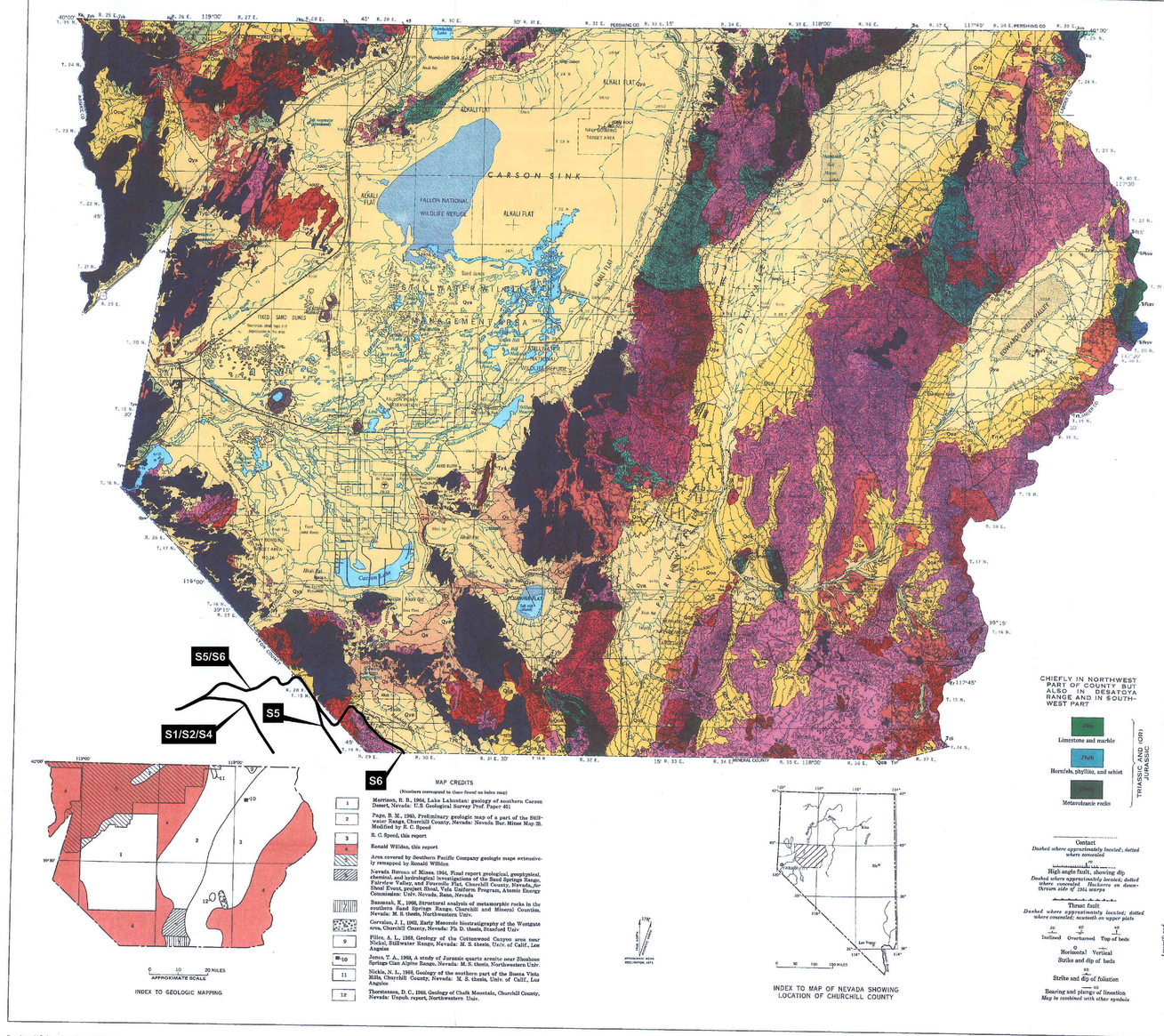
Geotechnical Report

REGIONAL GEOLOGY COMPILATION MAP
PLATE 2 (Sheet 4 of 4)

NEVADA BUREAU OF MINES AND GEOLOGY

PREPARED COOPERATIVELY BY
THE U.S. GEOLOGICAL SURVEY

BULLETIN 83, PLATE 1



INDEX TO GEOLOGIC MAPPING

MAP CREDITS

(Numbers correspond to those found on index map)

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3. R. C. Speed, this report
4. Ronald Willden, this report
5. Area covered by Southern Pacific Company geologic maps extensively remapped by Ronald Willden
6. Nevada Bureau of Mines, 1964, Final report geological, geophysical, chemical, and hydrological investigations of the Sand Springs Range, Fairview Valley, and Fourmile Flat, Churchill County, Nevada, for Shoal Event, project Shoal, Vela Uniform Program, Atomic Energy Commission: Univ. Nevada, Reno, Nevada
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INDEX TO MAP OF NEVADA SHOWING LOCATION OF CHURCHILL COUNTY

Base from U.S. Geological Survey 1:250,000: Lovelock, 1955; Reno, 1960; Winnemucca, and Millett, 1962
Roads modified, 1971
Revised, 1971

GEOLOGIC MAP OF CHURCHILL COUNTY, NEVADA

By
Ronald Willden and Robert C. Speed

SCALE 1:250 000

6 0 5 10 15 20 25 MILES
5 0 5 10 15 20 25 30 35 KILOMETERS

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
DATUM IS MEAN SEA LEVEL

EXPLANATION

- Qya — Younger alluvium — *Late Lahontan deposits, playa deposits, and young fan gravels*
- Qs — Dune sand
- Qb — Basalt and basaltic sediments
- Qp — Piedmont gravels
- Qoa — Older alluvium — *Dissected alluvial fans; landslides; and some areas of pediment gravels*
- Qog — Older gravels
- Tys — Younger sedimentary rocks
- Ty — Younger basalt and andesite — *Ta, andesite flows; Tbi, intrusive bodies*
- Td — Dacite — *Td, principally flows; Tdi, intrusive bodies*
- Tos — Older sedimentary rocks
- Tr — Rhyolite to rhyodacite — *Tr, extrusive rhyolite units; usually as flows, tuffs, and welded tuffs; Tri, intrusive bodies; In Desatoya Range, Tr, subdivided into: Tru, upper rhyolite; Trd, quartz latite; Trl, lower rhyolite; In Clan Alpine Range, Tr, includes: Trd, rhyodacite; Trl, lower rhyolite*
- Tov — Older volcanic rocks — *Tov, undivided volcanic rocks, mostly basalt and andesite; In Stillwater Range Tob, basalt and andesite; Tot, rhyolite to rhyodacite welded tuffs. In Stillwater Range; Tol, latite welded tuffs. In Stillwater Range*
- Tg — Granitic rocks — *Granite to granodiorite. In southern Stillwater Range*
- Kg — Granitic rocks — *Principally granodiorite and quartz monzonite of Cretaceous(?) age. Some bodies may be Tertiary in age*
- Kd — Diorite rocks
- Kgb — Gabbro rocks — *Locally includes amphibolite and schiste*
- Mv — Mafic volcanic rocks — *Massive flows, basaltic tuffs, and lapilli tuffs*
- Pzq — Quartz arenite — *Well sorted, fine-grained quartz arenite and basal limestone and conglomerate*
- Pzl — Limestone and marble — *Largely massive carbonate rocks with intercalated quartz arenite*
- Pzv — Volcaniclastic rocks and limestone — *Ss, limestone*
- Jsl — Calcareous siltstone and limestone — *Includes minor amount of shale*
- Trs — Shale and siltstone — *Trs, undivided shale, mud, and siltstone; In Clan Alpine Mountains, Includes 3 subunits. Trsu, upper subunit; contains 30 to 50% of intercalated limestone and dolomite; Trsi, intermediate subunit; contains more than 30% siltstone and mudstone and 10% sandstone, limestone and conglomerate; Trsl, lower subunit; containing 70 to 85% siltstone and 20 to 30% intercalated sandstone*
- Trd — Limestone and dolomite
- Pzm — Limestone and marble — *Pzm, undivided; In Desatoya Range, Pzmu, upper unit; Pzml, lower unit*
- Pzh — Hornfels, phyllite, and schist
- Pzmv — Metavolcanic rocks

CHIEFLY IN NORTHWEST PART OF COUNTY BUT ALSO IN DESATOYA RANGE AND IN SOUTHWEST PART

Contact — *Dashed where approximately located; dotted where concealed*

High-angle fault, showing dip — *Dashed where approximately located; dotted where concealed. Hachures on downthrown side of 1954 scarps*

Thrust fault — *Dashed where approximately located; dotted where concealed; barbed on upper plate*

Inclined 30 · Overturned 60 · Top of beds 45

Horizontal 0 · Vertical 90

Strike and dip of beds

Strike and dip of foliation

Bearing and plunge of lineation — *May be combined with other symbols*

AUGUSTA MOUNTAINS

- Ogb — Gabbro Formation
- Trcs — Cane Spring Formation
- Ta — Augusta Mountain Formation
- Pzvr — Favret Formation
- Pzc — Conglomerate
- Pzsv — Sedimentary and volcanic rocks
- Pzc — Chert and clastic and volcanic rocks

Miocene / Pliocene / Oligocene — QUATERNARY / TERTIARY

Middle Jurassic / Upper Triassic to Middle Jurassic / Lower Jurassic / Upper Triassic / Middle Triassic / Lower(?) and Middle Triassic — TRIASSIC AND (OR) JURASSIC / JURASSIC / TRIASSIC / JURASSIC TO TERTIARY / PALEOZOIC

Filename: 21-1-28102-214_GEOTECH_Plate-2_Sheet-3_Regional-Geology-Compilation-Map_Esmeralda.mxd Created Using: ArcMap 9.2 Date: 04/24/07 BRL

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SPECIAL INSTRUCTION SHEET

1. QA: N/A

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REGIONAL GEOLOGY COMPILATION MAP PLATE 2 (SHEET 3 OF 4)

7. Document Number(s)	8. Version Designator
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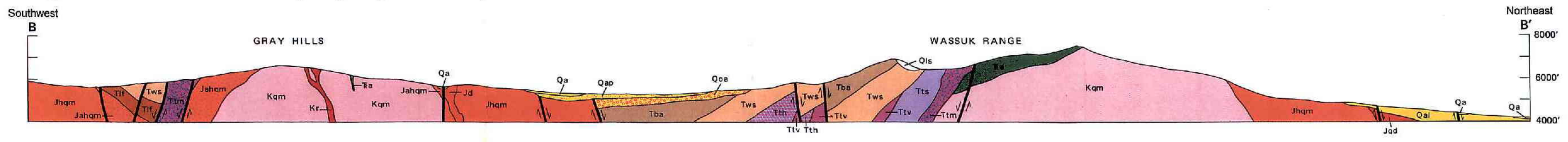
V0-CY05-NHC4-00197-00024-001-004

13. Comments
Oversize drawing cannot be scanned.

14. RPC Electronic Media Verification

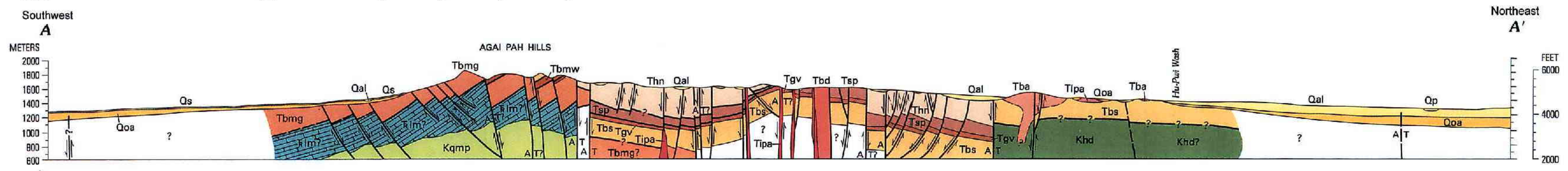
1 Section B-B' from Geologic Map of the Schurz Quadrangle (Bingler, 1978)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Qls	Landslide Deposits
Qa	Alluvial Plain and Undifferentiated Alluvial Deposits
Qap	Pediment Deposits
Qal	Alluvial Fan and Bajada Deposits
Qoa	Older Alluvial Fan Deposits
Tba	Basaltic Andesite Flows
Tws	Tuffacious and Diatomaceous Silty Sandstone to Sandy Siltstone
Tlf	Hornblende Latite Volcanic Rocks
Tth	Hu-Pwi Rhyodacite
Ttv	Vitric Tuff, Undifferentiated
Tts	Singatse Tuff
Ttm	Mickey Pass Tuff (Rhyodacite to Rhyolite)
Kr	Rhyolite Porphyry Dikes
Kqm	Bald Mountain Pluton (Sodic Biotite Quartz Monzonite)
Jd	Dacite Porphyry
Jhqm	Hornblende-Biotite Quartz Monzonite to Granodiorite
Jahqm	Altered Quartz Monzonite
Jqd	Hornblende Quartz Diorite and Quartz Diorite Breccia
Tks	Metavolcanic Rocks

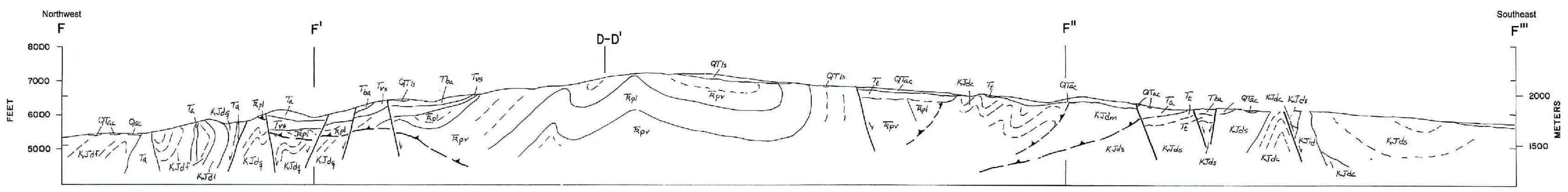
2 Section A-A' from Geologic Map of the Gillis Canyon Quadrangle, Mineral County, Nevada (Hardyman, 1980)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Qs	Windblown Sand (Holocene)
Qal	Younger Alluvium and Colluvium, Undivided (Holocene)
Qoa	Older Alluvium (Holocene and Pleistocene?)
Tba	Basaltic Andesite (Pliocene?)
Tipa	Andesite Dikes (Miocene)
Tbd	Basaltic Andesite Dikes/Plugs (Miocene)
Thn	Nugent Member of the Hu-Pwi Rhyodacite Tuff (Miocene)
Tsp	Blue Sphinx Tuff (Miocene or Oligocene)
Tgv	Gabbs Valley Tuff (Miocene)
Tbs	Singatse Tuff
Tbmw	Weed Heights Tuff
Tbmg	Guild Mine Tuff
Kqmp	Quartz Monzonite of Gillis Canyon (Cretaceous?)
Khd	Hornblende Diorite Porphyry (Cretaceous?)
Ŧlm	Limestone (Triassic)

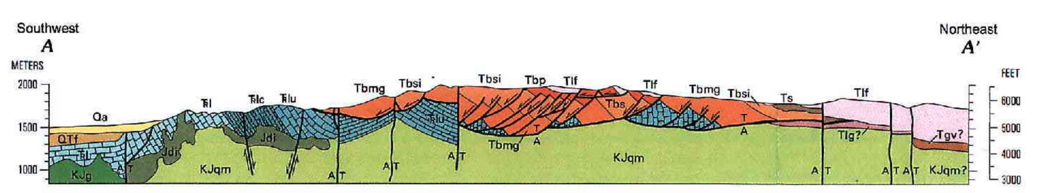
3 Section F-F''' from Preliminary Geologic Map of the Mable Mountain Quadrangle, Mineral County, Nevada (Oldow and Steuer, 1985)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Qac	Alluvium and Colluvium (Quaternary)
QTac	Older Alluvium and Colluvium (Quaternary and/or Tertiary)
QTls	Landslide Deposits (Quaternary and/or Tertiary)
Tba	Basaltic Andesite and Basalt (Pliocene and/or Miocene)
Ta	Andesite and Basalt (Pliocene and/or Miocene)
Tvs	Volcanogenic Sedimentary Rocks (Pliocene and/or Miocene)
Tt	Ash-Flow Tuff (Tertiary)
KJid	Diorite (Cretaceous or Jurassic)
	Dunlap Formation (Cretaceous and/or Jurassic):
KJds	Sandstone Unit
KJdm	Mudstone Unit
KJdc	Carbonate Unit
KJdf	Feldspar Sandstone Unit
KJdl	Limestone Unit
KJdq	Quartz Sandstone Unit
	Pamlico Formation of Oldow (Jurassic):
Ŧpl	Limestone Unit
Ŧpv	Volcanic Unit

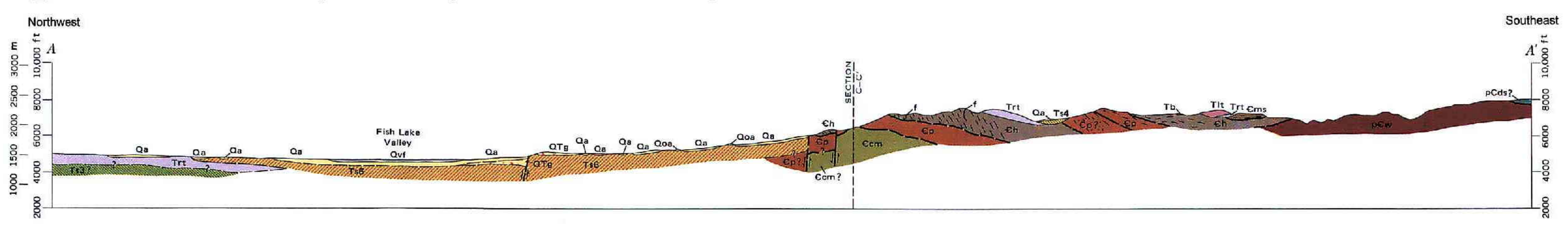
4 Section A-A' from Geologic Map of the Gabbs Mountain, Mount Ferguson, Luning, and Sunrise Flat Quadrangles, Mineral and Nye Counties, Nevada (Ekren and Byers, 1985a)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Qa	Alluvium (Holocene and Pleistocene)
QTf	Fan Alluvium (Pleistocene and Pliocene)
Tlf	Lavas of Mount Ferguson, Undivided (Miocene)
Ts	Sedimentary Rocks (Miocene)
Tgv	Gabbs Valley Tuff (Miocene or Oligocene)
Tbs	Benton Spring Group, Undivided (Oligocene)
Tbp	Petrified Spring Tuff
Tbsi	Singatse Tuff
Tbmg	Guild Mine Member of Mickey Pass Tuff
Tlg	Lavas of Giroux Valley (Oligocene)
KJg	Granite (Cretaceous and Jurassic)
KJqm	Quartz Monzonite (Cretaceous and Jurassic)
Jdi	Diorite (Cretaceous and Jurassic)
Ŧl	Luning Formation, Undivided (Upper Triassic)
Ŧlc	Clastic Rocks of the Luning Formation
Ŧlu	Upper Member, Undivided, of the Luning Formation

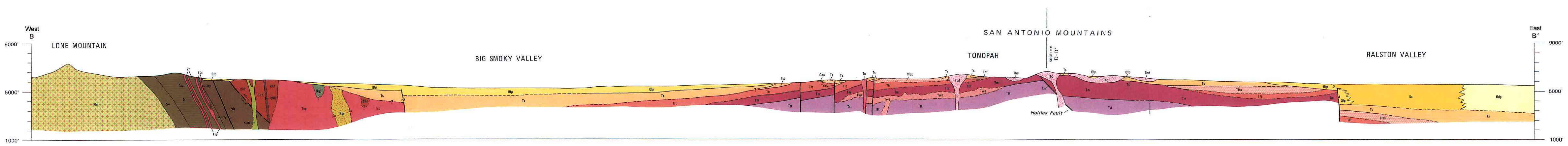
5 Section A-A' from Geologic Map of the Rhyolite Ridge Quadrangle, Esmeralda County, Nevada (Robinson, et al., 1976)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Qa	Alluvial Fan Deposits
Qvf	Valley Fill Deposits
Qoa	Older Alluvium
QTg	Gravel
Ts6	Sedimentary Unit 6 - Claystone with Minor Siltstone and Sandstone
Tb	Basalt
Ts4	Sedimentary Unit 4 - Sandstone and Siltstone with Minor Limestone
Tlt	Latite Welded Tuff
Trt	Rhyolite Tuff
Ts3	Sedimentary Unit 3 - Volcaniclastic Sandstone and Conglomerate
f	Felsite Dikes
Cms	Mule Spring Limestone
Ch	Harkless Formation
Cp	Poleta Formation
Ccm	Campito Formation, Montenegro Member
pCds	Deep Spring Formation
pCw	Wyman Formation

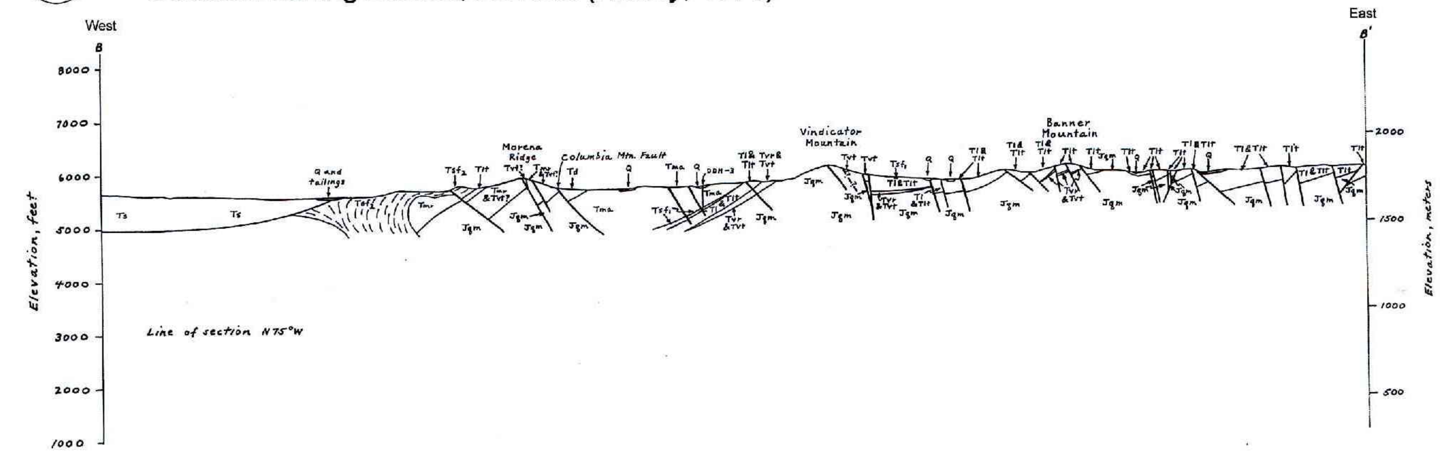
6 Section B-B' from Geology of the Tonopah, Lone Mountain, Klondike, and Northern Mud Lake Quadrangles, Nevada (Bonham and Garside, 1979)



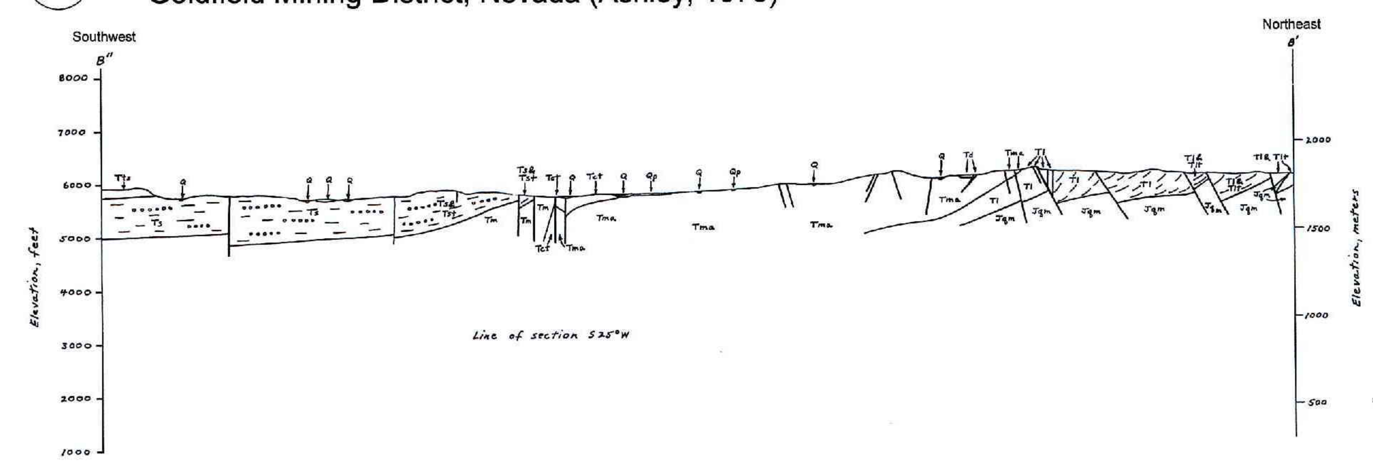
GEOLOGIC UNIT LEGEND

Symbol	Unit
Qs	Ephemeral Stream Deposits
Qdp	Mixed Dune Playa Deposits
Qfp	Fan and Pediment Deposits
Qoa	Older Alluvial Deposits
Tbd	Brougher Rhyolite (Domes)
	Siebert Formation:
Ts	Volcanoclastic and Tuffaceous Sedimentary Rocks
Tsb	Basal Sedimentary Breccia
Tht	Heller Tuff
Tfbx	Fraction Tuff - King Tonopah Member Breccia Unit
Tft	Fraction Tuff - Tonopah Summit Member Ash Flow Tuff
Twe	West End Rhyolite and Extension Breccia
	Mizpah Formation
Tm	Predominantly Flows
Tsp	Silicic Porphyry Dikes and Intrusive Rocks
	Tonopah Formation
Ttt	Ash Flow Tuffs and Sedimentary Rocks
Kgr	Microcline Granite
Klm	Lone Mountain Pluton
Kqm	Quartz Monzodiorite
Kgb	Gabbro
	Harkless Formation
Ɛh?	Hornfels and Dark Quartzite
Ɛh?	Limestone
Zds	Deep Spring Formation
Zr	Reed Dolomite
Zw	Wyman Formation

7 Section B-B' from Preliminary Geologic Map of the Goldfield Mining District, Nevada (Ashley, 1975)

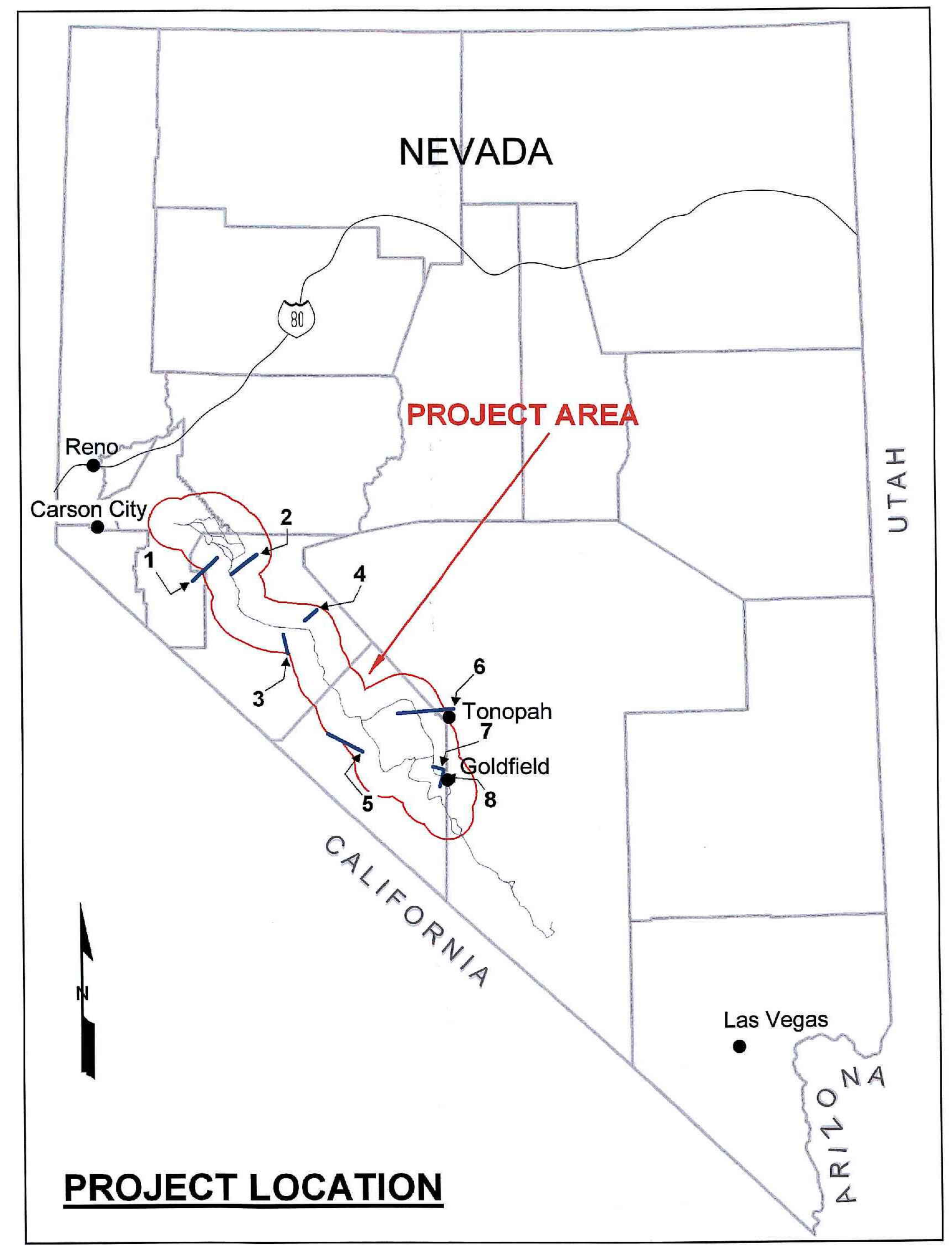


8 Section B'-B'' from Preliminary Geologic Map of the Goldfield Mining District, Nevada (Ashley, 1975)



GEOLOGIC UNIT LEGEND

Symbol	Unit
Q	Alluvium and Colluvium (Quaternary)
Qp	Pediment Gravel (Quaternary)
Tts	Spearhead Member of Thirsty Canyon Tuff (Miocene or Pliocene)
Ts	Siebert Tuff (Miocene)
Tst	Silicic Vitric Air Fall
Tm	Meda Rhyolite (Middle Miocene)
Tct	Tuff of Chispa Hills (Lower Miocene)
Tma	Milltown Andesite (Lower Miocene)
Tsf_2	Sandstorm Formation Rhyolite (Oligocene)
Tsf_1	Tuff and Tuff Breccia of the Sandstorm Formation (Oligocene)
Tl	Quartz Latite (Oligocene)
Tlt	Compacted Quartz Latite Tuff and Lapilli Tuff
Tvr	Vindicator Rhyolite (Oligocene)
Tmr	Crystal-Rich Ash Flow Tuff
Tvt	Rhyolite Ash Flow Tuff
Jqm	Quartz Monzonite (Jurassic)

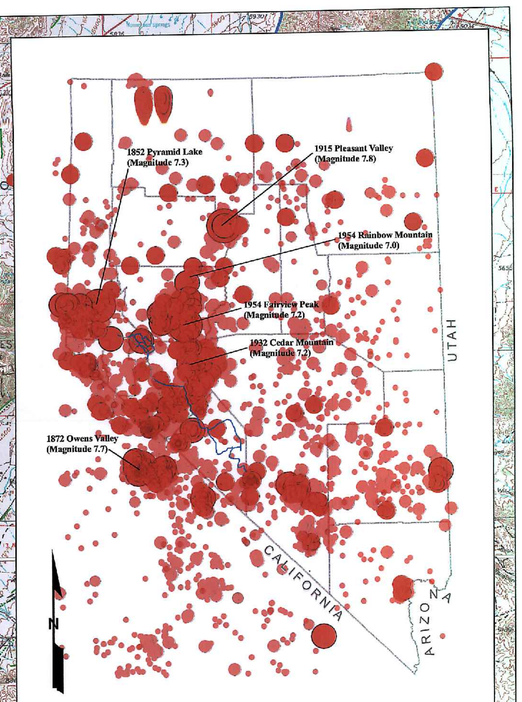


YUCCA MOUNTAIN PROJECT
MINA RAIL CORRIDOR
PHASE 1a MINA ROUTE

Geotechnical Report

GEOLOGIC CROSS-SECTIONS
PLATE 3

Filename: J:\211\20102-214\21-1-20102-214 Mina Plate (plotted date 6-24-07).dwg Created Using: AutoCAD 2007 and Photoshop 6.0



PROJECT LOCATION

LEGEND

SEISMIC EVENTS

APPROXIMATE LOCATION AND MAGNITUDE OF SEISMIC EVENT

- 7.0 - 8.0
- 6.0 - 6.9
- 5.0 - 5.9
- 4.0 - 4.9
- 3.0 - 3.9

RAIL STUDY RELATED FEATURES

- Existing Rail
- Mina Corridor Potential Alignments
- Mina/Caliente Corridor Potential Alignments
- MN1 — Mina Alignment Designator
- SR3 — Mina/Caliente Alignment Designator

FAULTS: WORKMAN, ET AL. (2002) AND COUNTY SOURCES

- FAULT-certain
- FAULT-concealed
- FAULT-inferred
- FAULT-queried
- THRUST FAULT-certain
- THRUST FAULT-concealed
- THRUST FAULT-inferred
- GEOPHYSICALLY INFERRED STRUCTURE
- FAULT ZONE
- THRUST FAULT ZONE

FAULTS: USGS FAULT AND FOLD DATABASE

(**FAULT AGE** DETERMINES LINE THICKNESS, **SLIP RATE** DETERMINES COLOR)

SLIP RATE	FAULT AGE
1 to 5 mm/yr	Historic
0.2 to 1 mm/yr	Holocene (<15,000 yrs)
<0.2 mm/yr	Late Quaternary (<130,000 yrs)
	Mid to Late Quaternary (<750,000 yrs)
	Quaternary (<1,600,000 yrs)

certain / concealed — inferred — FAULT

SOURCES

1. U.S. Department of Energy (DOE), U.S. Department of Energy Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy Yucca Mountain Site Characterization Office (YMSCO), 1999, Arc/info coverage – FCHUS (line features of faults of Churchill County, Nevada): Las Vegas, Nev., YMSCO, MO9904COV9163A.001, G99235, August 8.
2. U.S. Department of Energy (DOE), U.S. Department of Energy Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy Yucca Mountain Site Characterization Office (YMSCO), 1999, Arc/info coverage – FESMS (line features of faults of Esmeralda County, Nevada): Las Vegas, Nev., YMSCO, MO9904COV9163D.001, G99235, August 8.
3. U.S. Department of Energy (DOE), U.S. Department of Energy Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy Yucca Mountain Site Characterization Office (YMSCO), 1999, Arc/info coverage – FLDCS (line features of faults of Lyon, Douglas and Ormsby (Carson City) Counties, Nevada): Las Vegas, Nev., YMSCO, MO9904COV9163H.001, G99235, August 8.
4. U.S. Department of Energy (DOE), U.S. Department of Energy Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy Yucca Mountain Site Characterization Office (YMSCO), 1999, Arc/info coverage – FMNS (line features of faults of Mineral County, Nevada): Las Vegas, Nev., YMSCO, MO9904COV9163J.001, G99235, August 8.
5. U.S. Geological Survey, 2006, Quaternary fault and fold database of the United States: Available: http://earthquake.usgs.gov/regional/qfaults/, accessed March 20, 2007.
6. Workman, J.B.; Menges, C.M.; Page, W.R.; and others, 2002, Geologic map of the Death Valley ground-water model area, Nevada and California, digital geologic and tectonic database, ver. 1.0: U.S. Geological Survey Miscellaneous Field Studies Map MF-2381-A, available: http://geology.cr.usgs.gov/pub/mf-maps/mf-2381.
7. Workman, J.B.; Menges, C.M.; Page, W.R.; and others, 2002, Tectonic map of the Death Valley ground-water model area, Nevada and California, digital geologic and tectonic database, ver. 1.0: U. S. Geological Survey Miscellaneous Field Studies Map MF-2381-B, available: http://geology.cr.usgs.gov/pub/mf-maps/mf-2381.

NOTES

1. Rail Study Related Features provided by BSC - T06-00-238 rev09 (10/13/06).
2. Jurisdictional GIS data provided by BSC - GIS Baseline Data Dictionary (October, 2006) .
3. Indication of displacement along thrust faults is for display only and is not an indication of the plane of movement.
4. Seismic event location and magnitude data acquired from the Nevada Seismological Laboratory. Catalog includes events from 1852 to October 24, 2004.
5. All faults shown in color refer to data acquired from USGS (2006). All faults shown in black refer to data acquired from Workman, et al. (2002) and county sources.

YUCCA MOUNTAIN PROJECT
NEVADA RAIL CORRIDOR
PHASE 1a MINA ROUTE

Geotechnical Report

FAULTS AND SEISMIC ACTIVITY MAP
PLATE 4

0 5 10 15 20

Scale in Miles

Filename: 21-1-20102-214_Geotech_Plate-4_Faults-And-Seismic-Activity-Map.mxd Created Using: ArcMap 9.2 Date: 04/24/07 BRL

APPENDIX A
PRELIMINARY GEOTECHNICAL DESIGN CRITERIA MANUAL
Rev 0, 24 February 2005
[under separate cover]

APPENDIX B
BALLAST SOURCING COST ANALYSIS
Rev 0, 18 February 2005
[under separate cover]

APPENDIX C
PRELIMINARY CONSTRUCTION AGGREGATE REPORT
Mina Corridor, Rev 0, 10 April 2007
[under separate cover]

APPENDIX D
BALLAST QUARRY REPORT
Mina Corridor, Rev 0, 13 March 2006
[under separate cover]

APPENDIX E
PRELIMINARY MINERAL AND ENERGY RESOURCE OCCURRENCE REPORT
Mina Corridor, Rev 0, 17 April 2007
[under separate cover]

APPENDIX F

SHANNON & WILSON, INC.
FIELD REFERENCES – SOIL AND ROCK CLASSIFICATION

FIELD REFERENCE SOIL CLASSIFICATION

ORDER OF CLASSIFICATION TERMS

Relative density or consistency,

color,

slightly (5 to 12%),

minor constituents (12 to 50%)

MAJOR constituent (>50%),

trace constituents (0 to 5%);

moisture content;

structure, plasticity, gradation, grain shape, min., cementation, organics, odor, other;

(Geologic Name: Fill, Till, Alluvium, etc.)

USCS group symbol.

EXAMPLES

Very dense, light brown, slightly silty, sandy fine GRAVEL, trace of cobbles; moist; scattered roots; (Weathered Till) GP-GM.

Medium stiff, dark gray, silty CLAY, trace of fine sand; moist; laminated (< 2mm) with light gray silt, occasional slickensides; (Glaciolacustrine) CL.

Medium dense, dark brown, sandy SILT, trace of clay; wet; numerous organics and strong organic odor; (Marsh Deposits) ML.

Loose and soft, mottled black and green, silty SAND and clayey SILT; moist; hydrocarbon sheen and faint hydrocarbon odor; (Fill) SM/ML.

STRUCTURE

TERM	THICKNESS
Parting	0 to 1/16"
Seam	1/16 to 1/2"
Layer	> 1/2"
Lamination	< 6 mm, < 1/4"
Pocket	Irregular, < 1 foot
Varved	Alternating seams or lam.
Occasional	< 1 per foot
Frequent	≥ 1 per foot

DESCRIPTION	CRITERIA, LIST THICKNESS
Stratified	Alternating layers
Interbedded	Alternating layers > 1/2"
Laminated	Alt. layers < 6 mm thick
Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, striated fractured planes
Blocky, Diced	Easily breaks into small angular lumps
Lensed	Small pockets of diff. soils
Homogenous	Same color and appearance throughout
Sheared	Disturbed texture, mix of strengths

ORGANIC CONTENT

ADJECTIVE	PERCENT BY VOLUME
Occasional	0 to 1
Scattered	1 to 10
Numerous	10 to 30
Organic	30 to 50, minor constituent
PEAT	50 to 100, MAJOR const.

Describe type and size of organic debris.

TERM	GRAIN SIZE	EXAMPLES
Boulders	> 12"	> Basketball
Cobbles	3" to 12"	Fist to basketball
Gravel-coarse	3/4" to 3"	Thumb to fist
Gravel-fine	#4 to 3/4"	Pea to thumb
Sand-coarse	#10 to #4 (5 mm)	Rock salt to peat
Sand-medium	#40 to #10 (2 mm)	Sugar to rock salt
Sand-fine	#200 to #40 (0.4 mm)	Flour to sugar
Fines	< #200 (0.08 mm)	Grains not visible

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water near optimum
Wet	Visible free water, saturated, over optimum

RELATIVE DENSITY OF COARSE-GRAINED (COHESIONLESS) SOILS
(Cohesionless Silt, Sand, and Gravel)

N. SPT, BLOWS/FT	RELATIVE DENSITY	FIELD TEST FOR RELATIVE DENSITY OF SAND
0 to 4	Very loose	Easily penetrated with 1/2" reinforcing rod pushed by hand
4 to 10	Loose	Easily penetrated with 1/2" reinforcing rod pushed by hand
10 to 30	Medium dense	Penetrated one foot with 1/2" reinforcing rod driven with 5-lb hammer
30 to 50	Dense	Penetrated one foot with 1/2" reinforcing rod driven with 5-lb hammer
Over 50	Very dense	Penetrated only a few inches with 1/2" reinf. rod driven with 5-lb hammer

RELATIVE CONSISTENCY OF FINE-GRAINED (COHESIVE) SOILS
(Cohesive Silt, Clayey Silt, and Clay)

N. SPT, BLOWS/FT	RELATIVE CONSISTENCY	TORVANE, tsf SHEAR STR.	POC. PEN., tsf UNCONF. STR.	MANUAL PENETRATION TEST
< 2	Very soft	< 0.13	< 0.25	Easy several inches by fist
2 to 4	Soft	0.13 to 0.25	0.25 to 0.5	Easy several inches by thumb
4 to 8	Medium stiff	0.25 to 0.5	0.5 to 1	Moderate several inches by thumb
8 to15	Stiff	0.5 to 1	1 to 2	Readily indented by thumb
15 to 30	Very stiff	1 to 2	2 to 4	Readily indented by thumbnail
Over 30	Hard	> 2	> 4	Difficulty by thumbnail

UNIFIED SOIL CLASSIFICATION SYSTEM
(From USACE Tech Memo 3-357)

MAJOR DIVISIONS			GROUP SYMBOL	TYPICAL DESCRIPTION
Coarse-Grained Soils (more than 50% retained on No. 200 sieve) [Use Dual Symbols for 5 to 12% Fines (i.e. GP-GM)]	Gravels (more than 50% of coarse fraction retained on No.4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures
		Gravels with Fines (more than 12% fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		Sands with Fines (more than 12% fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
Fine-Grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		Organic	OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	CH	Inorganic Clays of Medium to High Plasticity, Sandy Fat Clay, Gravelly Fat Clay
			MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silty Soils, Elastic Silt
		Organic	OH	Organic Clays of Medium to High Plasticity, Organic Silts
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat, Humus, Swamp Soils with High Organic Content (See D 4427-92)

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GRADATION	DESCRIPTION	EXAMPLES
Well-graded	Full range and even distribution of grain sizes present	Silty, sandy GRAVEL
Poorly-graded	Narrow range of grain sizes present	Fine to medium SAND, trace of silt
Uniformly -graded	Consists predominantly of one grain size	Fine SAND
Gap-graded	Within the range of grain sizes present, one or more sizes are missing	Silty, medium to coarse SAND

FIELD REFERENCE SOIL CLASSIFICATION

Dual Symbols

(symbols separated by a hyphen, i.e., SP-SM, slightly silty fine SAND) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

Borderline Symbols

(symbols separated by a slash, i.e., CL/ML, silty CLAY/clayey SILT; GW/SW, sandy GRAVEL/gravelly SAND) indicate that the soil may fall into one of two possible basic groups.

ASTM D 2488 Tables

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TABLE 8 Criteria for Describing Dry Strength

DESCRIPTION	CRITERIA
None	The dry specimen crumbles into powder with mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface.
Very High	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 9 Criteria for Describing Dilatancy

DESCRIPTION	CRITERIA
None	No visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

TABLE 10 Criteria for Describing Toughness

DESCRIPTION	CRITERIA
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 11 Criteria for Describing Plasticity

DESCRIPTION	CRITERIA
Nonplastic	A 1/8-in. (3mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

TABLE 1 Criteria for Describing Angularity of Coarse-Grained Particles

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

TABLE 2 Criteria for Describing Particle Shape

DESCRIPTION	CRITERIA
The particle shape shall be described as follows where length, width, and thickness refer to the greatest, intermediate, and least dimensions of a particle, respectively.	
Flat	Particles with width/thickness > 3
Elongated	Particles with length/width > 3
Flat and Elongated	Particles meet criteria for both flat and elongated

TABLE 4 Criteria for Describing the Reaction with HCl

DESCRIPTION	CRITERIA
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

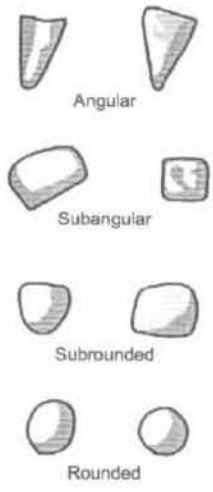
TABLE 6 Criteria for Describing Cementation

DESCRIPTION	CRITERIA
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

TABLE 12 Identification of Inorganic Fine-Grained Soils from Manual Tests

SOIL SYMBOL	DRY STRENGTH	DILATANCY	TOUGHNESS
ML	None to Low	Slow to Rapid	Low or Thread Cannot be Formed
CL	Medium to High	None to Slow	Medium
MH	Low to Medium	None to Slow	Low to Medium
CH	High to Very High	None	High

GRAIN SHAPE



SPT SPECS (From Dept. of Interior Earth Manual)

140-lb hammer, 30-inch freefall

Cathead: 6 to 10-inch diameter, 2-1/4 rope turns, ≥ 100 rpm, mechanical OK

Sampler: 18 to 30-inch long, shoe ID = 1.375 inches, barrel ID = 1.5 inches, OD = 2.0 inches

Count blows for each of three 6-inch increments
Refusal: 50 blows for 6 inches or less, 10 blows for 0 inches

Standard Penetration Resistance = "N-Value" = blows for last 12 inches

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FIELD REFERENCE ROCK CLASSIFICATION

ORDER OF CLASSIFICATION TERMS

1. ROCK NAME: (see back of sheet)
2. strength,
3. basic rock description;
4. structure;
5. weathering;
6. other or unique features
7. (Formation or Member name)

EXAMPLE

BASALT: moderate strength, gray, fine grained; moderately vesicular, smooth, closely-spaced, high angle joints with iron-oxide staining; slightly weathered (Wanapum Basalt).

3. BASIC ROCK DESCRIPTION

COLOR

TEXTURE (see back side of sheet)

CEMENTATION: Weakly / Strongly

INDURATION: Slightly / Highly

4. STRUCTURE

a) FABRIC: Bedding, foliation, etc.; Describe type, spacing, orientation

b) VESICULARITY: Describe percent by volume and size of holes (range and typical)

c) DISCONTINUITIES: Describe type, number of sets, spacing or intercept (range and typical), roughness, healing, aperture (width), filling type and consistency (use soil terms), and orientation or dip (low / high or angle)

4a. FABRIC TERMS

Sedimentary Rocks:

MASSIVE - Rock without significant structure

BEDDED - Regular layering from sedimentation

FISSILE - Tendency to break along laminations

Metamorphic Rocks:

FOLIATED - Parallel arrangement or distribution of minerals

SCHISTOSE - Parallel arrangement of tabular minerals giving a planar fissility

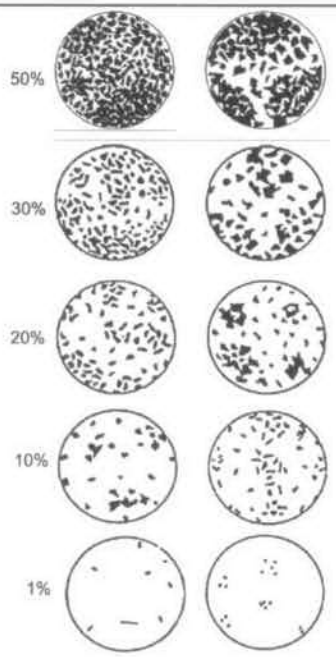
GNEISSOSE - Segregation of minerals into bands

CLEAVAGE - Tendancy to split along secondary, planar textures or structures

4b. VESICULARITY

Slightly Vesicular	1 to 10%
Moderately Vesicular	10 to 30%
Highly Vesicular	30 to 50%
Scoriaceous	>50%

COMPARISON CHART
(percent by volume)



4c. DISCONTINUITY TERMS

FRACTURE - Collective term for any natural break excluding shears, shear zones, and faults

JOINT (JT) - Planar break with little or no displacement

FOLIATION JOINT (FJ) or BEDDING JOINT (BJ) - Joint along foliation or bedding

INCIPIENT JOINT (IJ) or INCIPIENT FRACTURE (IF) - Joint or fracture not evident until wetted and dried; breaks along existing surface

RANDOM FRACTURE (RF) - Natural, very irregular fracture that does not belong to a set

BEDDING PLANE SEPARATION or PARTING - A separation along bedding after extraction from stress relief or slaking

FRACTURE ZONE (FZ) - Planar zone of broken rock without gouge

MECHANICAL BREAK (MB) - Breaks due to drilling or handling; drilling break (DB), hammer break (HB).

SHEAR (SH) - Surface of differential movement evident by presence of slickensides, striations, or polishing

SHEAR ZONE (SZ) - Zone of gouge and rock fragments bounded by planar shear surfaces

FAULT (FT) - Shear zone of significant extent; differentiation from shear may be site-specific

4c. OUTCROP DATA

When collecting outcrop data, fracture orientation, aperture, roughness, and filling type / consistency, should be described in greater detail than is possible with core. Depending on the nature or investigation, additional data should also be recorded:

Fracture WALL STRENGTH

Fracture CONTINUITY OR LENGTH

Fracture ENDS OBSERVED (0, 1, 2)

Fracture MOISTURE CONDITIONS (dry, dry but stained, damp, wet, dripping, flowing)

BLOCK SIZE

When this level of detail is required, a special data collection form should be used.

Pathname: J:\211\20102-239\Field Guides\21-1-20102-239 FIELD ROCK CLASS 2 (3 pgs).dwg 08-02-2007 Login: CNT

cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Inches 1 2 3 4 5 6

APPENDIX G

PHOTOGRAPHS FROM FIELD RECONNAISSANCE (DVD)

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1001_ALG_0001_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1		KJg sheared granodiorite in Wassuk Range	ALG	10/5/2006
MT1001_SMP_0006_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1	NW	KJg outcrop, sheared zone	SMP	10/5/2006
MT1001_SMP_0007_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1	N	KJg outcrop closeup	SMP	10/5/2006
MT1001_WTL_0025_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1		Granodiorite of Alum Cr. in Cottonwood Canyon	WTL	10/5/2006
MT1001_WTL_0026_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1		Granodiorite of Alum Cr. in Cottonwood Canyon	WTL	10/5/2006
MT1001_WTL_0027_05Oct06.jpg	MT1001	MCS1	NA	NA	Plate 1		Closeup of KJg granodiorite	WTL	10/5/2006
MT1002_ALG_0002_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		KJg granite & granodiorite in Wassuk Range	ALG	10/5/2006
MT1002_ALG_0003_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		KJg weathered granite in Wassuk Range	ALG	10/5/2006
MT1002_SMP_0008_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1	W	KJg outcrop; less sheared, degraded zone	SMP	10/5/2006
MT1002_SMP_0009_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1	NW	closeup of sheared/altered KJg	SMP	10/5/2006
MT1002_WTL_0028_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		Granite outcrop	WTL	10/5/2006
MT1002_WTL_0029_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		Color difference between sheared granodiorite and granite	WTL	10/5/2006
MT1002_WTL_0030_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		Closeup of granite outcrop	WTL	10/5/2006
MT1002_WTL_0031_05Oct06.jpg	MT1002	MCS1	NA	NA	Plate 1		Hillside of granite; note chute without outcrop	WTL	10/5/2006
MT1004_ALG_0004_05Oct06.jpg	MT1004	MCS1	NA	NA	18	E	View east at start of MCS1	ALG	10/5/2006
MT1004_ALG_0005_05Oct06.jpg	MT1004	MCS1	NA	NA	18	SW	View SW of Wassuk Range from Thorne	ALG	10/5/2006
MT1004_ALG_0006_05Oct06.jpg	MT1004	MCS1	NA	NA	18		Ql fg-mg sand	ALG	10/5/2006
MT1004_ALG_0007_05Oct06.jpg	MT1004	MCS1	NA	NA	18		Ql silty sand & sandy silt	ALG	10/5/2006
MT1004_SMP_0010_05Oct06.jpg	MT1004	MCS1	NA	NA	18	SE	start of Mina route; silty, fine SAND (SM)	SMP	10/5/2006
MT1004_SMP_0011_05Oct06.jpg	MT1004	MCS1	NA	NA	18	NW	start of Mina route; silty, fine SAND (SM)	SMP	10/5/2006
MT1004_WTL_0032_05Oct06.jpg	MT1004	MCS1	NA	NA	18	E	Thorne, looking E along old and new RR grades	WTL	10/5/2006
MT1004_WTL_0033_05Oct06.jpg	MT1004	MCS1	NA	NA	18		1-foot-deep test hole at Thorne Holocene lake deposits	WTL	10/5/2006
MT1004_WTL_0034_05Oct06.jpg	MT1004	MCS1	NA	NA	18	N	Looking N at Gillis Range from Thorne	WTL	10/5/2006
MT1004_WTL_0035_05Oct06.jpg	MT1004	MCS1	NA	NA	18		Test hole with silty fine sand and fine sandy silt	WTL	10/5/2006
MT1005_ALG_0008_05Oct06.jpg	MT1005	MCS1	1005+66	-198	18		culverts & stone wall under tracks	ALG	10/5/2006
MT1006_ALG_0009_05Oct06.jpg	MT1006	MCS1	1024+90	-190	18		RR embankment crossing dessicated lake beds	ALG	10/5/2006
MT1006_SMP_0012_05Oct06.jpg	MT1006	MCS1	1024+90	-190	18	W	embankment, approx. 10 feet high with 20-degree slope	SMP	10/5/2006
MT1006_WAH_0026_16Nov06.jpg	MT1006	MCS1	1024+90	-190	18	NW	View NW along existing main track showing sand accumulation between the rails	WAH	11/16/2006
MT1006_WTL_0036_05Oct06.jpg	MT1006	MCS1	1024+90	-190	18		Abandoned RR grade; 20 degree side slopes	WTL	10/5/2006
MT1006_WTL_0334_16Nov06.jpg	MT1006	MCS1	1024+90	-190	18		Thorne lake beds	WTL	11/16/2006
MT1006_WTL_0335_16Nov06.jpg	MT1006	MCS1	1024+90	-190	18		Thorne lake beds	WTL	11/16/2006
MT1007_ALG_0010_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19	NW	View NW of dunes along MCS1	ALG	10/5/2006
MT1007_ALG_0012_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19	SE	View SE of dunes along MCS1	ALG	10/5/2006
MT1007_ALG_0013_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19		Silty sand and sand	ALG	10/5/2006
MT1007_SMP_0013_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19	S	Qay alluvial fan outcrop	SMP	10/5/2006
MT1007_WTL_0037_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19		Cut bank with silty fine to coarse sand underlain by fine sandy silt	WTL	10/5/2006
MT1007_WTL_0038_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19		Closeup of cut bank (061005037)	WTL	10/5/2006
MT1007_WTL_0039_05Oct06.jpg	MT1007	MCS1	1156+75	-166	19		Blow sand around gully cut	WTL	10/5/2006
MT1008_ALG_0014_05Oct06.jpg	MT1008	MCS1	1270+24	-543	19		Qe sediments	ALG	10/5/2006
MT1008_ALG_0015_05Oct06.jpg	MT1008	MCS1	1270+24	-543	19	NW	View NW of Qe along MCS1	ALG	10/5/2006
MT1008_ALG_0016_05Oct06.jpg	MT1008	MCS1	1270+24	-543	19	SE	ViewSE of Qe along MCS1	ALG	10/5/2006
MT1008_WTL_0040_05Oct06.jpg	MT1008	MCS1	1270+24	-543	19		Test hole with slightly silty fine sand	WTL	10/5/2006
MT1008_WTL_0041_05Oct06.jpg	MT1008	MCS1	1270+24	-543	19		Test hole with slightly silty fine sand	WTL	10/5/2006
MT1009_ALG_0017_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19	NW	View NW along MCS1	ALG	10/5/2006
MT1009_ALG_0018_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19	SE	View SE along MCS1	ALG	10/5/2006
MT1009_ALG_0019_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19		Gillis Range fan alluvium	ALG	10/5/2006
MT1009_ALG_0020_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19		Gillis Range fan alluvium	ALG	10/5/2006
MT1009_ALG_0021_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19		Gillis Range fan alluvium	ALG	10/5/2006
MT1009_WTL_0042_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19	W	Walker Valley old RR grade, looking W	WTL	10/5/2006
MT1009_WTL_0043_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19	E	Walker Valley old RR grade, looking E	WTL	10/5/2006
MT1009_WTL_0044_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19	NE	Walker Valley old RR grade, looking NE	WTL	10/5/2006
MT1009_WTL_0045_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19		Old trench exposure	WTL	10/5/2006
MT1009_WTL_0046_05Oct06.jpg	MT1009	MCS1	1369+02	-169	19		Old trench exposure	WTL	10/5/2006
MT1010_ALG_0022_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite of Ta4 in Garfield Hills	ALG	10/5/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1010_ALG_0023_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite of Ta4 in Garfield Hills	ALG	10/5/2006
MT1010_SMP_0014_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19	E	Ta3 cut slope, approx. 35 degrees	SMP	10/5/2006
MT1010_SMP_0015_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19	SSE	Ta3 cut slope, approx. 35 degrees	SMP	10/5/2006
MT1010_WTL_0047_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite outcrop in US 95 road cut	WTL	10/5/2006
MT1010_WTL_0048_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite outcrop in US 95 road cut; 35 degree slope	WTL	10/5/2006
MT1010_WTL_0049_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite outcrop in US 95 road cut	WTL	10/5/2006
MT1010_WTL_0050_05Oct06.jpg	MT1010	MCS1	1469+83	1357	19		Latite outcrop in US 95 road cut	WTL	10/5/2006
MT1011_ALG_0024_05Oct06.jpg	MT1011	MCS1	1565+77	97	20		Ta4 latite overlying TRPvs sheared rhyolite	ALG	10/5/2006
MT1011_SMP_0016_05Oct06.jpg	MT1011	MCS1	1565+77	97	20	SE	Ta3/TrPvs cut slope, approx. 51 degrees	SMP	10/5/2006
MT1011_SMP_0017_05Oct06.jpg	MT1011	MCS1	1565+77	97	20	SSE	Ta3/TrPvs cut slope, approx. 51 degrees	SMP	10/5/2006
MT1011_SMP_0018_05Oct06.jpg	MT1011	MCS1	1565+77	97	20	NW	Old RR embankment, approx. 25-degree slope	SMP	10/5/2006
MT1011_WTL_0051_05Oct06.jpg	MT1011	MCS1	1565+77	97	20		Tertiary latite overlying Triassic rhyolite in US 95 road cut	WTL	10/5/2006
MT1011_WTL_0052_05Oct06.jpg	MT1011	MCS1	1565+77	97	20		Tertiary latite overlying Triassic rhyolite in US 95 road cut	WTL	10/5/2006
MT1011_WTL_0053_05Oct06.jpg	MT1011	MCS1	1565+77	97	20		Old RR N of US 95	WTL	10/5/2006
MT1011_WTL_0054_05Oct06.jpg	MT1011	MCS1	1565+77	97	20		Contact of latite and rhyolite in US 95 road cut; note paleosol	WTL	10/5/2006
MT1012_WTL_0055_05Oct06.jpg	MT1012	MCS1	1610+60	1536	20		NDOT Pit MI 02-05; 8 to 10 feet deep	WTL	10/5/2006
MT1013_ALG_0025_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Tb in Garfield Hills	ALG	10/5/2006
MT1013_ALG_0026_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Tb in Garfield Hills	ALG	10/5/2006
MT1013_SMP_0019_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1	E	Tb outcrop	SMP	10/5/2006
MT1013_WTL_0056_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Tertiary basalt outcrop, S of US 95	WTL	10/5/2006
MT1013_WTL_0057_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Tertiary basalt outcrop, S of US 95	WTL	10/5/2006
MT1013_WTL_0058_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Tertiary basalt outcrop, S of US 95; closeup	WTL	10/5/2006
MT1013_WTL_0059_05Oct06.jpg	MT1013	MCS1	NA	NA	Plate 1		Larger outcrop of Tertiary basalt S of N outcrop (300 feet long x 50 feet high)	WTL	10/5/2006
MT1014_SMP_0020_06Oct06.jpg	MT1014	S6	NA	NA	1	N	Wabuska yard vicinity	SMP	10/6/2006
MT1015_ALG_0027_06Oct06.jpg	MT1015	S6	NA	NA	1		View north of a canal and UPRR tracks near the proposed site of a rail yard for the MRC	ALG	10/6/2006
MT1015_SMP_0021_06Oct06.jpg	MT1015	S6	NA	NA	1	NE	west of Wabuska yard at existing RR line	SMP	10/6/2006
MT1015_SMP_0022_06Oct06.jpg	MT1015	S6	NA	NA	1	NW	west of Wabuska yard at existing RR line	SMP	10/6/2006
MT1015_SMP_0023_06Oct06.jpg	MT1015	S6	NA	NA	1	N	view of erosion around RR culvert	SMP	10/6/2006
MT1016_ALG_0028_06Oct06.jpg	MT1016	S6	NA	NA	Plate 1		Thin Tb cap on Cleaver Peak	ALG	10/6/2006
MT1017_ALG_0029_06Oct06.jpg	MT1017	S6	NA	NA	2	E	View east at start of S2	ALG	10/6/2006
MT1017_ALG_0030_06Oct06.jpg	MT1017	S6	NA	NA	2	W	View west at start of S2	ALG	10/6/2006
MT1017_ALG_0031_06Oct06.jpg	MT1017	S6	NA	NA	2		Qbf sandy silt in Campbell Valley	ALG	10/6/2006
MT1017_SMP_0024_06Oct06.jpg	MT1017	S6	NA	NA	2	SW	RR embankment with approx. 33-35 degree slope	SMP	10/6/2006
MT1017_SMP_0025_06Oct06.jpg	MT1017	S6	NA	NA	2	E	RR embankment with approx. 24-25 degree slope	SMP	10/6/2006
MT1017_SMP_0026_06Oct06.jpg	MT1017	S6	NA	NA	2	SE	wood culvert through RR embankment	SMP	10/6/2006
MT1018_ALG_0032_06Oct06.jpg	MT1018	S4	10106+66	23	2	SW	View SW along S1/S2 of QTf & Tsy in Walker R. valley	ALG	10/6/2006
MT1018_ALG_0033_06Oct06.jpg	MT1018	S4	10106+66	23	2		Art Geldon and Scott Pawling	ALG	10/6/2006
MT1018_ALG_0034_06Oct06.jpg	MT1018	S4	10106+66	23	2	S	View S of QTf & Tsy in Walker River Valley	ALG	10/6/2006
MT1018_ALG_0035_06Oct06.jpg	MT1018	S4	10106+66	23	2	NE	View NE along S1/S2 of Tsy topography	ALG	10/6/2006
MT1018_ALG_0036_06Oct06.jpg	MT1018	S4	10106+66	23	2		Tsy above wash & QTf in wash	ALG	10/6/2006
MT1018_ALG_0037_06Oct06.jpg	MT1018	S4	10106+66	23	2		QTf crossbedded sand	ALG	10/6/2006
MT1018_ALG_0038_06Oct06.jpg	MT1018	S4	10106+66	23	2		Tsy thinly bedded clay, silt, and fg sand	ALG	10/6/2006
MT1018A_SMP_0027_06Oct06.jpg	MT1018A	S4	10104+08	5	2	W	along alignment	SMP	10/6/2006
MT1018A_SMP_0028_06Oct06.jpg	MT1018A	S4	10104+08	5	2	E	along alignment	SMP	10/6/2006
MT1018B_SMP_0029_06Oct06.jpg	MT1018B	S2	10112+49	-6	2	NE	top of Ta4 cut, along alignment	SMP	10/6/2006
MT1019_ALG_0039_06Oct06.jpg	MT1019	S4	10150+61	128	2	E	View E along S2 of volcanic clast-capped bench	ALG	10/6/2006
MT1019_ALG_0040_06Oct06.jpg	MT1019	S4	10150+61	128	2	SW	View SW along S2	ALG	10/6/2006
MT1020_ALG_0041_06Oct06.jpg	MT1020	S4	10491+94	1398	4	NE	View NE of Tsy laminated clay, silt, and fg sand	ALG	10/6/2006
MT1020_ALG_0042_06Oct06.jpg	MT1020	S4	10491+94	1398	4	NW	View NW along S1 & 2	ALG	10/6/2006
MT1020_ALG_0043_06Oct06.jpg	MT1020	S4	10491+94	1398	4	SE	View SE along S1 & 2	ALG	10/6/2006
MT1020A_SMP_0030_06Oct06.jpg	MT1020A	S4	10489+85	46	4	NNW	along alignment; Tsy	SMP	10/6/2006
MT1021_ALG_0044_06Oct06.jpg	MT1021	S2	10466+35	-780	3		Butte of basaltic andesite in Ta4	ALG	10/6/2006
MT1021_ALG_0045_06Oct06.jpg	MT1021	S2	10466+35	-780	3		Basaltic andesite shear zone	ALG	10/6/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1021_ALG_0046_06Oct06.jpg	MT1021	S2	10466+35	-780	3		Basaltic andesite boulders capping butte	ALG	10/6/2006
MT1021_SMP_0031_06Oct06.jpg	MT1021	S2	10466+35	-780	3	NNW	andesite shear zone	SMP	10/6/2006
MT1021_SMP_0032_06Oct06.jpg	MT1021	S2	10466+35	-780	3	NNW	zoom-out from andesite shear zone	SMP	10/6/2006
MT1021_SMP_0033_06Oct06.jpg	MT1021	S2	10466+35	-780	3	NNE	view of blocky andesite, Ta2	SMP	10/6/2006
MT1022_ALG_0047_06Oct06.jpg	MT1022	S2	10555+85	45	4	SE	View SE of badlands developed on Tsy lakebeds	ALG	10/6/2006
MT1022_ALG_0048_06Oct06.jpg	MT1022	S2	10555+85	45	4	SE	View SE of Tsy lakebeds	ALG	10/6/2006
MT1022_SMP_0035_06Oct06.jpg	MT1022	S2	10555+85	45	4	SE	zoom-out of weathered badlands, along alignment	SMP	10/6/2006
MT1022A_SMP_0034_06Oct06.jpg	MT1022A	S2	10558+25	122	4	SE	weathered badlands	SMP	10/6/2006
MT1023_ALG_0049_07Oct06.jpg	MT1023	S2	10719+18	2822	5	ENE	View ENE of Tsy lakebeds from Weber Dam	ALG	10/7/2006
MT1023_ALG_0050_07Oct06.jpg	MT1023	S2	10719+18	2822	5	ENE	View ENE of Tsy lakebeds	ALG	10/7/2006
MT1023_ALG_0062_07Oct06.jpg	MT1023	S2	10719+18	2822	5	E	View east of Tsy lakebeds	ALG	10/7/2006
MT1023_ALG_0063_07Oct06.jpg	MT1023	S2	10719+18	2822	5	SE	Pan SE of Tsy lakebeds	ALG	10/7/2006
MT1024_ALG_0051_07Oct06.jpg	MT1024	S4	10675+93	790	4	E	View E of Terrill Mts fan covered with Qe silty sand	ALG	10/7/2006
MT1024_SMP_0038_07Oct06.jpg	MT1024	S4	10675+93	790	4	SSW	overview of Qc wash	SMP	10/7/2006
MT1024A_SMP_0036_07Oct06.jpg	MT1024A	S2	10673+18	-21	4	W	north slope of Qc wash, approx. 23-28 degree slope	SMP	10/7/2006
MT1024B_ALG_0052_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	ESE	View ESE of fan and wash alluvium	ALG	10/7/2006
MT1024B_ALG_0053_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	N	View N along S1 & 2	ALG	10/7/2006
MT1024B_ALG_0054_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	WSW	View WSW of Wassuk Range and White Mt.	ALG	10/7/2006
MT1024B_ALG_0055_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	SW	pan SW of Wassuk Range & Sunshine Flat	ALG	10/7/2006
MT1024B_ALG_0056_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	S	Pan S along S1 & 2	ALG	10/7/2006
MT1024B_ALG_0057_07Oct06.jpg	MT1024B	S2	10675+16	-437	4		Qc sand and gravelly sand	ALG	10/7/2006
MT1024B_ALG_0058_07Oct06.jpg	MT1024B	S2	10675+16	-437	4		Fluvial sl. silty, mg sand	ALG	10/7/2006
MT1024B_SMP_0037_07Oct06.jpg	MT1024B	S2	10675+16	-437	4	W	north slope of Qc wash, approx. 23 degree slope	SMP	10/7/2006
MT1025_ALG_0059_07Oct06.jpg	MT1025	S2	10614+06	122	4	W	View W of fluvial sediments	ALG	10/7/2006
MT1025_ALG_0060_07Oct06.jpg	MT1025	S2	10614+06	122	4	SE	View SE along S1 & 2	ALG	10/7/2006
MT1025_ALG_0061_07Oct06.jpg	MT1025	S2	10614+06	122	4	NW	View NW along S1 & 2	ALG	10/7/2006
MT1026_ALG_0064_07Oct06.jpg	MT1026	S3	10000+18	5074	5		Weber Dam quarry in KJg quartz monzonite	ALG	10/7/2006
MT1026_ALG_0065_07Oct06.jpg	MT1026	S3	10000+18	5074	5		KJg quartz monzonite in Weber Dam quarry	ALG	10/7/2006
MT1026_ALG_0066_07Oct06.jpg	MT1026	S3	10000+18	5074	5		Fracture sets in KJg quartz monzonite	ALG	10/7/2006
MT1026_ALG_0067_07Oct06.jpg	MT1026	S3	10000+18	5074	5		Fracture sets in KJg quartz monzonite quarry	ALG	10/7/2006
MT1026_SMP_0039_07Oct06.jpg	MT1026	S3	10000+18	5074	5	E	White Mtn. quarry	SMP	10/7/2006
MT1026_SMP_0040_07Oct06.jpg	MT1026	S3	10000+18	5074	5	SE	White Mtn. quarry	SMP	10/7/2006
MT1027_ALG_0068_07Oct06.jpg	MT1027	S3	10033+80	315	5	W	View W of Reservation Hill where S3 cuts through it	ALG	10/7/2006
MT1027_ALG_0069_07Oct06.jpg	MT1027	S3	10033+80	315	5	W	View W from top of Reservation Hill	ALG	10/7/2006
MT1027_ALG_0070_07Oct06.jpg	MT1027	S3	10033+80	315	5	E	View east along S3	ALG	10/7/2006
MT1027_ALG_0071_07Oct06.jpg	MT1027	S3	10033+80	315	5		Qao fan alluvium on east side of Reservation Hill	ALG	10/7/2006
MT1027_SMP_0044_07Oct06.jpg	MT1027	S3	10033+80	315	5	NE	overview of Reservation Hill, approx. 17.5 degrees average slope angle	SMP	10/7/2006
MT1027A_SMP_0041_07Oct06.jpg	MT1027A	S3	10037+89	22	5	NW	Reservation Hill, along alignment	SMP	10/7/2006
MT1027A_SMP_0042_07Oct06.jpg	MT1027A	S3	10037+89	22	5	E	Reservation Hill, along alignment	SMP	10/7/2006
MT1027A_SMP_0043_07Oct06.jpg	MT1027A	S3	10037+89	22	5	E	test hole showing surficial soils: medium dense, reddish brown, slightly gravelly, slightly silty to silty SAND; SW-SM/SM	SMP	10/7/2006
MT1028_ALG_0072_07Oct06.jpg	MT1028	S3	10071+74	67	5		lakebeds & fluvial sediments cut by Walker River	ALG	10/7/2006
MT1028_ALG_0073_07Oct06.jpg	MT1028	S3	10071+74	67	5		Tsy lakebeds exposed by Walker River	ALG	10/7/2006
MT1028_ALG_0074_07Oct06.jpg	MT1028	S3	10071+74	67	5	SE	View SE of Tsy lakebeds	ALG	10/7/2006
MT1028_ALG_0075_07Oct06.jpg	MT1028	S3	10071+74	67	5		Lake & fluvial sediments by Walker R	ALG	10/7/2006
MT1028_ALG_0076_07Oct06.jpg	MT1028	S3	10071+74	67	5	SE	View SE of fluvial sediments by Walker River	ALG	10/7/2006
MT1028_ALG_0077_07Oct06.jpg	MT1028	S3	10071+74	67	5		Cemented gravel layers in fluvial sediments	ALG	10/7/2006
MT1028_ALG_0078_07Oct06.jpg	MT1028	S3	10071+74	67	5	NE	View NE of fluvial sediments in banks of Walker R	ALG	10/7/2006
MT1028_ALG_0079_07Oct06.jpg	MT1028	S3	10071+74	67	5	NE	View NE of fluvial sediments on E bank of Walker R	ALG	10/7/2006
MT1028_SMP_0045_07Oct06.jpg	MT1028	S3	10071+74	67	5	NE	Walker River Valley crossing	SMP	10/7/2006
MT1028_SMP_0046_07Oct06.jpg	MT1028	S3	10071+74	67	5	NE	closeup of Walker River Valley crossing, site of proposed abutment	SMP	10/7/2006
MT1028_SMP_0047_07Oct06.jpg	MT1028	S3	10071+74	67	5	SW	along alignment	SMP	10/7/2006
MT1028_SMP_0048_07Oct06.jpg	MT1028	S3	10071+74	67	5	NW	approx. 35-degree slope on SW bank of Walker River	SMP	10/7/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1028_SMP_0049_07Oct06.jpg	MT1028	S3	10071+74	67	5	ESE	sand & gravel outcrop on SW side of Walker River Valley crossing, east of waypoint on river bank	SMP	10/7/2006
MT1028_SMP_0050_07Oct06.jpg	MT1028	S3	10071+74	67	5	SE	sand & gravel outcrop on SW side of Walker River Valley crossing, east of waypoint on river bank	SMP	10/7/2006
MT1028_WAH_0020_16Nov06.jpg	MT1028	S3	10071+74	67	5	NE	View of bridge crossing site over Walker River	WAH	11/16/2006
MT1028_WAH_0021_16Nov06.jpg	MT1028	S3	10071+74	67	5	S	View interbedded sand and gravel deposits (QTf)	WAH	11/16/2006
MT1028_WAH_0032_16Nov06.jpg	MT1028	S3	10071+74	67	5	S	View interbedded sand and gravel deposits (QTf)	WAH	11/16/2006
MT1028_WTL_0339_16Nov06.jpg	MT1028	S3	10071+74	67	5		Panorama of Walker R crossing at Schurz	WTL	11/16/2006
MT1028_WTL_0340_16Nov06.jpg	MT1028	S3	10071+74	67	5		Panorama of Walker R crossing at Schurz	WTL	11/16/2006
MT1028_WTL_0341_16Nov06.jpg	MT1028	S3	10071+74	67	5		Panorama of Walker R crossing at Schurz	WTL	11/16/2006
MT1028_WTL_0342_16Nov06.jpg	MT1028	S3	10071+74	67	5		Panorama of Walker R crossing at Schurz	WTL	11/16/2006
MT1028_WTL_0343_16Nov06.jpg	MT1028	S3	10071+74	67	5		Eroded west bluff at Walker R crossing	WTL	11/16/2006
MT1028_WTL_0344_16Nov06.jpg	MT1028	S3	10071+74	67	5		Eroded west bluff at Walker R crossing	WTL	11/16/2006
MT1028_WTL_0345_16Nov06.jpg	MT1028	S3	10071+74	67	5		Eroded west bluff at Walker R crossing	WTL	11/16/2006
MT1028_WTL_0346_16Nov06.jpg	MT1028	S3	10071+74	67	5		Badlands south of Walker R crossing	WTL	11/16/2006
MT1028_WTL_0347_16Nov06.jpg	MT1028	S3	10071+74	67	5		Badlands south of Walker R crossing	WTL	11/16/2006
MT1030_ALG_0080_07Oct06.jpg	MT1030	S2	10733+22	63	5	N	View N of wash cut into QTg fan along S1 & 2	ALG	10/7/2006
MT1030_ALG_0081_07Oct06.jpg	MT1030	S2	10733+22	63	5	S	View south along S1 & 2	ALG	10/7/2006
MT1030A_SMP_0051_07Oct06.jpg	MT1030A	S2	10732+03	3	5	N	in wash bottom along alignment	SMP	10/7/2006
MT1030A_SMP_0052_07Oct06.jpg	MT1030A	S2	10732+03	3	5	S	in wash bottom along alignment	SMP	10/7/2006
MT1030A_SMP_0053_07Oct06.jpg	MT1030A	S2	10732+03	3	5	W	in wash bottom toward outcrop	SMP	10/7/2006
MT1031_ALG_0082_07Oct06.jpg	MT1031	S3	10130+73	41	5	E	View east of Qe along S1 & 2	ALG	10/7/2006
MT1031_SMP_0054_07Oct06.jpg	MT1031	S3	10130+73	41	5	SSE	along road with loose areas exposed	SMP	10/7/2006
MT1033_ALG_0083_07Oct06.jpg	MT1033	S3	10271+52	-5	6	SE	View SE along S1 at US-95	ALG	10/7/2006
MT1033_ALG_0084_07Oct06.jpg	MT1033	S3	10271+52	-5	6	WNW	View WNW along S1 at US-95	ALG	10/7/2006
MT1033_SMP_0055_07Oct06.jpg	MT1033	S3	10271+52	-5	6	WNW	along alignment, US95 in foreground	SMP	10/7/2006
MT1033_SMP_0056_07Oct06.jpg	MT1033	S3	10271+52	-5	6	ESE	along alignment, US95 in foreground	SMP	10/7/2006
MT1033_SMP_0057_07Oct06.jpg	MT1033	S3	10271+52	-5	6	S	US95 embankment, approx. 15-16 degree slope	SMP	10/7/2006
MT1033B_SMP_0058_07Oct06.jpg	MT1033B	S3	10270+36	-679	6	NW	US95 embankment showing imported material overlying native	SMP	10/7/2006
MT1034_ALG_0085_08Oct06.jpg	MT1034	S2	11072+53	-102	7	NW	View NW along S2 of White Mt (KJg)	ALG	10/8/2006
MT1034_ALG_0086_08Oct06.jpg	MT1034	S2	11072+53	-102	7	SE	View SE along S2	ALG	10/8/2006
MT1034_ALG_0087_08Oct06.jpg	MT1034	S2	11072+53	-102	7		Eolian sand over sandy silt in Qbf	ALG	10/8/2006
MT1034_SMP_0059_08Oct06.jpg	MT1034	S2	11072+53	-102	7	NW	along alignment	SMP	10/8/2006
MT1034_SMP_0060_08Oct06.jpg	MT1034	S2	11072+53	-102	7	SE	along alignment	SMP	10/8/2006
MT1035_ALG_0088_08Oct06.jpg	MT1035	S3	10372+95	58	6	E	View E of Calico Hills alluvial fan	ALG	10/8/2006
MT1035_ALG_0089_08Oct06.jpg	MT1035	S3	10372+95	58	6	NNW	Pan NW to N along S1	ALG	10/8/2006
MT1035_ALG_0090_08Oct06.jpg	MT1035	S3	10372+95	58	6	SE	Pan SE along S1	ALG	10/8/2006
MT1035A_ALG_0091_08Oct06.jpg	MT1035A	S1	11066+28	-658	6		Qay alluvium on Calico Hills fan	ALG	10/8/2006
MT1035A_SMP_0061_08Oct06.jpg	MT1035A	S1	11066+28	-658	6	NNE	test pit approx. 10 feet deep in Qay	SMP	10/8/2006
MT1036_ALG_0092_08Oct06.jpg	MT1036	S3	10453+25	38	7	NW	View NW along S1	ALG	10/8/2006
MT1036_ALG_0093_08Oct06.jpg	MT1036	S3	10453+25	38	7		Hydrothermally altered tuff in Calico Hills	ALG	10/8/2006
MT1036_ALG_0094_08Oct06.jpg	MT1036	S3	10453+25	38	7	SW	View SW to a playa in the Walker River basin	ALG	10/8/2006
MT1036_ALG_0095_08Oct06.jpg	MT1036	S3	10453+25	38	7	SE	View SE along S1	ALG	10/8/2006
MT1036A_ALG_0096_08Oct06.jpg	MT1036A	S3	10478+15	-858	7		Qay fan alluvium from Calico Hills	ALG	10/8/2006
MT1036A_ALG_0097_08Oct06.jpg	MT1036A	S3	10478+15	-858	7	N	View N of borrow pit in fan alluvium	ALG	10/8/2006
MT1036A_SMP_0062_08Oct06.jpg	MT1036A	S3	10478+15	-858	7	N	overview of gravel pit	SMP	10/8/2006
MT1036A_SMP_0063_08Oct06.jpg	MT1036A	S3	10478+15	-858	7	N	boulder or bedrock exposure?	SMP	10/8/2006
MT1036A_SMP_0064_08Oct06.jpg	MT1036A	S3	10478+15	-858	7	N	boulder in borrow pit	SMP	10/8/2006
MT1037_ALG_0098_08Oct06.jpg	MT1037	S2	11151+78	80	7	NW	View NW of Qbf along SZ2	ALG	10/8/2006
MT1037_ALG_0099_08Oct06.jpg	MT1037	S2	11151+78	80	7	E	View E along SZ2	ALG	10/8/2006
MT1037_ALG_0100_08Oct06.jpg	MT1037	S2	11151+78	80	7		Qe overlying indurated sand and silt in Qbf	ALG	10/8/2006
MT1037_SMP_0065_08Oct06.jpg	MT1037	S2	11151+78	80	7	N	test hole showing surficial soils: approx. 4 inches of loose, brown SAND, trace of silt (SP), overlying dense to very dense, gray-brown to brown, slightly fine sandy SILT, trace of medium to coarse sand (ML)	SMP	10/8/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1038_ALG_0101_08Oct06.jpg	MT1038	S2	NA	NA	7	NE	View NE of Calico Hills & a playa underlain by clay	ALG	10/8/2006
MT1038_SMP_0066_08Oct06.jpg	MT1038	S2	NA	NA	7	NNW	View NNW on playa (Qp)	SMP	10/8/2006
MT1039_ALG_0102_08Oct06.jpg	MT1039	S1	11268+10	-340	7		On S1 in an area of depressions and sand hills	ALG	10/8/2006
MT1039_ALG_0103_08Oct06.jpg	MT1039	S1	11268+10	-340	7		Sand hill and depression	ALG	10/8/2006
MT1039_ALG_0104_08Oct06.jpg	MT1039	S1	11268+10	-340	7	SE	View SE of a depression and sand ridge	ALG	10/8/2006
MT1039_ALG_0105_08Oct06.jpg	MT1039	S1	11268+10	-340	7	E	View E of a depression and sand ridge	ALG	10/8/2006
MT1039_ALG_0106_08Oct06.jpg	MT1039	S1	11268+10	-340	7	NE	View NE of the Calico Hills from a closed depression	ALG	10/8/2006
MT1039_ALG_0107_08Oct06.jpg	MT1039	S1	11268+10	-340	7	NW	View NW of the Wassuk Rge from a depression	ALG	10/8/2006
MT1039A_ALG_0108_08Oct06.jpg	MT1039A	S1	11269+60	-8	7	NW	View NW along alignment	ALG	10/8/2006
MT1039A_ALG_0109_08Oct06.jpg	MT1039A	S1	11269+60	-8	7	SE	View SE along alignment	ALG	10/8/2006
MT1039A_SMP_0067_08Oct06.jpg	MT1039A	S1	11269+60	-8	7	NW	along alignment	SMP	10/8/2006
MT1039A_SMP_0068_08Oct06.jpg	MT1039A	S1	11269+60	-8	7	SE	along alignment	SMP	10/8/2006
MT1040_ALG_0110_08Oct06.jpg	MT1040	S3	10628+68	-4404	7		Flowing well in a GW discharge area 0.8 mi E of SZ1	ALG	10/8/2006
MT1040_ALG_0111_08Oct06.jpg	MT1040	S3	10628+68	-4404	7		Well in AG407 with surrounding vegetation	ALG	10/8/2006
MT1040_ALG_0112_08Oct06.jpg	MT1040	S3	10628+68	-4404	7		Spring issuing from Qp in GW discharge area	ALG	10/8/2006
MT1040_SMP_0069_08Oct06.jpg	MT1040	S3	10628+68	-4404	7	N	flowing well, artesian flow to approx. 1 foot above ground surface	SMP	10/8/2006
MT1040A_ALG_0113_08Oct06.jpg	MT1040A	S3	10631+96	-4716	7		Double Spring issuing in GW discharge area	ALG	10/8/2006
MT1041_ALG_0114_08Oct06.jpg	MT1041	S3	10622+26	35	7	NW	View NW of Qe on SZ1	ALG	10/8/2006
MT1041_ALG_0115_08Oct06.jpg	MT1041	S3	10622+26	35	7	SE	View SE of Qe on SZ1	ALG	10/8/2006
MT1041_SMP_0070_08Oct06.jpg	MT1041	S3	10622+26	35	7	SW	cut through Qe, approx. 20-21 degree slope	SMP	10/8/2006
MT1041_SMP_0071_08Oct06.jpg	MT1041	S3	10622+26	35	7	NW	along alignment	SMP	10/8/2006
MT1041_SMP_0072_08Oct06.jpg	MT1041	S3	10622+26	35	7	SE	along alignment	SMP	10/8/2006
MT1041_WAH_0031_16Nov06.jpg	MT1041	S3	10622+26	35	7	W	Blowing sand (loose, brown, fine to medium Sand, tr. Silt (Qe)	WAH	11/16/2006
MT1041_WTL_0337_16Nov06.jpg	MT1041	S3	10622+26	35	7		Road cut in dune sand (Qe) at Schurz	WTL	11/16/2006
MT1041_WTL_0338_16Nov06.jpg	MT1041	S3	10622+26	35	7		Road cut in dune sand (Qe) at Schurz	WTL	11/16/2006
MT1042_ALG_0116_08Oct06.jpg	MT1042	S2	11203+06	-29	7	NW	View NW along SZ2	ALG	10/8/2006
MT1042_ALG_0117_08Oct06.jpg	MT1042	S2	11203+06	-29	7	SE	View SE along SZ2	ALG	10/8/2006
MT1042A_ALG_0118_08Oct06.jpg	MT1042A	S2	11196+13	898	7		Qbf variably indurated, clayey sand and silt	ALG	10/8/2006
MT1043_ALG_0119_08Oct06.jpg	MT1043	S2	11295+36	167	8	NW	View NW on SZ2	ALG	10/8/2006
MT1043_ALG_0120_08Oct06.jpg	MT1043	S2	11295+36	167	8	SE	Pan SE on SZ2 of Gillis Rge & Walker R. valley	ALG	10/8/2006
MT1044_ALG_0121_08Oct06.jpg	MT1044	S1	11409+12	44	8	NNE	View NNE on SZ1	ALG	10/8/2006
MT1044_ALG_0122_08Oct06.jpg	MT1044	S1	11409+12	44	8	SE	View SE of Gillis Range	ALG	10/8/2006
MT1044_ALG_0123_08Oct06.jpg	MT1044	S1	11409+12	44	8	S	View S on SZ1	ALG	10/8/2006
MT1044_SMP_0073_08Oct06.jpg	MT1044	S1	11409+12	44	8	SE	along alignment toward Gillis Range	SMP	10/8/2006
MT1045_ALG_0124_08Oct06.jpg	MT1045	S2	11430+92	-42	8	SW	View SW on SZ1	ALG	10/8/2006
MT1045_ALG_0125_08Oct06.jpg	MT1045	S2	11430+92	-42	8	NE	View NE on SZ1	ALG	10/8/2006
MT1045_ALG_0126_08Oct06.jpg	MT1045	S2	11430+92	-42	8	NW	View NW along SZ2 of sand dune & depression	ALG	10/8/2006
MT1045_ALG_0127_08Oct06.jpg	MT1045	S2	11430+92	-42	8		diorite and Tt2 in Gillis Range	ALG	10/8/2006
MT1045_ALG_0128_08Oct06.jpg	MT1045	S2	11430+92	-42	8	SE	View SE of Tt2 in Gillis Range	ALG	10/8/2006
MT1045_SMP_0074_08Oct06.jpg	MT1045	S2	11430+92	-42	8	N	along alignment, sand dunes overlying clay	SMP	10/8/2006
MT1045_SMP_0075_08Oct06.jpg	MT1045	S2	11430+92	-42	8	S	along alignment; toward W.T. (on 24k USGS map)	SMP	10/8/2006
MT1046_ALG_0137_09Oct06.jpg	MT1046	S3	10968+81	235	9	SW	View SW on SZ1	ALG	10/9/2006
MT1046_ALG_0138_09Oct06.jpg	MT1046	S3	10968+81	235	9	NE	View NE on SZ1	ALG	10/9/2006
MT1046_ALG_0139_09Oct06.jpg	MT1046	S3	10968+81	235	9	SW	View SW of ancestral Walker Lake beach sand	ALG	10/9/2006
MT1046_ALG_0140_09Oct06.jpg	MT1046	S3	10968+81	235	9	SW	View SW of ancestral Walker Lake floor sediments	ALG	10/9/2006
MT1046_ALG_0141_09Oct06.jpg	MT1046	S3	10968+81	235	9		Sand fence between RR tracks & basin floor	ALG	10/9/2006
MT1046_ALG_0142_09Oct06.jpg	MT1046	S3	10968+81	235	9		Qay fan alluvium	ALG	10/9/2006
MT1046_ALG_0143_09Oct06.jpg	MT1046	S3	10968+81	235	9		Qay fan alluvium sloping toward tracks	ALG	10/9/2006
MT1046_ALG_0144_09Oct06.jpg	MT1046	S3	10968+81	235	9		FAULT CUTTING FAN ALLUVIUM BY TRACKS	ALG	10/9/2006
MT1046_ALG_0145_09Oct06.jpg	MT1046	S3	10968+81	235	9		SAND FILLING TROUGH IN FAN ALLUVIUM	ALG	10/9/2006
MT1046_ALG_0146_09Oct06.jpg	MT1046	S3	10968+81	235	9		SAND FILLING TROUGH IN FAN ALLUVIUM	ALG	10/9/2006
MT1046_SMP_0091_09Oct06.jpg	MT1046	S3	10968+81	235	9	SE	thrust fault in cut (offset gravel layer)	SMP	10/9/2006
MT1046_SMP_0092_09Oct06.jpg	MT1046	S3	10968+81	235	9	E	structural fold in cut	SMP	10/9/2006
MT1046A_SMP_0084_09Oct06.jpg	MT1046A	S3	10971+69	19	9	SE	RR embankment with approx. 31-degree slope	SMP	10/9/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1046A_SMP_0085_09Oct06.jpg	MT1046A	S3	10971+69	19	9	NE	RR embankment overview	SMP	10/9/2006
MT1046A_SMP_0086_09Oct06.jpg	MT1046A	S3	10971+69	19	9	SW	RR embankment overview from top of cut slope; sand barricade parallel to alignment	SMP	10/9/2006
MT1046A_SMP_0087_09Oct06.jpg	MT1046A	S3	10971+69	19	9	E	cut slope failures near top	SMP	10/9/2006
MT1046A_SMP_0088_09Oct06.jpg	MT1046A	S3	10971+69	19	9	E	cut slope overview	SMP	10/9/2006
MT1046A_SMP_0089_09Oct06.jpg	MT1046A	S3	10971+69	19	9	NE	overview of embankment and cut	SMP	10/9/2006
MT1046A_SMP_0090_09Oct06.jpg	MT1046A	S3	10971+69	19	9	SE	gravel outcrop in cut	SMP	10/9/2006
MT1047_ALG_0129_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1		KJg quartz monzonite in Gillis Range	ALG	10/9/2006
MT1047_ALG_0130_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1		KJg quartz monzonite cut by a rhyolite dike	ALG	10/9/2006
MT1047_ALG_0131_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1		KJg quartz monzonite	ALG	10/9/2006
MT1047_ALG_0132_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1	SE	Pan SE showing wash access to KJg	ALG	10/9/2006
MT1047_ALG_0133_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1		KJg quartz monzonite	ALG	10/9/2006
MT1047_ALG_0134_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1		KJg quartz monzonite	ALG	10/9/2006
MT1047_SMP_0076_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1	NE	Granite outcrop	SMP	10/9/2006
MT1047_SMP_0078_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1	N	Granite outcrop showing J1, J2, J3 in SMP's notes	SMP	10/9/2006
MT1047_SMP_0079_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1	W	wedge failure	SMP	10/9/2006
MT1047_SMP_0080_09Oct06.jpg	MT1047	S6	NA	NA	Plate 1	S	SMP's J4 (shear zone)	SMP	10/9/2006
MT1047A_SMP_0077_09Oct06.jpg	MT1047A	S6	NA	NA	Plate 1	SW	failed sand dune from canyon bottom, approx. 32-degree slope	SMP	10/9/2006
MT1048_ALG_0135_09Oct06.jpg	MT1048	S3	11010+22	38	9	NNE	View NNE at SZ1 start in ancestral Walker Lake sand	ALG	10/9/2006
MT1048_ALG_0136_09Oct06.jpg	MT1048	S3	11010+22	38	9	SE	View SE of ancestral Walker Lake sand dunes	ALG	10/9/2006
MT1048_SMP_0081_09Oct06.jpg	MT1048	S3	11010+22	38	9	NNW	system of blowing sand barricades	SMP	10/9/2006
MT1048_SMP_0082_09Oct06.jpg	MT1048	S3	11010+22	38	9	W	closeup of 2 fence lines (barricades)	SMP	10/9/2006
MT1048_SMP_0083_09Oct06.jpg	MT1048	S3	11010+22	38	9	N	RR berm with approx. 25-30 degree slope	SMP	10/9/2006
MT1049_ALG_0147_09Oct06.jpg	MT1049	MCS1	1639+91	5	20	W	View W on MCS1 of Soda Spring Valley playa	ALG	10/9/2006
MT1049_ALG_0148_09Oct06.jpg	MT1049	MCS1	1639+91	5	20	E	View E along MCS1 of Soda Spring Valley playa	ALG	10/9/2006
MT1049_ALG_0149_09Oct06.jpg	MT1049	MCS1	1639+91	5	20		QP clay	ALG	10/9/2006
MT1050_ALG_0150_09Oct06.jpg	MT1050	MCS1	1732+56	-9	20	W	View W along MCS1	ALG	10/9/2006
MT1050_ALG_0151_09Oct06.jpg	MT1050	MCS1	1732+56	-9	20	E	View east on MCS1	ALG	10/9/2006
MT1050_SMP_0093_09Oct06.jpg	MT1050	MCS1	1732+56	-9	20	E	old RR roadbed, approx. 12-15 degree slope	SMP	10/9/2006
MT1051_ALG_0152_09Oct06.jpg	MT1051	MCS1	1794+22	941	20		Borrow pits on Garfield Hills alluvial fan	ALG	10/9/2006
MT1051_ALG_0153_09Oct06.jpg	MT1051	MCS1	1794+22	941	20		Borrow pit in Garfield Hills Qao fan	ALG	10/9/2006
MT1052_ALG_0154_09Oct06.jpg	MT1052	MCS1	1876+50	-219	21	W	View W along MCS1 of Soda Spring Valley	ALG	10/9/2006
MT1052_ALG_0155_09Oct06.jpg	MT1052	MCS1	1876+50	-219	21	E	View E along MCS1 of Soda Spring Valley	ALG	10/9/2006
MT1052_ALG_0156_09Oct06.jpg	MT1052	MCS1	1876+50	-219	21		Borrow pit excavated in Qao fan alluvium	ALG	10/9/2006
MT1053_ALG_0157_09Oct06.jpg	MT1053	MCS1	1971+11	2377	21	E	View E down Garfield Hills Qao fan	ALG	10/9/2006
MT1054_ALG_0158_10Oct06.jpg	MT1054	MCS1	2202+02	-233	22	E	View E of Soda Spring Valley along MCS1	ALG	10/10/2006
MT1054_ALG_0159_10Oct06.jpg	MT1054	MCS1	2202+02	-233	22	W	View W of Soda Spring Valley along MCS1	ALG	10/10/2006
MT1054_ALG_0160_10Oct06.jpg	MT1054	MCS1	2202+02	-233	22		Qao fan alluvium exposed in a trench	ALG	10/10/2006
MT1054_SMP_0094_09Oct06.jpg	MT1054	MCS1	2202+02	-233	22	W	trench wall exposure	SMP	10/9/2006
MT1054_SMP_0095_09Oct06.jpg	MT1054	MCS1	2202+02	-233	22	W	closeup of exposed trench wall	SMP	10/9/2006
MT1054_SMP_0096_10Oct06.jpg	MT1054	MCS1	2202+02	-233	22	S	Hwy. 361	SMP	10/10/2006
MT1055_ALG_0161_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1		Qao in Gillis Range fan cropped	ALG	10/10/2006
MT1055_ALG_0162_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1		Qao in Gillis Range fan	ALG	10/10/2006
MT1055_ALG_0163_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1		Preferential burrowing in a loose sand interval	ALG	10/10/2006
MT1055_ALG_0164_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	NE	PAN NE OF GILLIS RANGE QAO FAN	ALG	10/10/2006
MT1055_SMP_0097_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	E	Qao outcrop	SMP	10/10/2006
MT1055_SMP_0098_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	E	closeup of Qao outcrop	SMP	10/10/2006
MT1055_SMP_0099_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	E	very dense vs. loose Qao exposure showing the different weathering rates	SMP	10/10/2006
MT1055_SMP_0100_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	W	Qao outcrop	SMP	10/10/2006
MT1055_SMP_0101_10Oct06.jpg	MT1055	MCS1	NA	NA	Plate 1	N	gravel pit overview	SMP	10/10/2006
MT1057_ALG_0165_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		View downwash in Gabbs Valley Range	ALG	10/10/2006
MT1057_ALG_0166_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		KJg granite outcrops	ALG	10/10/2006
MT1057_ALG_0167_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Altered Oligocene Mickey Pass Tuff and Jurassic diorite, Todd Mountain	ALG	10/10/2006
MT1057_ALG_0168_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Alteration in possible fault zone at granite-diorite contact	ALG	10/10/2006
MT1057_ALG_0169_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Typical weathering of KJg granite	ALG	10/10/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1057_ALG_0170_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Typical rectangular fractures in granite	ALG	10/10/2006
MT1057_ALG_0171_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Weathered granite in contact with diorite	ALG	10/10/2006
MT1057_ALG_0172_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Weathered granite slope	ALG	10/10/2006
MT1057_ALG_0173_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1		Tarantula on Qc alluvium	ALG	10/10/2006
MT1057_SMP_0102_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1	N	Granite outcrop showing J1, J2, J3 in SMP's notes	SMP	10/10/2006
MT1057_SMP_0103_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1	N	Closeup of granite outcrop showing J1, J2, J3 in SMP's notes	SMP	10/10/2006
MT1057_SMP_0104_10Oct06.jpg	MT1057	MCS1	NA	NA	Plate 1	SW	tarantula on alluvium	SMP	10/10/2006
MT1058_ALG_0174_10Oct06.jpg	MT1058	MCS1	NA	NA	Plate 1		Limestone of Triassic Luning Fm at Todd Mt.	ALG	10/10/2006
MT1058_ALG_0175_10Oct06.jpg	MT1058	MCS1	NA	NA	Plate 1		Jurassic diorite & KJg at Todd Mt	ALG	10/10/2006
MT1059_ALG_0176_10Oct06.jpg	MT1059	MCS1	NA	NA	Plate 1		Cretaceous quartz monzonite pluton, Todd Mountain, SW of the New Santa Fe mine	ALG	10/10/2006
MT1059_ALG_0177_10Oct06.jpg	MT1059	MCS1	NA	NA	Plate 1		Coarse detritus at head of GV Range fan	ALG	10/10/2006
MT1060_ALG_0178_10Oct06.jpg	MT1060	MCS1	2271+27	41	22	WNW	View WNW on MCS1	ALG	10/10/2006
MT1060_ALG_0179_10Oct06.jpg	MT1060	MCS1	2271+27	41	22	ESE	View ESE on MCS1 to Alkali Flat playa	ALG	10/10/2006
MT1061_ALG_0180_10Oct06.jpg	MT1061	MCS1	2372+41	51	22	NW	View NW on MCS1 of Gabbs Valley Rge bajada	ALG	10/10/2006
MT1061_ALG_0181_10Oct06.jpg	MT1061	MCS1	2372+41	51	22	SW	View down fan SW to Alkali Flat playa	ALG	10/10/2006
MT1061_ALG_0182_10Oct06.jpg	MT1061	MCS1	2372+41	51	22	SE	View SE along MCS1	ALG	10/10/2006
MT1061_ALG_0183_10Oct06.jpg	MT1061	MCS1	2372+41	51	22		Qao sandy gravel in borrow pit	ALG	10/10/2006
MT1061_SMP_0105_10Oct06.jpg	MT1061	MCS1	2372+41	51	22	S	test hole in Qao	SMP	10/10/2006
MT1062_ALG_0184_10Oct06.jpg	MT1062	MCS1	2416+67	-104	22	NW	View NW along MCS-1 on Gabbs Valley Range alluvial fan	ALG	10/10/2006
MT1062_ALG_0185_10Oct06.jpg	MT1062	MCS1	2416+67	-104	22	SE	View SW to Soda Spring Valley along the Gabbs Valley Range alluvial fan	ALG	10/10/2006
MT1062_ALG_0186_10Oct06.jpg	MT1062	MCS1	2416+67	-104	22		Pleistocene sandy gravel underlying Gabbs Valley Range alluvial fan near the mine shaft	ALG	10/10/2006
MT1062_SMP_0106_10Oct06.jpg	MT1062	MCS1	2416+67	-104	22	SW	test hole in Qao	SMP	10/10/2006
MT1063_ALG_0187_11Oct06.jpg	MT1063	MCS1	2416+51	728	22		View west of a vertical mine shaft excavated into Gabbs Valley range fan alluvium, Mildred & Copper Queen claims	ALG	10/11/2006
MT1063_ALG_0188_11Oct06.jpg	MT1063	MCS1	2416+51	728	22		Warning sign posted on fence around vertical mine shaft excavated through fan alluvium to a copper-molybdenum ore body	ALG	10/11/2006
MT1063_SMP_0107_11Oct06.jpg	MT1063	MCS1	2416+51	728	22	SW	abandoned mine shaft	SMP	10/11/2006
MT1064_ALG_0189_11Oct06.jpg	MT1064	MCS1	NA	NA	22	NE	View NE of folded and faulted limestone in the Triassic Luning Formation, Todd Mountain		10/11/2006
MT1064_SMP_0108_11Oct06.jpg	MT1064	MCS1	NA	NA	22	NE	Luning Fm., folding (anticline) and thrust fault visible	SMP	10/11/2006
MT1065_ALG_0190_11Oct06.jpg	MT1065	MCS1	NA	NA	22		Outcrop of limestone, dolomitic limestone, and shaly dolomite in the Luning Formation	ALG	10/11/2006
MT1065_ALG_0191_11Oct06.jpg	MT1065	MCS1	NA	NA	22	S	SW-dipping Luning Fm Ls & dolomite	ALG	10/11/2006
MT1065_SMP_0109_11Oct06.jpg	MT1065	MCS1	NA	NA	22	SW	limestone outcrop	SMP	10/11/2006
MT1065_SMP_0110_11Oct06.jpg	MT1065	MCS1	NA	NA	22	N	Luning Fm., folding (anticline) and thrust fault visible, from top of limestone outcrop	SMP	10/11/2006
MT1066_ALG_0192_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	NW	View NW on MCS1 of Gabbs Valley Range fan	ALG	10/11/2006
MT1066_ALG_0193_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	NE	View NE of folding in Gabbs Valley Range	ALG	10/11/2006
MT1066_ALG_0194_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	E	View E of folds related to thrust fault in GV Range	ALG	10/11/2006
MT1066_ALG_0195_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	SE	View SE along MCS1	ALG	10/11/2006
MT1066_ALG_0196_11Oct06.jpg	MT1066	MCS1	2463+10	144	23		Qao in Gabbs Valley Range fan	ALG	10/11/2006
MT1066_SMP_0111_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	SE	test hole in Qao	SMP	10/11/2006
MT1066_SMP_0112_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	NNW	along alignment	SMP	10/11/2006
MT1066_SMP_0113_11Oct06.jpg	MT1066	MCS1	2463+10	144	23	SSE	along alignment (left side of frame)	SMP	10/11/2006
MT1067_ALG_0197_11Oct06.jpg	MT1067	MCS1	2634+19	10	24	NNE	View NNE on MCS1 of composite fan from GV & Gillis Ranges	ALG	10/11/2006
MT1067_ALG_0198_11Oct06.jpg	MT1067	MCS1	2634+19	10	24	SSW	View SSW on MCS1 to Pilot Mts	ALG	10/11/2006
MT1067_ALG_0199_11Oct06.jpg	MT1067	MCS1	2634+19	10	24		Eolian silty sand and sandy silt	ALG	10/11/2006
MT1067_SMP_0114_11Oct06.jpg	MT1067	MCS1	2634+19	10	24	NNE	test hole in Qbf, distal fan alluvium	SMP	10/11/2006
MT1068_ALG_0201_11Oct06.jpg	MT1068	MCS1	NA	NA	24		Interlayered Ta3 lahars and thin andesite flows	ALG	10/11/2006
MT1068_ALG_0202_11Oct06.jpg	MT1068	MCS1	NA	NA	24		Thin Ta3 andesite flow overlying a lahar	ALG	10/11/2006
MT1068_ALG_0203_11Oct06.jpg	MT1068	MCS1	NA	NA	24		Thin Ta3 andesite flow in Volcano Canyon	ALG	10/11/2006
MT1068_ALG_0204_11Oct06.jpg	MT1068	MCS1	NA	NA	24		Thick Ta3 lahar in Volcano Canyon	ALG	10/11/2006
MT1068_SMP_0118_11Oct06.jpg	MT1068	MCS1	NA	NA	24	NE	andesite outcrop	SMP	10/11/2006
MT1068A_ALG_0200_11Oct06.jpg	MT1068A	MCS1	NA	NA	24		View down Volcano Canyon in Gabbs Valley Range	ALG	10/11/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[1]	DIRECTION	COMMENT	SOURCE	DATE
MT1068A_SMP_0115_11Oct06.jpg	MT1068A	MCS1	NA	NA	24	NNW	overview of andesite area	SMP	10/11/2006
MT1068A_SMP_0116_11Oct06.jpg	MT1068A	MCS1	NA	NA	24	SW	View down Volcano Canyon in Gabbs Valley Range	SMP	10/11/2006
MT1068A_SMP_0117_11Oct06.jpg	MT1068A	MCS1	NA	NA	24	NE	Mudflow breccia in two forms	SMP	10/11/2006
MT1069_ALG_0205_11Oct06.jpg	MT1069	MCS1	2779+28	11	24	SSE	Pan SSE on MCS1 of Soda Spring V. & Pilot Mts	ALG	10/11/2006
MT1069_ALG_0206_11Oct06.jpg	MT1069	MCS1	2779+28	11	24	N	View N on MCS1 of Soda Spring Valley & GV Range	ALG	10/11/2006
MT1069_SMP_0119_11Oct06.jpg	MT1069	MCS1	2779+28	11	24	N	along alignment MCS1	SMP	10/11/2006
MT1069_SMP_0120_11Oct06.jpg	MT1069	MCS1	2779+28	11	24	S	along alignment MCS1	SMP	10/11/2006
MT1070_ALG_0207_11Oct06.jpg	MT1070	MCS1	2924+97	41	25	NNW	View NNW on MCS1	ALG	10/11/2006
MT1070_ALG_0208_11Oct06.jpg	MT1070	MCS1	2924+97	41	25	SSE	Pan SSE to S on MCS1 of Soda Spring Valley	ALG	10/11/2006
MT1070_ALG_0209_11Oct06.jpg	MT1070	MCS1	2924+97	41	25	E	View E of faulted & altered TRPs in Pilot Mts	ALG	10/11/2006
MT1070_ALG_0210_11Oct06.jpg	MT1070	MCS1	2924+97	41	25		Qao & possibly Qbf sandy gravel and fg sand	ALG	10/11/2006
MT1070_SMP_0121_11Oct06.jpg	MT1070	MCS1	2924+97	41	25	NE	outcrop showing Qao overlying Qbf	SMP	10/11/2006
MT1071_ALG_0213_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	N	View N on MCS1 of Mina & Pilot Mts fan	ALG	10/12/2006
MT1071_ALG_0214_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	S	View S on MCS1	ALG	10/12/2006
MT1071_ALG_0215_12Oct06.jpg	MT1071	MCS1	2998+03	118	26		Qao fan alluvium	ALG	10/12/2006
MT1071_ALG_0216_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	S	View S of White Mts & Boundary Peak	ALG	10/12/2006
MT1071_SMP_0122_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	N	test hole in Qao	SMP	10/12/2006
MT1071_SMP_0123_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	N	along alignment MCS1	SMP	10/12/2006
MT1071_SMP_0124_12Oct06.jpg	MT1071	MCS1	2998+03	118	26	S	along alignment MCS1, Boundary Peak in background	SMP	10/12/2006
MT1072_ALG_0217_12Oct06.jpg	MT1072	MCS1	3064+70	-1710	26	SSW	View SSW of 10-ft deep wash that crosses MCS1	ALG	10/12/2006
MT1072_SMP_0125_12Oct06.jpg	MT1072	MCS1	3064+70	-1710	26	WSW	deep wash, approx. 0.4 miles from MCS1	SMP	10/12/2006
MT1073_ALG_0218_12Oct06.jpg	MT1073	MCS1	3092+57	-1565	26	WSW	View WSW of possible prospect pits in fan alluvium	ALG	10/12/2006
MT1074_ALG_0224_12Oct06.jpg	MT1074	MCS1	3111+44	-202	26	NW	View NW along MCS1 to Sodaville & Garfield Hills	ALG	10/12/2006
MT1074_ALG_0225_12Oct06.jpg	MT1074	MCS1	3111+44	-202	26	SW	View SW of Rhodes Salt Marsh	ALG	10/12/2006
MT1074_ALG_0226_12Oct06.jpg	MT1074	MCS1	3111+44	-202	26	SE	View SE along MCS1	ALG	10/12/2006
MT1074A_ALG_0219_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26	SW	View SW of possible prospect pits & Rhodes Marsh	ALG	10/12/2006
MT1074A_ALG_0220_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26		Qao sandy gravel excavated in a trench	ALG	10/12/2006
MT1074A_ALG_0221_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26		Qao sandy gravel	ALG	10/12/2006
MT1074A_ALG_0222_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26		Tarantula on Pilot Mts fan alluvium	ALG	10/12/2006
MT1074A_ALG_0223_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26		Tarantula on Pilot Mts fan alluvium	ALG	10/12/2006
MT1074A_SMP_0126_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26	NW	Qao in old test trench	SMP	10/12/2006
MT1074A_SMP_0127_12Oct06.jpg	MT1074A	MCS1	3103+83	-1550	26	SW	view of old test trench	SMP	10/12/2006
MT1074B_ALG_0227_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26		Pan up wide, deep wash crossing MCS1	ALG	10/12/2006
MT1074B_ALG_0228_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26	NE	View NE up wash cut into alluvial fan	ALG	10/12/2006
MT1074B_ALG_0229_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26		Qao fan alluvium in N bank of wash	ALG	10/12/2006
MT1074B_ALG_0230_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26		Qao sandy gravel exposed by wash	ALG	10/12/2006
MT1074B_SMP_0128_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26	SE	along alignment MCS1, deep trench	SMP	10/12/2006
MT1074B_SMP_0129_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26	NW	along alignment MCS1, deep trench	SMP	10/12/2006
MT1074B_SMP_0130_12Oct06.jpg	MT1074B	MCS1	3117+35	3	26	NE	two washes merge into one (Qao)	SMP	10/12/2006
MT1075_ALG_0231_12Oct06.jpg	MT1075	MCS1	3350+36	142	27	NE	View NE along MCS1	ALG	10/12/2006
MT1075_ALG_0232_12Oct06.jpg	MT1075	MCS1	3350+36	142	27	SW	View SW along MCS1	ALG	10/12/2006
MT1075_SMP_0131_12Oct06.jpg	MT1075	MCS1	3350+36	142	27	NNE	along alignment MCS1	SMP	10/12/2006
MT1075_SMP_0132_12Oct06.jpg	MT1075	MCS1	3350+36	142	27	SSW	along alignment MCS1	SMP	10/12/2006
MT1076_ALG_0233_12Oct06.jpg	MT1076	MCS1	3444+08	-271	28	N	View N on MCS1 to Rhodes Marsh	ALG	10/12/2006
MT1076_ALG_0234_12Oct06.jpg	MT1076	MCS1	3444+08	-271	28	S	View S on MCS1	ALG	10/12/2006
MT1076_ALG_0235_12Oct06.jpg	MT1076	MCS1	3444+08	-271	28		Alluvium of composite fan from Pilot Mts & Monte Cristo Range	ALG	10/12/2006
MT1076_SMP_0133_12Oct06.jpg	MT1076	MCS1	3444+08	-271	28	NE	Qay outcrop, lower layers exposed	SMP	10/12/2006
MT1076_SMP_0134_12Oct06.jpg	MT1076	MCS1	3444+08	-271	28	NE	Qay outcrop, upper layers exposed	SMP	10/12/2006
MT1077_ALG_0211_12Oct06.jpg	MT1077	MCS1	NA	NA	27		Rhodes Marsh salt mine	ALG	10/12/2006
MT1077_ALG_0212_12Oct06.jpg	MT1077	MCS1	NA	NA	27		Rhodes Marsh and Pilot Mts	ALG	10/12/2006
MT1077_ALG_0236_12Oct06.jpg	MT1077	MCS1	NA	NA	27		Borax (evaporite) processing structures at south end of Rhodes Marsh	ALG	10/12/2006
MT1077_ALG_0237_12Oct06.jpg	MT1077	MCS1	NA	NA	27	NW	View NW across Rhodes Marsh to Excelsior Mts., old salt mine at far end of marsh	ALG	10/12/2006
MT1077_ALG_0239_12Oct06.jpg	MT1077	MCS1	NA	NA	27	NNE	PAN N TO NE OF RHODES SALT MARSH & PILOT MTNS.	ALG	10/12/2006
MT1077_ALG_0241_12Oct06.jpg	MT1077	MCS1	NA	NA	27	NE	View NE of Rhodes Marsh & Pilot Mts	ALG	10/12/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1078_ALG_0242_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Gilbert Andesite (Ta4) in Candelaria Hills	ALG	10/12/2006
MT1078_ALG_0243_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Columnar jointed andesite flow	ALG	10/12/2006
MT1078_ALG_0244_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Andesite flow over dacite ash-flow tuff	ALG	10/12/2006
MT1078_ALG_0245_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Weathered, fractured ash-flow tuff	ALG	10/12/2006
MT1078_ALG_0246_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Columnar jointed andesite flow	ALG	10/12/2006
MT1078_ALG_0247_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1		Columnar jointed andesite flow	ALG	10/12/2006
MT1078_SMP_0135_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1	S	andesite outcrop, source of strike & dip measurements in SMP's notes	SMP	10/12/2006
MT1078_SMP_0136_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1	E	andesite outcrop, source of strike & dip measurements in SMP's notes	SMP	10/12/2006
MT1078_SMP_0137_12Oct06.jpg	MT1078	MCS1	NA	NA	Plate 1	N	andesite with weathered, welded tuff above and below	SMP	10/12/2006
MT1079_ALG_0248_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28		QTf weakly to well-indurated, silty sand & gravel and sandy silt	ALG	10/13/2006
MT1079_ALG_0249_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28		Gullied QTf sand & gravel beds	ALG	10/13/2006
MT1079_ALG_0250_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28		QTf weakly to moderately indurated silty sand, sand, & gravel	ALG	10/13/2006
MT1079_SMP_0138_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28	W	old RR grade, approx. 21-26 degree slope	SMP	10/13/2006
MT1079_SMP_0139_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28	W	old RR grade, approx. 28-degree slope	SMP	10/13/2006
MT1079_SMP_0140_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28	NW	eroding slope, approx. 32-34 degrees	SMP	10/13/2006
MT1079_SMP_0141_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28	SE	along aligment MCS1 from top of slope	SMP	10/13/2006
MT1079_SMP_0142_13Oct06.jpg	MT1079	MCS1	3502+49	-89	28	N	closeup of dipping Tsy beds	SMP	10/13/2006
MT1080_ALG_0251_13Oct06.jpg	MT1080	MCS1	3526+50	-201	28	SE	View SE on MCS1 next to a hill underlain by Tsy	ALG	10/13/2006
MT1080_SMP_0143_13Oct06.jpg	MT1080	MCS1	3526+50	-201	28	NE	slope weathered to approx. 35 degrees	SMP	10/13/2006
MT1080_SMP_0144_13Oct06.jpg	MT1080	MCS1	3526+50	-201	28	NE	slope weathered to approx. 35 degrees	SMP	10/13/2006
MT1080A_ALG_0252_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28		Tsy lacustrine claystone & colluvium	ALG	10/13/2006
MT1080A_ALG_0253_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28		Tsy lacustrine claystone & colluvium	ALG	10/13/2006
MT1080A_ALG_0254_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28		Tsy lacustrine claystone & colluvium	ALG	10/13/2006
MT1080A_ALG_0255_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28		Colluvium-covered claystone in Tsy	ALG	10/13/2006
MT1080A_SMP_0145_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28	E	Tsy valley (CH soil)	SMP	10/13/2006
MT1080A_SMP_0146_13Oct06.jpg	MT1080A	MCS1	3524+48	-684	28	N	test hole showing dessicated and weathered claystone overlying CLAYSTONE	SMP	10/13/2006
MT1081_ALG_0256_13Oct06.jpg	MT1081	MCS1	3584+66	-352	28		Colluvium-covered sandy siltstone in Tsy	ALG	10/13/2006
MT1081_SMP_0147_13Oct06.jpg	MT1081	MCS1	3584+66	-352	28	S	test hole showing 8 inches of colluvium overlying SILTSTONE	SMP	10/13/2006
MT1082_ALG_0257_13Oct06.jpg	MT1082	MCS1	3632+66	-194	29	NW	View NW on MCS1	ALG	10/13/2006
MT1082_ALG_0258_13Oct06.jpg	MT1082	MCS1	3632+66	-194	29	SE	View SE on MCS1	ALG	10/13/2006
MT1082_SMP_0148_13Oct06.jpg	MT1082	MCS1	3632+66	-194	29	NW	along alignment MCS1, test hole with siltstone exposed	SMP	10/13/2006
MT1082_SMP_0149_13Oct06.jpg	MT1082	MCS1	3632+66	-194	29	NW	test hole showing 6 inches of sandy SILT over SILTSTONE	SMP	10/13/2006
MT1082A_SMP_0150_13Oct06.jpg	MT1082A	MCS1	3636+79	877	29	SW	old RR cut, approx. 20-23 degree slope	SMP	10/13/2006
MT1082B_ALG_0259_13Oct06.jpg	MT1082B	MCS1	3636+48	1005	29		Qao at distal end of composite Pilot Mts-Monte Cristo Range fan	ALG	10/13/2006
MT1082B_ALG_0260_13Oct06.jpg	MT1082B	MCS1	3636+48	1005	29		Qao silty sand and calcrete	ALG	10/13/2006
MT1082B_SMP_0151_13Oct06.jpg	MT1082B	MCS1	3636+48	1005	29	SW	US95 cut; approx. 29-32 degree slope	SMP	10/13/2006
MT1082B_SMP_0152_13Oct06.jpg	MT1082B	MCS1	3636+48	1005	29	NW	incised cut slope view	SMP	10/13/2006
MT1083_ALG_0261_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	N	View N from MCS1 of wash incised into Monte Cristo Range fan alluvium	ALG	10/13/2006
MT1083_ALG_0262_13Oct06.jpg	MT1083	MCS1	3739+40	91	29		Qao fan alluvium	ALG	10/13/2006
MT1083_ALG_0263_13Oct06.jpg	MT1083	MCS1	3739+40	91	29		View west of nonwelded ash-flow tuff adjacent to the Mina rail corridor in the Redlich claim bloc	ALG	10/13/2006
MT1083_ALG_0264_13Oct06.jpg	MT1083	MCS1	3739+40	91	29		NW ash-flow tuff in Tsv	ALG	10/13/2006
MT1083_ALG_0265_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	NW	View NW on MCS1 of old RR grade and wash	ALG	10/13/2006
MT1083_ALG_0266_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	SE	View SE along MCS1	ALG	10/13/2006
MT1083_SMP_0153_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	NE	old RR grade, approx. 20-25 degree slope	SMP	10/13/2006
MT1083_SMP_0154_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	NW	old RR grade, approx. 25-27 degree slope	SMP	10/13/2006
MT1083_SMP_0155_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	E	test hole in Qao	SMP	10/13/2006
MT1083_SMP_0156_13Oct06.jpg	MT1083	MCS1	3739+40	91	29	S	foreground hill is welded tuff (gray color)	SMP	10/13/2006
MT1084_ALG_0267_13Oct06.jpg	MT1084	MCS1	3923+90	30	30		Qe overlying Qao	ALG	10/13/2006
MT1084_ALG_0268_13Oct06.jpg	MT1084	MCS1	3923+90	30	30	SW	View SW to Columbus Salt Marsh playa	ALG	10/13/2006
MT1084_ALG_0269_13Oct06.jpg	MT1084	MCS1	3923+90	30	30	SE	View SE on MCS1	ALG	10/13/2006
MT1084_ALG_0270_13Oct06.jpg	MT1084	MCS1	3923+90	30	30	NW	View NW on MCS1	ALG	10/13/2006
MT1084_SMP_0157_13Oct06.jpg	MT1084	MCS1	3923+90	30	30	N	test hole in Qe overlying Qao	SMP	10/13/2006
MT1085_ALG_0271_13Oct06.jpg	MT1085	MCS1	4154+63	7	31	NW	View NW on MCS1 of Monte Cristo Range fan	ALG	10/13/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1085_ALG_0272_13Oct06.jpg	MT1085	MCS1	4154+63	7	31	SE	View SE on MCS1	ALG	10/13/2006
MT1085_ALG_0273_13Oct06.jpg	MT1085	MCS1	4154+63	7	31	SE	View SE on MCS1 of Tt3 in Blair Junction sequence	ALG	10/13/2006
MT1085_ALG_0274_13Oct06.jpg	MT1085	MCS1	4154+63	7	31		Qe overlying Qao	ALG	10/13/2006
MT1085_SMP_0158_13Oct06.jpg	MT1085	MCS1	4154+63	7	31	N	test hole showing Qe overlying CALCRETE, overlying Qao	SMP	10/13/2006
MT1086_ALG_0275_13Oct06.jpg	MT1086	MCS1	4357+16	247	32	N	View N on MCS1 of lower Blair Junction sequence	ALG	10/13/2006
MT1086_ALG_0276_13Oct06.jpg	MT1086	MCS1	4357+16	247	32	N	View N on mCS-1 of Ta3 on lower Blair Junction	ALG	10/13/2006
MT1086_ALG_0277_13Oct06.jpg	MT1086	MCS1	4357+16	247	32	S	View S on MCS1 to Coaldale & Silver Peak Range	ALG	10/13/2006
MT1086_ALG_0278_13Oct06.jpg	MT1086	MCS1	4357+16	247	32		Qe overlying Qao	ALG	10/13/2006
MT1086_SMP_0159_13Oct06.jpg	MT1086	MCS1	4357+16	247	32	N	along alignment; test hole in Qao	SMP	10/13/2006
MT1088_ALG_0287_14Oct06.jpg	MT1088	MCS1	4693+93	-214	33	W	View W on MCS1 of Monte Cristo Range fan	ALG	10/14/2006
MT1088_ALG_0288_14Oct06.jpg	MT1088	MCS1	4693+93	-214	33	SE	View SE along MCS1	ALG	10/14/2006
MT1088_ALG_0289_14Oct06.jpg	MT1088	MCS1	4693+93	-214	33	N	View N of Monte Cristo Range	ALG	10/14/2006
MT1088_SMP_0162_14Oct06.jpg	MT1088	MCS1	4693+93	-214	33	SW	test hole in Qe overlying Qao	SMP	10/14/2006
MT1088_SMP_0163_14Oct06.jpg	MT1088	MCS1	4693+93	-214	33	W	along alignment MCS1	SMP	10/14/2006
MT1089_ALG_0290_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	WSW	View WSW along MCS1 of fan alluvium & Tsv	ALG	10/14/2006
MT1089_ALG_0291_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	ENE	View ENE along MCS1 of tuff in Tsv & colluvium	ALG	10/14/2006
MT1089_ALG_0292_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	N	View N of Esmeralda Fm (Tsv) outcrops	ALG	10/14/2006
MT1089_ALG_0293_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33		Tsv in foreground with Qb in distance	ALG	10/14/2006
MT1089_SMP_0164_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	W	along alignment MCS1	SMP	10/14/2006
MT1089_SMP_0165_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	E	along alignment MCS1	SMP	10/14/2006
MT1089_SMP_0166_14Oct06.jpg	MT1089	MCS1	4618+01	-14	33	SE	Tsv outcrop & colluvium	SMP	10/14/2006
MT1090_ALG_0294_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Esmeralda Fm (Tsv) fluvial sedimentary rocks	ALG	10/14/2006
MT1090_ALG_0295_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	NW	View NW of Tsv outcrop	ALG	10/14/2006
MT1090_ALG_0296_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	N	View N of Tsv tuff & sedimentary rocks	ALG	10/14/2006
MT1090_ALG_0297_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	SE	View SE of Tsv at US-95	ALG	10/14/2006
MT1090_ALG_0298_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	S	View S of Tsv boulder conglomerate	ALG	10/14/2006
MT1090_ALG_0299_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	SE	View SE of Tsv on both sides of US-95	ALG	10/14/2006
MT1090_ALG_0300_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Tsv fractured boulder conglomerate	ALG	10/14/2006
MT1090_ALG_0301_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Conglomerate layers separated by laminated ss, siltstone, & claystone	ALG	10/14/2006
MT1090_ALG_0302_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Tsv boulder conglomerate	ALG	10/14/2006
MT1090_ALG_0303_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Laminated ss, siltstone & claystone overlying conglomerate	ALG	10/14/2006
MT1090_ALG_0304_14Oct06.jpg	MT1090	MCS1	4519+87	539	33		Interbedded conglomerate, ss, siltstone, & claystone	ALG	10/14/2006
MT1090_SMP_0178_14Oct06.jpg	MT1090	MCS1	4519+87	539	33	NW	Esmeralda Formation view	SMP	10/14/2006
MT1090_WAH_0015_15Nov06.jpg	MT1090	MCS1	4519+87	539	33		Photo of High Strenth, slightly to moderately weathered, massive, clast supported, coarse-grained (subrounded to rounded) TUFF BRECCIA; rx fragments of various volcanic tlthologies (e.g. tuff, lapilli tuff)	WAH	11/15/2006
MT1090_WAH_0016_15Nov06.jpg	MT1090	MCS1	4519+87	539	33	N	View of W. Hultman near Tuff Breccia outcrop	WAH	11/15/2006
MT1090_WTL_0307_15Nov06.jpg	MT1090	MCS1	4519+87	539	33		North-dipping tuff breccia, conglomerate at Coaldale	WTL	11/15/2006
MT1090_WTL_0308_15Nov06.jpg	MT1090	MCS1	4519+87	539	33		Closeup of tuff breccia,conglomerate at Coaldale	WTL	11/15/2006
MT1090_WTL_0309_15Nov06.jpg	MT1090	MCS1	4519+87	539	33		Higher elevation stratified tuff deposits at Coaldale	WTL	11/15/2006
MT1090_WTL_0310_15Nov06.jpg	MT1090	MCS1	4519+87	539	33	NW	Coaldale cut hill, looking NW	WTL	11/15/2006
MT1090A_ALG_0305_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33		Platy fracturing ash-flow tuff in Tsv	ALG	10/14/2006
MT1090A_SMP_0167_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	NW	cut through Esmeralda Fm., approx. 30-45 degrees; TUFF: gray, high strength, fissille (sheet joints due to weathering)	SMP	10/14/2006
MT1090A_SMP_0168_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	SW	cut through Esmeralda Fm., approx. 25-30 degrees; TUFF: gray, high strength, fissille (sheet joints due to weathering)	SMP	10/14/2006
MT1090A_SMP_0169_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	NW	cut through Esmeralda Fm., approx. 35-40 degrees; SILTSTONE: moderate strength, gray-brown	SMP	10/14/2006
MT1090A_SMP_0170_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	SW	cut through Esmeralda Fm., approx. 23-32 degrees; SILTSTONE: moderate strength, gray-brown	SMP	10/14/2006
MT1090A_SMP_0171_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	NW	cut through Esmeralda Fm., approx. 32-80 degrees; CONGLOMERATE: low to moderate strength, reddish brown	SMP	10/14/2006
MT1090A_SMP_0172_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	SW	cut through Esmeralda Fm., approx. 32-40 degrees; CONGLOMERATE: low to moderate strength, reddish brown	SMP	10/14/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT1090A_SMP_0173_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	NW	cut through Esmeralda Fm., approx. 32-85 degrees; SANDSTONE: low to moderate strength, light brown	SMP	10/14/2006
MT1090A_SMP_0174_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	SW	cut through Esmeralda Fm., approx. 32-52 degrees; SANDSTONE: low to moderate strength, light brown	SMP	10/14/2006
MT1090A_SMP_0175_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	NW	old RR embankment, approx. 17-25 degree slope	SMP	10/14/2006
MT1090A_SMP_0176_14Oct06.jpg	MT1090A	MCS1	4530+39	824	33	SW	failed RR embankment, approx. 30-45 degree slope	SMP	10/14/2006
MT1090B_SMP_0177_14Oct06.jpg	MT1090B	MCS1	4526+37	711	33	NW	old RR embankment, approx. 18-20 degree slope	SMP	10/14/2006
MT1091_ALG_0306_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33	SE	View SE of gravel pit in fan alluvium & Tsv	ALG	10/14/2006
MT1091_ALG_0307_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33		Poorly to moderately indurated, variably silty sand in fan alluvium	ALG	10/14/2006
MT1091_ALG_0308_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33		Limonite-indurated sand & gravel at bottom of fan alluvium	ALG	10/14/2006
MT1091_ALG_0309_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33		Tsv sandstone	ALG	10/14/2006
MT1091_ALG_0310_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33		Tsv very closely fractured, tuffaceous ss	ALG	10/14/2006
MT1091_ALG_0311_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33		Borrow pit in fan alluvium and Tsv	ALG	10/14/2006
MT1091_SMP_0179_14Oct06.jpg	MT1091	MCS1	4484+21	-252	33	E	borrow pit view	SMP	10/14/2006
MT2001_BKR_0002_05Oct06.jpg	MT2001	MN3	696+26	4913	55	NE	Granitic outcrop, 3.5 mi SW of Alkali, looking NE	BKR	10/5/2006
MT2001_EAK_0001_05Oct06.jpg	MT2001	MN3	696+26	4913	55	W	West toward outcrops	EAK	10/5/2006
MT2001_EAK_0002_05Oct06.jpg	MT2001	MN3	696+26	4913	55	N	North toward outcrops	EAK	10/5/2006
MT2002_BKR_0003_05Oct06.jpg	MT2002	MN3	721+15	-141	55	NW	Granitic outcrop, less than 1 km from MN-1 alignment; SW of Alkali, looking NW	BKR	10/5/2006
MT2003_EAK_0003_06Oct06.jpg	MT2003	MN2	7498+47	-204	45	N	North along alignment MN-1	EAK	10/6/2006
MT2005_EAK_0004_06Oct06.jpg	MT2005	MN2	7229+87	-20	44	N	North along old railroad grade	EAK	10/6/2006
MT2006_BKR_0006_06Oct06.jpg	MT2006	MN2	7232+62	-14	44	N	Old RR grade; south end of fill area, looking north	BKR	10/6/2006
MT2006_BKR_0007_06Oct06.jpg	MT2006	MN2	7232+62	-14	44	S	Old RR grade; south end of fill area, looking south	BKR	10/6/2006
MT2006_EAK_0005_06Oct06.jpg	MT2006	MN2	7232+62	-14	44	E	East toward old railroad grade culvert	EAK	10/6/2006
MT2006_EAK_0006_06Oct06.jpg	MT2006	MN2	7232+62	-14	44	E	East, close-up of old railroad grade material	EAK	10/6/2006
MT2007_BKR_0008_06Oct06.jpg	MT2007	MN2	7215+97	-641	44	NE	NDOT south borrow pit ES0402, looking NE	BKR	10/6/2006
MT2007_EAK_0007_06Oct06.jpg	MT2007	MN2	7215+97	-641	44		Across South pit of NDOT burrow pit ES04-02, Keith in distance on opposite side of pit	EAK	10/6/2006
MT2008_BKR_0009_06Oct06.jpg	MT2008	MN2	7210+54	-742	44	NE	NDOT north borrow pit ES0402, looking NE	BKR	10/6/2006
MT2008_BKR_0010_06Oct06.jpg	MT2008	MN2	7210+54	-742	44	SW	NDOT north borrow pit ES0402, looking SW	BKR	10/6/2006
MT2008_EAK_0008_06Oct06.jpg	MT2008	MN2	7210+54	-742	44		Close-up of east wall of north pit of NDOT burrow pit ES04-02	EAK	10/6/2006
MT2008_EAK_0009_06Oct06.jpg	MT2008	MN2	7210+54	-742	44	E	East at entire wall of NDOT burrow pit ES04-02	EAK	10/6/2006
MT2009_BKR_0011_06Oct06.jpg	MT2009	MN2	7180+69	-2	43	SE	Big Wash; missing trestle on old RR grade, looking SE	BKR	10/6/2006
MT2009_BKR_0012_06Oct06.jpg	MT2009	MN2	7180+69	-2	43	S	Big Wash; filled section on old RR grade, looking S	BKR	10/6/2006
MT2009_BKR_0013_06Oct06.jpg	MT2009	MN2	7180+69	-2	43	N	Big Wash; filled section on old RR grade, looking N	BKR	10/6/2006
MT2009_EAK_0010_06Oct06.jpg	MT2009	MN2	7180+69	-2	43	W	West from Powerline to old railroad grade	EAK	10/6/2006
MT2009_EAK_0011_06Oct06.jpg	MT2009	MN2	7180+69	-2	43	E	East toward old railroad grade	EAK	10/6/2006
MT2010_BKR_0014_06Oct06.jpg	MT2010	MN2	6971+91	-323	42	S	Klondike well, looking S	BKR	10/6/2006
MT2010_BKR_0015_06Oct06.jpg	MT2010	MN2	6971+91	-323	42	SW	Klondike well looking SW	BKR	10/6/2006
MT2010_BKR_0016_06Oct06.jpg	MT2010	MN2	6971+91	-323	42	W	Klondike well looking W	BKR	10/6/2006
MT2010_EAK_0012_06Oct06.jpg	MT2010	MN2	6971+91	-323	42	E	East toward Klondike mine spoils	EAK	10/6/2006
MT2012_BKR_0017_06Oct06.jpg	MT2012	MN2	6660+39	-16	41	NE	SW end filled section on old RR grade; looking NE	BKR	10/6/2006
MT2012_BKR_0018_06Oct06.jpg	MT2012	MN2	6660+39	-16	41	SW	NE end filled section on old RR grade; looking SW	BKR	10/6/2006
MT2013_BKR_0019_06Oct06.jpg	MT2013	MN2	6659+06	-220	41	E	Potential borrow pit area, looking E	BKR	10/6/2006
MT2013_BKR_0020_06Oct06.jpg	MT2013	MN2	6659+06	-220	41	W	Potential borrow pit area, looking W	BKR	10/6/2006
MT2013_EAK_0013_06Oct06.jpg	MT2013	MN2	6659+06	-220	41		Close-up of sand outcrop	EAK	10/6/2006
MT2013_EAK_0014_06Oct06.jpg	MT2013	MN2	6659+06	-220	41	E	East showing further view of sand outcrop	EAK	10/6/2006
MT2015_BKR_0021_06Oct06.jpg	MT2015	MN2	6257+62	2	38	W	Narrow wash-out in old RR grade, looking W	BKR	10/6/2006
MT2017_BKR_0022_06Oct06.jpg	MT2017	MN2	5853+03	5204	37	SSE	Lone Mountain granitic area, looking SSE	BKR	10/6/2006
MT2017_BKR_0023_06Oct06.jpg	MT2017	MN2	5853+03	5204	37	SSE	Lone Mountain granitic area, looking SSE	BKR	10/6/2006
MT2018_BKR_0024_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	E	Lone Mountain granitic area; basic intrusive (left) in contact with quartz monzanite (right); field book is at contact; looking E	BKR	10/6/2006
MT2018_BKR_0025_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	E	Lone Mountain granitic area; granitic intrusive (right) in contact with steep dipping slate (left); field book is at contact; looking E	BKR	10/6/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2018_BKR_0026_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	E	Lone Mountain granitic area; granitic intrusive (right) in contact with steep dipping slate (left); field book is at contact; looking E	BKR	10/6/2006
MT2018_BKR_0027_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Lone Mountain granitic area; granitic dike intruding quartz monzanite	BKR	10/6/2006
MT2018_BKR_0028_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	NW	Lone Mountain granitic area; stone foundation near prospect adit; looking NW	BKR	10/6/2006
MT2018_BKR_0029_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	SW	Lone Mountain granitic area; cabin near prospect adit; looking SW	BKR	10/6/2006
MT2018_EAK_0015_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	E	East toward further outcrops at higher elevations	EAK	10/6/2006
MT2018_EAK_0016_06Oct06.jpg	MT2018	MN2	NA	NA	Plate 1	S	South toward further outcrops at higher elevations	EAK	10/6/2006
MT2018_WTL_0090_07Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Lone Mtn quartz monzonite hillside photo	WTL	10/7/2006
MT2018_WTL_0091_07Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Lone Mtn outcrop; potential quarry site	WTL	10/7/2006
MT2018_WTL_0092_07Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Lone Mtn outcrop closeup	WTL	10/7/2006
MT2018_WTL_0093_07Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Lone Mtn quarry site;lower edge of southern drainage	WTL	10/7/2006
MT2018_WTL_0094_07Oct06.jpg	MT2018	MN2	NA	NA	Plate 1		Larger outcrop of quartz monzonite; S side	WTL	10/7/2006
MT2019_EAK_0017_06Oct06.jpg	MT2019	MN2	NA	NA	Plate 1		Contact memamorphism between granitic pluton and sediments	EAK	10/6/2006
MT2020_BKR_0030_07Oct06.jpg	MT2020	MN2	NA	NA	36		Operationg borrow pit producing screened gravel for asphalt plant	BKR	10/7/2006
MT2020_EAK_0018_07Oct06.jpg	MT2020	MN2	NA	NA	36		Close-up of burrow source material	EAK	10/7/2006
MT2020_EAK_0019_07Oct06.jpg	MT2020	MN2	NA	NA	36		Wall of active burrow source wall	EAK	10/7/2006
MT2020_WTL_0086_07Oct06.jpg	MT2020	MN2	NA	NA	36		NDOT Pit ES 02-11 active pit for asphalt aggregate	WTL	10/7/2006
MT2020_WTL_0087_07Oct06.jpg	MT2020	MN2	NA	NA	36		NDOT Pit ES 02-11 active pit for asphalt aggregate	WTL	10/7/2006
MT2020_WTL_0088_07Oct06.jpg	MT2020	MN2	NA	NA	36		NDOT Pit ES 02-11 active pit for asphalt aggregate	WTL	10/7/2006
MT2020_WTL_0089_07Oct06.jpg	MT2020	MN2	NA	NA	36		NDOT Pit ES 02-11 active pit for asphalt aggregate	WTL	10/7/2006
MT2021_BKR_0031_07Oct06.jpg	MT2021	MN2	NA	NA	35		Granite outcrop in wash; potential quarry site	BKR	10/7/2006
MT2021_EAK_0020_07Oct06.jpg	MT2021	MN2	NA	NA	35	N	North toward possible contact between dolomite and granitics	EAK	10/7/2006
MT2021_EAK_0021_07Oct06.jpg	MT2021	MN2	NA	NA	35		Close-up of dolomite	EAK	10/7/2006
MT2021_WTL_0095_07Oct06.jpg	MT2021	MN2	NA	NA	35		Limestone outcrop at W promontory of Lone Mtn	WTL	10/7/2006
MT2021_WTL_0096_07Oct06.jpg	MT2021	MN2	NA	NA	35	W	Looking W from Lone Mtn; RR alignment in valley	WTL	10/7/2006
MT2022_BKR_0035_07Oct06.jpg	MT2022	MN2	5253+29	-543	35		Test pit in sand dune area; on alignment, 1.67 mi E MT2022	BKR	10/7/2006
MT2022_BKR_0036_07Oct06.jpg	MT2022	MN2	5253+29	-543	35	SW	Test pit in old RR cut; looking SW; silty sand, gravel & occ cobbles	BKR	10/7/2006
MT2022_EAK_0022_07Oct06.jpg	MT2022	MN2	5253+29	-543	35	NE	Northeast along old Railroad grade	EAK	10/7/2006
MT2022_WTL_0097_07Oct06.jpg	MT2022	MN2	5253+29	-543	35	E	McLeans; flat ground and disturbed, looking E	WTL	10/7/2006
MT2022_WTL_0098_07Oct06.jpg	MT2022	MN2	5253+29	-543	35	W	McLeans, looking W	WTL	10/7/2006
MT2024_WTL_0099_07Oct06.jpg	MT2024	MN2	5267+90	-580	35		Old RR embanment at 25 degree slopes, E of McLeans	WTL	10/7/2006
MT2026_WTL_0102_07Oct06.jpg	MT2026	MN2	5312+58	-616	35	E	Old RR grade, looking E	WTL	10/7/2006
MT2027_EAK_0023_07Oct06.jpg	MT2027	MN2	5341+86	-636	35	E	East toward Lone Mountain and alignment MN-2 across playa.	EAK	10/7/2006
MT2027_WTL_0103_07Oct06.jpg	MT2027	MN2	5341+86	-636	35		End of old RR grade and playa surrounding	WTL	10/7/2006
MT2027_WTL_0104_07Oct06.jpg	MT2027	MN2	5341+86	-636	35		End of old RR grade and playa surroudning	WTL	10/7/2006
MT2027_WTL_0105_07Oct06.jpg	MT2027	MN2	5341+86	-636	35		Test hole into playa surface; silt, trace fine sand	WTL	10/7/2006
MT2027_WTL_0106_07Oct06.jpg	MT2027	MN2	5341+86	-636	35	S	Playa, looking south from existing RR embankment	WTL	10/7/2006
MT2027_WTL_0107_07Oct06.jpg	MT2027	MN2	5341+86	-636	35		Team 2, Keith Rauch and Elizabeth Karcheski	WTL	10/7/2006
MT2028_WTL_0108_07Oct06.jpg	MT2028	MN2	5248+09	-565	35		Cut in old RR grade, W of McLeans	WTL	10/7/2006
MT2028_WTL_0109_07Oct06.jpg	MT2028	MN2	5248+09	-565	35		RR grade; layered gravelly, silty sand fill	WTL	10/7/2006
MT2029_BKR_0037_07Oct06.jpg	MT2029	MN2	5232+83	-449	35	SW	Test pit in wall of wash; 450 ft N of alignment; looking SW; 0-16" = bedded silty sand, 16-20" = silt	BKR	10/7/2006
MT2029_EAK_0024_07Oct06.jpg	MT2029	MN2	5232+83	-449	35	W	West at wash cut face	EAK	10/7/2006
MT2029_WTL_0110_07Oct06.jpg	MT2029	MN2	5232+83	-449	35		Dry wash cut; stratified fine to coarse sand and fine to medium sand, and fine sandy silt	WTL	10/7/2006
MT2029_WTL_0111_07Oct06.jpg	MT2029	MN2	5232+83	-449	35		Dry wash cut; stratified fine to coarse sand and fine to medium sand, and fine sandy silt	WTL	10/7/2006
MT2029_WTL_0112_07Oct06.jpg	MT2029	MN2	5232+83	-449	35	S	Looking S at new RR alignment	WTL	10/7/2006
MT2030_BKR_0038_07Oct06.jpg	MT2030	MN2	5221+10	-286	35		Prospect pit, 7 ft deep; silty sand w/gravel & rounded cobbles	BKR	10/7/2006
MT2030_WTL_0113_07Oct06.jpg	MT2030	MN2	5221+10	-286	35		8-foot-deep shaft on desert floor	WTL	10/7/2006
MT2031_BKR_0039_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Cut through old RR grade; silty sand w/abun gravel & scatt cobbles	BKR	10/7/2006
MT2031_BKR_0040_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Close view; lower zone thinly stratifed	BKR	10/7/2006
MT2031_BKR_0041_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Potential sand borrow source adjacent to alignment	BKR	10/7/2006
MT2031_EAK_0025_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Old railroad grade cut face, blue tape indicates fill/native contact	EAK	10/7/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2031_EAK_0026_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Native material in old railroad grade	EAK	10/7/2006
MT2031_WTL_0114_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		8-foot-high eroded old RR embankment and subgrade soils	WTL	10/7/2006
MT2031_WTL_0115_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		8-foot-high eroded old RR embankment and subgrade soils	WTL	10/7/2006
MT2031_WTL_0116_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		8-foot-high eroded old RR embankment and subgrade soils	WTL	10/7/2006
MT2031_WTL_0117_07Oct06.jpg	MT2031	MN2	5187+53	-559	34		Dry wash bank downstream from MT2031	WTL	10/7/2006
MT2031_WTL_0118_07Oct06.jpg	MT2031	MN2	5187+53	-559	34	SE	Looking SE at SW corner of Lone Mtn	WTL	10/7/2006
MT2032_BKR_0042_07Oct06.jpg	MT2032	MN2	5139+82	166	34	SE	Lone Mountain viewed from alignment; looling SE	BKR	10/7/2006
MT2032_WTL_0119_07Oct06.jpg	MT2032	MN2	5139+82	166	34		Resistant old fan	WTL	10/7/2006
MT2032_WTL_0120_07Oct06.jpg	MT2032	MN2	5139+82	166	34		Small test hole on resistant old fan; note desert pavement	WTL	10/7/2006
MT2032_WTL_0121_07Oct06.jpg	MT2032	MN2	5139+82	166	34	N	Looking N at old RR grade	WTL	10/7/2006
MT2033_BKR_0043_07Oct06.jpg	MT2033	MN1	5030+07	2539	46		Gravel pit adjacent to SR 265; road bed fill above hammer, natural sediments below: silty sand w/occ gravel	BKR	10/7/2006
MT2033_WTL_0124_07Oct06.jpg	MT2033	MN1	5030+07	2539	46	SW	Pit, looking SW, County Pit	WTL	10/7/2006
MT2033_WTL_0125_07Oct06.jpg	MT2033	MN1	5030+07	2539	46		Stockpile closeup	WTL	10/7/2006
MT2033_WTL_0126_07Oct06.jpg	MT2033	MN1	5030+07	2539	46		Excavated cut face NE of stockpiles	WTL	10/7/2006
MT2034_BKR_0044_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1		Weepah Hills: hard qtz monzanite exposed in canyon; potential quarry site	BKR	10/7/2006
MT2034_EAK_0027_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1	S	South up small canyon in Weepah Hills granitic	EAK	10/7/2006
MT2034_WTL_0127_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1		Weepah Hill quartz monzonite	WTL	10/7/2006
MT2034_WTL_0128_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1		Close and closer-up of quartz monzonite	WTL	10/7/2006
MT2034_WTL_0129_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1		Close and closer-up of quartz monzonite	WTL	10/7/2006
MT2034_WTL_0130_07Oct06.jpg	MT2034	MN1	NA	NA	Plate 1		Overview of small arroyo in KJg	WTL	10/7/2006
MT2035_WTL_0140_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	E	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0141_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	E	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0142_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	SE	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0143_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	SE	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0144_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	SE	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0145_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	S	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2035_WTL_0146_07Oct06.jpg	MT2035	MN1	5949+28	3249	51	S	Panorama of Clayton Valley looking E to S	WTL	10/7/2006
MT2036_BKR_0049_08Oct06.jpg	MT2036	MN1	5238+39	-123	47		Test pit: weak, tan silt; not cemented	BKR	10/8/2006
MT2036_EAK_0028_08Oct06.jpg	MT2036	MN1	5238+39	-123	47	E	East along alignment MN-1	EAK	10/8/2006
MT2036_EAK_0029_08Oct06.jpg	MT2036	MN1	5238+39	-123	47	W	West along alignment MN-1	EAK	10/8/2006
MT2037_BKR_0050_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Moderately hard, light grey ash bed	BKR	10/8/2006
MT2037_BKR_0051_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Conglomeritic welded tuff (?)	BKR	10/8/2006
MT2037_BKR_0052_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Tire ruts in soft gravely sand; looking NW	BKR	10/8/2006
MT2037_EAK_0030_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Close-up of tuff matrix	EAK	10/8/2006
MT2037_EAK_0031_08Oct06.jpg	MT2037	MN1	5260+30	3	47	N	North toward breccia over tuff	EAK	10/8/2006
MT2037_WTL_0147_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Airfall ash ridge, welded and nonwelded	WTL	10/8/2006
MT2037_WTL_0148_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Mounds and ridges of airfall tuff	WTL	10/8/2006
MT2037_WTL_0149_08Oct06.jpg	MT2037	MN1	5260+30	3	47		Closeup of welded tuff breccia	WTL	10/8/2006
MT2038_BKR_0053_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	SE	View of alignment; looking SE	BKR	10/8/2006
MT2038_BKR_0054_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	NW	View of alignment; looking NW	BKR	10/8/2006
MT2038_BKR_0055_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	SE	Exposure in wash; on alignment, looking SE: sandy siltstone w/sparse gravel, overlain by silty conglomerate with cobbles up to 12 in diam	BKR	10/8/2006
MT2038_BKR_0056_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	SE	Wide view of same exposure	BKR	10/8/2006
MT2038_WTL_0150_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	W	Looking westward at SS outcrop approx. 200 feet W of alignment	WTL	10/8/2006
MT2038_WTL_0151_08Oct06.jpg	MT2038	MN1	5354+49	-33	48		E-W ridges, part of radial drainage system	WTL	10/8/2006
MT2038_WTL_0152_08Oct06.jpg	MT2038	MN1	5354+49	-33	48		Tilted (25 to 30 degrees) fine to medium grained SS, thinly bedded	WTL	10/8/2006
MT2038_WTL_0153_08Oct06.jpg	MT2038	MN1	5354+49	-33	48		Closeup of SS	WTL	10/8/2006
MT2038_WTL_0154_08Oct06.jpg	MT2038	MN1	5354+49	-33	48		Interbedded siltstone, sandstone, and conglomerate dipping S	WTL	10/8/2006
MT2038_WTL_0155_08Oct06.jpg	MT2038	MN1	5354+49	-33	48		Interbedded siltstone, sandstone, and conglomerate dipping S	WTL	10/8/2006
MT2038_WTL_0156_08Oct06.jpg	MT2038	MN1	5354+49	-33	48	E	Silty sandstone dipping to SE at 30 degrees	WTL	10/8/2006
MT2039_BKR_0057_08Oct06.jpg	MT2039	MN1	5414+47	1162	48		Siltstone: soft, tan, vy thin bdd; occ chert nodules on bedd; FeOx stained; bedding dips 38 deg at 180 Az	BKR	10/8/2006
MT2039_EAK_0032_08Oct06.jpg	MT2039	MN1	5414+47	1162	48		Close-up of siltstone	EAK	10/8/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2039_WAH_0014_15Nov06.jpg	MT2039	MN1	5414+47	1162	48		Photo of Very low strength, moderately to highly weathered, white, friable, v. thinnly bedded to fissile, tuffaceious SILTSTONE/CLAYSTONE; w/ 2 inch thick interbeds of chert	WAH	11/15/2006
MT2039_WTL_0157_08Oct06.jpg	MT2039	MN1	5414+47	1162	48		Esmeralda Formation at edge of wash	WTL	10/8/2006
MT2039_WTL_0158_08Oct06.jpg	MT2039	MN1	5414+47	1162	48		Tuffaceous siltstone	WTL	10/8/2006
MT2039_WTL_0159_08Oct06.jpg	MT2039	MN1	5414+47	1162	48		Tuffaceous siltstone	WTL	10/8/2006
MT2040_BKR_0058_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Pediment(?) gravel overlying sandy siltstone	BKR	10/8/2006
MT2040_BKR_0059_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Cross bedded sandy siltstone; bedding dips 25 deg at 040 Az	BKR	10/8/2006
MT2040_EAK_0033_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Bedding in sandstone	EAK	10/8/2006
MT2040_EAK_0034_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Pediment gravel	EAK	10/8/2006
MT2040_EAK_0035_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Wash cut showing unconformable contact between underlying sandstone and pediment	EAK	10/8/2006
MT2040_WTL_0160_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Exposure on W edge of pediment gravel	WTL	10/8/2006
MT2040_WTL_0161_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Cross-bedded SS at lower 8 feet of slope	WTL	10/8/2006
MT2040_WTL_0162_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Well-bedded, slightly silty sandy gravel	WTL	10/8/2006
MT2040_WTL_0163_08Oct06.jpg	MT2040	MN1	5471+94	163	48		Pediment gravel over young Esmeralda Fm	WTL	10/8/2006
MT2041_BKR_0060_08Oct06.jpg	MT2041	MN1	5653+76	41	49	NE	Panoramic view of the "Crater"; looking NE	BKR	10/8/2006
MT2041_BKR_0061_08Oct06.jpg	MT2041	MN1	5653+76	41	49	N	Panoramic view of the "Crater"; looking N	BKR	10/8/2006
MT2041_BKR_0062_08Oct06.jpg	MT2041	MN1	5653+76	41	49	NW	Panoramic view of the "Crater"; looking NW	BKR	10/8/2006
MT2041_WTL_0166_08Oct06.jpg	MT2041	MN1	5653+76	41	49		The Crater Quat. basalt flow and E side breached cone	WTL	10/8/2006
MT2041_WTL_0167_08Oct06.jpg	MT2041	MN1	5653+76	41	49		The Crater Quat. basalt flow and E side breached cone	WTL	10/8/2006
MT2041_WTL_0168_08Oct06.jpg	MT2041	MN1	5653+76	41	49		On the S side (slope) of the basalt flow	WTL	10/8/2006
MT2041_WTL_0169_08Oct06.jpg	MT2041	MN1	5653+76	41	49		On top of basalt flow, looking N on alignment	WTL	10/8/2006
MT2041_WTL_0170_08Oct06.jpg	MT2041	MN1	5653+76	41	49		Only outcrop of basalt on Crater basalt flow	WTL	10/8/2006
MT2041_WTL_0171_08Oct06.jpg	MT2041	MN1	5653+76	41	49		Only outcrop of basalt on Crater basalt flow	WTL	10/8/2006
MT2042_BKR_0063_08Oct06.jpg	MT2042	MN1	5642+20	30	49	N	View of alignment, looking N toward the "Monocline"	BKR	10/8/2006
MT2042_BKR_0064_08Oct06.jpg	MT2042	MN1	5642+20	30	49	W	View of "Crater" looking W from alignment	BKR	10/8/2006
MT2042_BKR_0065_08Oct06.jpg	MT2042	MN1	5642+20	30	49		View of lava from "Crater"; on alignment	BKR	10/8/2006
MT2042_BKR_0066_08Oct06.jpg	MT2042	MN1	5642+20	30	49		View of lava from "Crater"; on alignment	BKR	10/8/2006
MT2042_EAK_0036_08Oct06.jpg	MT2042	MN1	5642+20	30	49	W	West toward "The Crater" cinder cone with basalt flow visible	EAK	10/8/2006
MT2042_EAK_0037_08Oct06.jpg	MT2042	MN1	5642+20	30	49	N	North along alignment MN-1	EAK	10/8/2006
MT2042_EAK_0038_08Oct06.jpg	MT2042	MN1	5642+20	30	49	S	South along alignment MN-1	EAK	10/8/2006
MT2043_BKR_0067_08Oct06.jpg	MT2043	MN1	5881+50	-6	51	N	Clayton Basin, looking N toward "Crater"; on alignment	BKR	10/8/2006
MT2043_BKR_0068_08Oct06.jpg	MT2043	MN1	5881+50	-6	51	S	Clayton Basin, looking S toward "Alcatraz"; on alignment	BKR	10/8/2006
MT2043_WTL_0172_08Oct06.jpg	MT2043	MN1	5881+50	-6	51		Looking S (toward Alcatraz Is.) and N (toward The Crater)	WTL	10/8/2006
MT2043_WTL_0173_08Oct06.jpg	MT2043	MN1	5881+50	-6	51		Looking S (toward Alcatraz Is.) and N (toward The Crater)	WTL	10/8/2006
MT2044_BKR_0069_08Oct06.jpg	MT2044	MN1	6622+20	-6	54	W	On alignment; looking W toward Silver Peak	BKR	10/8/2006
MT2044_BKR_0070_08Oct06.jpg	MT2044	MN1	6622+20	-6	54	E	On alignment; looking E	BKR	10/8/2006
MT2044_WTL_0176_08Oct06.jpg	MT2044	MN1	6622+20	-6	54		Looking E and W along al ignment, 5 degree fan surface	WTL	10/8/2006
MT2044_WTL_0177_08Oct06.jpg	MT2044	MN1	6622+20	-6	54		Looking E and W along alignment, 5 degree fan surface	WTL	10/8/2006
MT2045_BKR_0071_08Oct06.jpg	MT2045	MN1	6620+44	106	54		Sandy silt w/abun gravel exposed in wash; potential subballast source	BKR	10/8/2006
MT2045_EAK_0039_08Oct06.jpg	MT2045	MN1	6620+44	106	54	S	South along alignment MN-1	EAK	10/8/2006
MT2045_EAK_0040_08Oct06.jpg	MT2045	MN1	6620+44	106	54	N	North along alignment MN-1	EAK	10/8/2006
MT2045_WTL_0178_08Oct06.jpg	MT2045	MN1	6620+44	106	54		Wash side cut silt sandy GRAVEL, angular lgood subballast prospect	WTL	10/8/2006
MT2046_WTL_0179_08Oct06.jpg	MT2046	MN1	6606+36	-35	54		Looking back eastward at Quat. ash-pumice-tuff deposit laid in narrow valley	WTL	10/8/2006
MT2046_WTL_0180_08Oct06.jpg	MT2046	MN1	6606+36	-35	54		Closeup of ash (pumice) layer	WTL	10/8/2006
MT2046_WTL_0181_08Oct06.jpg	MT2046	MN1	6606+36	-35	54		Closeup of ash (pumice) layer	WTL	10/8/2006
MT2046_WTL_0182_08Oct06.jpg	MT2046	MN1	6606+36	-35	54		Closeup of ash (pumice) layer	WTL	10/8/2006
MT2047_EAK_0041_08Oct06.jpg	MT2047	MN1	6592+02	-2	54		Contact between dolomite and conglomerate	EAK	10/8/2006
MT2047_EAK_0042_08Oct06.jpg	MT2047	MN1	6592+02	-2	54		Distal view of contact between dolomite and conglomerate	EAK	10/8/2006
MT2047_WTL_0183_08Oct06.jpg	MT2047	MN1	6592+02	-2	54		Outcrop of conglomerate and dolomite on alignment	WTL	10/8/2006
MT2047_WTL_0184_08Oct06.jpg	MT2047	MN1	6592+02	-2	54	E	Looking E at another ashfall deposit tuff in valley (Tt3)	WTL	10/8/2006
MT2047_WTL_0185_08Oct06.jpg	MT2047	MN1	6592+02	-2	54		Joshua Tree	WTL	10/8/2006
MT2048_BKR_0072_08Oct06.jpg	MT2048	MN1	6590+75	0	54		Quartzite: hard, grey, fine crystalline; high angle joints at 6-12 in spacing	BKR	10/8/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2048_WTL_0186_08Oct06.jpg	MT2048	MN1	6590+75	0	54		Quartzite outcrop	WTL	10/8/2006
MT2048_WTL_0187_08Oct06.jpg	MT2048	MN1	6590+75	0	54		Phyllite, fissile	WTL	10/8/2006
MT2049_BKR_0075_09Oct06.jpg	MT2049	MN1	6585+92	90	54		Harkless Limestone: hard, dark grey, fine crystalline, massive bedded; abun calcite &/or dolomite veinlets; 1 inch lateral displacement on vertical veinlets	BKR	10/9/2006
MT2049_BKR_0076_09Oct06.jpg	MT2049	MN1	6585+92	90	54		Harkless Limestone: high angle joints strike at 025 Az & 115 Az	BKR	10/9/2006
MT2049_BKR_0077_09Oct06.jpg	MT2049	MN1	6585+92	90	54		Harkless Limestone: high angle joints strike at 025 Az & 115 Az	BKR	10/9/2006
MT2049_EAK_0043_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Breccia material between upper dolomite and lower dolomite	EAK	10/8/2006
MT2049_EAK_0044_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Close-up of breccia material between upper dolomite and lower dolomite	EAK	10/8/2006
MT2049_WTL_0188_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Unstable rock slope	WTL	10/8/2006
MT2049_WTL_0189_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Unstable rock slope	WTL	10/8/2006
MT2049_WTL_0190_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Unstable rock slope	WTL	10/8/2006
MT2049_WTL_0191_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Harkless rocks dipping 20 degrees toward valley	WTL	10/8/2006
MT2049_WTL_0192_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Contact (fault) of two units, one has crushed zone 1-inch-thick	WTL	10/8/2006
MT2049_WTL_0193_08Oct06.jpg	MT2049	MN1	6585+92	90	54		Contact (fault) of two units, one has crushed zone 1-inch-thick	WTL	10/8/2006
MT2050_BKR_0078_09Oct06.jpg	MT2050	MN1	6582+51	68	54	SW	Harkless Limestone terrane: view of alignment looking SW	BKR	10/9/2006
MT2050_BKR_0079_09Oct06.jpg	MT2050	MN1	6582+51	68	54	NE	Harkless Limestone terrane: view of alignment looking NE	BKR	10/9/2006
MT2050_EAK_0045_09Oct06.jpg	MT2050	MN1	6582+51	68	54	S	South along alignment MN-1	EAK	10/9/2006
MT2050_EAK_0046_09Oct06.jpg	MT2050	MN1	6582+51	68	54	W	West across valley from alignment MN-1	EAK	10/9/2006
MT2051_BKR_0080_09Oct06.jpg	MT2051	MN1	6580+05	18	54		Harkless Limestone: close spaced intersecting joints	BKR	10/9/2006
MT2053_BKR_0081_09Oct06.jpg	MT2053	MN1	6573+90	-48	54		Harkless Limestone: close spaced intersecting joints	BKR	10/9/2006
MT2053_BKR_0082_09Oct06.jpg	MT2053	MN1	6573+90	-48	54	SW	Harkless Limestone terrane: view of alignment looking SW	BKR	10/9/2006
MT2054_BKR_0083_09Oct06.jpg	MT2054	MN1	6570+74	101	54		Harkless Limestone: hard, tan, fine crystalline, thin bedded, FeOx stained; possible algal origin; overlies hard phyllitic siltstone with tiny, sparse garnets	BKR	10/9/2006
MT2054_EAK_0047_09Oct06.jpg	MT2054	MN1	6570+74	101	54		Fossil Archeocyathid	EAK	10/9/2006
MT2054_EAK_0048_09Oct06.jpg	MT2054	MN1	6570+74	101	54		Algal mat limestone	EAK	10/9/2006
MT2056_BKR_0084_09Oct06.jpg	MT2056	MN1	6552+19	40	54	NE	Normal fault with approximately 40 ft vertical displacement; alignment is at left edge of photo; looking NE	BKR	10/9/2006
MT2057_BKR_0085_09Oct06.jpg	MT2057	MN1	6546+44	38	54	SW	View from alignment, looking SW across Clayton Basin toward Angel Island	BKR	10/9/2006
MT2057_BKR_0086_09Oct06.jpg	MT2057	MN1	6546+44	38	54	NE	View from alignment, looking NE at planned cut through ridge	BKR	10/9/2006
MT2058_BKR_0087_09Oct06.jpg	MT2058	MN1	6412+38	44	53	NE	View from alignment, looking NE across alluvial fan toward Alkali Spring	BKR	10/9/2006
MT2058_BKR_0088_09Oct06.jpg	MT2058	MN1	6412+38	44	53	SW	View from alignment, looking SW across alluvial fan toward Angel Island	BKR	10/9/2006
MT2058_EAK_0049_09Oct06.jpg	MT2058	MN1	6412+38	44	53	W	West along alignment MN-1 toward Clayton Ridge	EAK	10/9/2006
MT2060_BKR_0089_10Oct06.jpg	MT2060	MN1	7844+91	732	59		Medium dense, tan sandy silt; variable gravel content; carbonate cement at top of section	BKR	10/10/2006
MT2060_BKR_0090_10Oct06.jpg	MT2060	MN1	7844+91	732	59		Medium dense, tan sandy silt; variable gravel content; carbonate cement at top of section	BKR	10/10/2006
MT2060_BKR_0091_10Oct06.jpg	MT2060	MN1	7844+91	732	59		Medium dense, tan sandy silt; variable gravel content; carbonate cement at top of section	BKR	10/10/2006
MT2062_BKR_0092_10Oct06.jpg	MT2062	MN1	7881+99	-248	59		Dense, tan sandy silt; abundant angular gravel; weak carbonate cement at top 4 ft of section	BKR	10/10/2006
MT2062_EAK_0050_10Oct06.jpg	MT2062	MN1	7881+99	-248	59		Wash cut	EAK	10/10/2006
MT2063_BKR_0093_10Oct06.jpg	MT2063	MN1	7890+62	-66	59		Carbonate cemented zone, 2-3 ft thick, exposed in dry wash; 6 ft below ground surface; contained within silty & gravelly sand	BKR	10/10/2006
MT2064_BKR_0094_10Oct06.jpg	MT2064	MN1	7954+62	185	59		Dense, tan silty sand; scatt angular gravel; weak carbonate cement	BKR	10/10/2006
MT2065_BKR_0095_10Oct06.jpg	MT2065	MN1	8008+27	75	60		Medium dense, tan silty sand; scatt fine subangular gravel; weak carbonate cement (weaker than previous exposure)	BKR	10/10/2006
MT2065_EAK_0051_10Oct06.jpg	MT2065	MN1	8008+27	75	60	N	North along alignment MN-1 across fans	EAK	10/10/2006
MT2066_EAK_0052_10Oct06.jpg	MT2066	MN1	8031+85	31	60	E	East toward butte with boulders present on surface	EAK	10/10/2006
MT2067_BKR_0096_10Oct06.jpg	MT2067	MN1	8043+58	-273	60		Very hard, high strength, red-grey, fine crystalline quartzite; close spaced jointing dips 82 deg at 234 Az & 70 deg at 258 Az	BKR	10/10/2006
MT2068_BKR_0097_10Oct06.jpg	MT2068	MN1	8080+52	325	60		Mule Spring Limestone: hard, dark grey, fine crystalline, thick bedded; abun carbonate veinlets; locally abundant spheroidal fossils(?) up to 1/2 in diam; bedding dips 5 deg at 165 Az	BKR	10/10/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2069_BKR_0098_10Oct06.jpg	MT2069	MN1	8090+44	178	60		Emigrant (?) Limestone: hard, dark grey, fine crystalline, thin bedded; vertical joints at 1-2 ft spacing; bedding dips 20 deg at 140 Az	BKR	10/10/2006
MT2070_BKR_0099_10Oct06.jpg	MT2070	MN1	8121+93	183	60		Subcropping Harkless(?) Shale: olive green, platy, weathered; may not be in place	BKR	10/10/2006
MT2070_BKR_0100_10Oct06.jpg	MT2070	MN1	8121+93	183	60		Subcropping Harkless(?) Shale: olive green, platy, weathered; bedding dips 11 degrees at 190 Az	BKR	10/10/2006
MT2070_EAK_0053_10Oct06.jpg	MT2070	MN1	8121+93	183	60			EAK	10/10/2006
MT2071_BKR_0101_10Oct06.jpg	MT2071	MN1	8164+95	-44	60	N	Ash bed: moderately hard, tan; welded; looking N	BKR	10/10/2006
MT2072_BKR_0102_10Oct06.jpg	MT2072	MN1	8201+03	285	60		Hard, tan, dense silty & sandy gravel overlying medium dense, tan silt with scatt cobbles & gravel	BKR	10/10/2006
MT2073_BKR_0103_10Oct06.jpg	MT2073	MN1	8224+14	255	60		Hard, tan, sandy gravel w/cobbles up to 8 in diam, overlying moderately hard, tan sandy silt with sparse fine gravel; carbonate cement	BKR	10/10/2006
MT2074_BKR_0104_10Oct06.jpg	MT2074	MN1	8253+42	-85	60		Moderately hard, tan silt w/carbonate cement, sparse gravel (24" thick), overlying hard, brown sandy silt with carbonate cement & abun coarse gravel (24" thick); overlying moderately hard, tan, sandy silt with carbonate cement & sparse gravel (24" thick)	BKR	10/10/2006
MT2075_BKR_0105_10Oct06.jpg	MT2075	MN1	8275+88	217	60		Limestone: moderately hard, red-brown, thin bedded, sandy; fossil fragments; bedding dips 15 degrees at 345 Az	BKR	10/10/2006
MT2075_EAK_0054_10Oct06.jpg	MT2075	MN1	8275+88	217	60		Fossils in sandstone unit	EAK	10/10/2006
MT2076_BKR_0106_10Oct06.jpg	MT2076	MN2	NA	NA	Plate 1	SW	Lone Mountain/Springdale Canyon area: panoramic view of canyon looking SW	BKR	10/10/2006
MT2076_BKR_0107_10Oct06.jpg	MT2076	MN2	NA	NA	Plate 1	W	Lone Mountain/Springdale Canyon area: panoramic view of canyon looking W	BKR	10/10/2006
MT2076_BKR_0108_10Oct06.jpg	MT2076	MN2	NA	NA	Plate 1	NW	Lone Mountain/Springdale Canyon area: panoramic view of canyon looking NW	BKR	10/10/2006
MT2076_BKR_0109_10Oct06.jpg	MT2076	MN2	NA	NA	Plate 1	NE	Lone Mountain/Springdale Canyon area: looking NE toward US 95, visible through gaps in mountains	BKR	10/10/2006
MT2076_BKR_0110_10Oct06.jpg	MT2076	MN2	NA	NA	Plate 1		Lone Mountain/Springdale Canyon area: map feature, "Mike's Well"	BKR	10/10/2006
MT2076_EAK_0055_11Oct06.jpg	MT2076	MN2	NA	NA	Plate 1		Joint set (075, 64) in quartz monzonite/granodiorite	EAK	10/11/2006
MT2077_BKR_0111_10Oct06.jpg	MT2077	MN2	NA	NA	Plate 1	N	Lone Mountain/Weepah Hills/Paymaster Canyon area: panoramic view of potential granitic ballast area; looking N	BKR	10/10/2006
MT2077_BKR_0112_10Oct06.jpg	MT2077	MN2	NA	NA	Plate 1	NE	Lone Mountain/Weepah Hills/Paymaster Canyon area: panoramic view of potential granitic ballast area; looking NE	BKR	10/10/2006
MT2077_BKR_0113_10Oct06.jpg	MT2077	MN2	NA	NA	Plate 1	SE	Lone Mountain/Weepah Hills/Paymaster Canyon area: panoramic view of potential granitic ballast area; looking SE	BKR	10/10/2006
MT2077_BKR_0114_10Oct06.jpg	MT2077	MN2	NA	NA	Plate 1	S	Lone Mountain/Weepah Hills/Paymaster Canyon area: panoramic view of potential granitic ballast area; looking S	BKR	10/10/2006
MT2077_BKR_0115_10Oct06.jpg	MT2077	MN2	NA	NA	Plate 1		Lone Mountain/Weepah Hills/Paymaster Canyon area: weathered granitic outcrop	BKR	10/10/2006
MT2078_BKR_0117_10Oct06.jpg	MT2078	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: weathered basaltic outcrop	BKR	10/10/2006
MT2078_BKR_0118_10Oct06.jpg	MT2078	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: largest basaltic outcrop in area	BKR	10/10/2006
MT2078_EAK_0056_11Oct06.jpg	MT2078	MN3	NA	NA	Plate 1	E	Panoramic east toward basalt balast area with little outcrop visible	EAK	10/11/2006
MT2078_EAK_0057_11Oct06.jpg	MT2078	MN3	NA	NA	Plate 1	E	Panoramic east toward basalt balast area with little outcrop visible	EAK	10/11/2006
MT2078_EAK_0058_11Oct06.jpg	MT2078	MN3	NA	NA	Plate 1	E	Panoramic east toward basalt balast area with little outcrop visible	EAK	10/11/2006
MT2079_BKR_0119_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1	SE	Montezuma Range/Indian Spring area: panoramic view of valley with sparse basaltic outcrops; looking SE	BKR	10/10/2006
MT2079_BKR_0120_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1	S	Montezuma Range/Indian Spring area: panoramic view of valley with sparse basaltic outcrops; looking S	BKR	10/10/2006
MT2079_BKR_0121_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1	SW	Montezuma Range/Indian Spring area: panoramic view of valley with sparse basaltic outcrops; looking SW	BKR	10/10/2006
MT2079_BKR_0127_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: ruins of old charcoal kiln	BKR	10/10/2006
MT2079_BKR_0128_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: ruins of old charcoal kiln	BKR	10/10/2006
MT2079_BKR_0129_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: native American petroglyphs	BKR	10/10/2006
MT2079_BKR_0130_10Oct06.jpg	MT2079	MN3	NA	NA	Plate 1		Montezuma Range/Indian Spring area: native American petroglyphs	BKR	10/10/2006
MT2079_EAK_0059_11Oct06.jpg	MT2079	MN3	NA	NA	Plate 1		Brecciated flow seperation	EAK	10/11/2006
MT2080_BKR_0122_10Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	E	Montezuma Peak: looking E toward Goldfield	BKR	10/10/2006
MT2080_BKR_0123_10Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	E	Montezuma Peak: looking E toward Goldfield	BKR	10/10/2006
MT2080_BKR_0124_10Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	N	Montezuma Peak: looking N toward Lone Mountain	BKR	10/10/2006
MT2080_BKR_0125_10Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	W	Montezuma Peak: looking W toward Silver Peak	BKR	10/10/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2,3] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT2080_BKR_0126_10Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	N	Montezuma Peak: looking N toward potential granitic ballast quarry area that is inaccessible	BKR	10/10/2006
MT2080_EAK_0060_11Oct06.jpg	MT2080	MN3	NA	NA	Plate 1	N	North toward inaccessible outcrop	EAK	10/11/2006
MT2082_BKR_0132_12Oct06.jpg	MT2082	MN1	6203+80	6	53	S	Angel Island: test pit - silty SAND: tan, mod dense, weakly cemented; looking south	BKR	10/12/2006
MT2082_BKR_0133_12Oct06.jpg	MT2082	MN1	6203+80	6	53		Angel Island: USBM quarter section marker	BKR	10/12/2006
MT2082_EAK_0061_11Oct06.jpg	MT2082	MN1	6203+80	6	53	N	North along alignment MN-1	EAK	10/11/2006
MT2083_BKR_0134_12Oct06.jpg	MT2083	MN1	6231+33	103	53	N	Angel Island: panoramic view of wash exposing intermittent ash beds and playa deposits; looking N	BKR	10/12/2006
MT2083_BKR_0135_12Oct06.jpg	MT2083	MN1	6231+33	103	53	E	Angel Island: panoramic view of wash exposing intermittent ash beds and playa deposits; looking E	BKR	10/12/2006
MT2083_BKR_0136_12Oct06.jpg	MT2083	MN1	6231+33	103	53	S	Angel Island: panoramic view of wash exposing intermittent ash beds and playa deposits; looking S	BKR	10/12/2006
MT2083_BKR_0137_12Oct06.jpg	MT2083	MN1	6231+33	103	53	W	Angel Island: panoramic view of wash exposing intermittent ash beds and playa deposits; looking W	BKR	10/12/2006
MT2084_BKR_0138_12Oct06.jpg	MT2084	MN1	6236+10	635	53	NE	Angel Island: Intermittent layers moderately hard ash falls/flows and softer playa clays; looking NE	BKR	10/12/2006
MT2084_EAK_0062_12Oct06.jpg	MT2084	MN1	6236+10	635	53		View of benched ash flow cuts	EAK	10/12/2006
MT2084_EAK_0063_12Oct06.jpg	MT2084	MN1	6236+10	635	53	N	North up wash cut	EAK	10/12/2006
MT2085_BKR_0139_12Oct06.jpg	MT2085	MN1	6259+04	251	53	NE	Angel Island: Qal fan at NE edge of ash/playa deposits; looking NE on alignment	BKR	10/12/2006
MT2085_BKR_0140_12Oct06.jpg	MT2085	MN1	6259+04	251	53	SE	Angel Island: Qal fan at NE edge of ash/playa deposits; looking SE toward source of Qal	BKR	10/12/2006
MT2085_BKR_0141_12Oct06.jpg	MT2085	MN1	6259+04	251	53	SW	Angel Island: Qal fan at NE edge of ash/playa deposits; looking SW on alignment	BKR	10/12/2006
MT2085_BKR_0142_12Oct06.jpg	MT2085	MN1	6259+04	251	53	NW	Angel Island: Qal fan at NE edge of ash/playa deposits; looking NW toward Angel Island	BKR	10/12/2006
MT2085_BKR_0143_12Oct06.jpg	MT2085	MN1	6259+04	251	53		Angel Island: looking perpendicular to alignment where it will cross the wash on fill	BKR	10/12/2006
MT2085_EAK_0064_12Oct06.jpg	MT2085	MN1	6259+04	251	53	NE	Northeast along alignment MN-1	EAK	10/12/2006
MT2085_EAK_0065_12Oct06.jpg	MT2085	MN1	6259+04	251	53	SW	Southwest along alignment MN-1	EAK	10/12/2006
MT2085_EAK_0066_12Oct06.jpg	MT2085	MN1	6259+04	251	53	E	East toward Silver Peak	EAK	10/12/2006
MT2085_EAK_0067_12Oct06.jpg	MT2085	MN1	6259+04	251	53	W	West into outcrops from base of outcroping	EAK	10/12/2006
MT2087_BKR_0145_12Oct06.jpg	MT2087	MN1	7367+83	-430	57	E	Silicified ash(?) bed; on alignment, looking E	BKR	10/12/2006
MT2087_BKR_0146_12Oct06.jpg	MT2087	MN1	7367+83	-430	57	W	Silicified ash(?) bed; on alignment, looking W	BKR	10/12/2006
MT2087_EAK_0068_12Oct06.jpg	MT2087	MN1	7367+83	-430	57		Fossilized burnt wood	EAK	10/12/2006
MT2088_BKR_0147_12Oct06.jpg	MT2088	MN1	7397+16	-79	57	W	On alignment, looking W	BKR	10/12/2006
MT2088_BKR_0148_12Oct06.jpg	MT2088	MN1	7397+16	-79	57	E	On alignment, looking E	BKR	10/12/2006
MT3001_WTL_0001_04Oct06.jpg	MT3001	MN1	8585+67	5163	61	N	Looking N from Lida Jct	WTL	10/4/2006
MT3002_WTL_0002_04Oct06.jpg	MT3002	MN1	8323+32	-1824	60	W	Looking W from where RR diverges W from US 95	WTL	10/4/2006
MT3003_WTL_0003_04Oct06.jpg	MT3003	MN1	NA	NA	Plate 1	N	Looking N at E edge of Malpais Mesa	WTL	10/4/2006
MT3004_WTL_0004_04Oct06.jpg	MT3004	MN2	7498+47	-1989	45		NDOT Pit ES 04-08, N of Goldfield	WTL	10/4/2006
MT3004_WTL_0005_04Oct06.jpg	MT3004	MN2	7498+47	-1989	45	N	View N from S end of MN2	WTL	10/4/2006
MT3005_WTL_0006_04Oct06.jpg	MT3005	MN2	7082+85	-2739	43		Potential ballast east of US 95, N of Godlfield	WTL	10/4/2006
MT3005_WTL_0007_04Oct06.jpg	MT3005	MN2	7082+85	-2739	43		Potential basalt ballast E of US 95, N of Goldfield	WTL	10/4/2006
MT3005_WTL_0008_04Oct06.jpg	MT3005	MN2	7082+85	-2739	43		Bajada on alignment approx. 10 miles N of Godlfield	WTL	10/4/2006
MT3005_WTL_0009_04Oct06.jpg	MT3005	MN2	7082+85	-2739	43		Potential andesite source E of US 95	WTL	10/4/2006
MT3006_WTL_0010_04Oct06.jpg	MT3006	MN2	NA	NA	Plate 1	W	Looking W of E side of Lone Mtn	WTL	10/4/2006
MT3007_WTL_0011_04Oct06.jpg	MT3007	MN2	NA	NA	Plate 1	SW	Panorama of E and NE side of Lone Mtn	WTL	10/4/2006
MT3007_WTL_0012_04Oct06.jpg	MT3007	MN2	NA	NA	Plate 1	SW	Panorama of E and NE side of Lone Mtn	WTL	10/4/2006
MT3008_WTL_0013_04Oct06.jpg	MT3008	MN1	NA	NA	34	S	Looking S toward Silver Peak from US 95	WTL	10/4/2006
MT3009_WTL_0014_04Oct06.jpg	MT3009	MN2	4829+75	2912	33	E	Looking E at Lone Mtn	WTL	10/4/2006
MT3010_WTL_0015_04Oct06.jpg	MT3010	MCS1	4519+07	511	33	S	Looking S from Blair Jct	WTL	10/4/2006
MT3010_WTL_0016_04Oct06.jpg	MT3010	MCS1	4519+07	511	33	W	Looking W along old RR grade; N of US 95	WTL	10/4/2006
MT3011_WTL_0017_04Oct06.jpg	MT3011	MCS1	4485+42	-38	33		NDOT Pit ES 02-03 E of Coaldale	WTL	10/4/2006
MT3011_WTL_0018_04Oct06.jpg	MT3011	MCS1	4485+42	-38	33		Old RR grade E of Coaldale	WTL	10/4/2006
MT3012_WTL_0019_04Oct06.jpg	MT3012	MCS1	3690+09	609	29		NDT Pit ES 05-01	WTL	10/4/2006
MT3013_WTL_0020_04Oct06.jpg	MT3013	MCS1	3478+20	1556	28	N	Looking N up southern end of Soda Spring Valley; Garfield Hills on right	WTL	10/4/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT3013_WTL_0021_04Oct06.jpg	MT3013	MCS1	3478+20	1556	28		Claim stakes N of US 95	WTL	10/4/2006
MT3014_WTL_0022_04Oct06.jpg	MT3014	MCS1	NA	NA	25		Fan S of Mina	WTL	10/4/2006
MT3014_WTL_0023_04Oct06.jpg	MT3014	MCS1	NA	NA	25	NE	Looking NE at alignment at Mina	WTL	10/4/2006
MT3015_WTL_0024_04Oct06.jpg	MT3015	MCS1	NA	NA	23	N	Looking N at Luning	WTL	10/4/2006
MT3016_WTL_0061_06Oct06.jpg	MT3016	S6	NA	NA	1		Wabuska yard site; E of power plant	WTL	10/6/2006
MT3017_WTL_0060_06Oct06.jpg	MT3017	S6	NA	NA	1		Wabuska yard site; high water level in drainage ditch	WTL	10/6/2006
MT3017_WTL_0062_06Oct06.jpg	MT3017	S6	NA	NA	1		Wabuska yard site; high water level in drainage ditch	WTL	10/6/2006
MT3017_WTL_0063_06Oct06.jpg	MT3017	S6	NA	NA	1		Wabuska yard site; high water level in drainage ditch	WTL	10/6/2006
MT3017_WTL_0064_06Oct06.jpg	MT3017	S6	NA	NA	1		Wabuska yard site; existing UPRR rail	WTL	10/6/2006
MT3017_WTL_0065_06Oct06.jpg	MT3017	S6	NA	NA	1		High water level at Wabuska	WTL	10/6/2006
MT3018_WTL_0066_06Oct06.jpg	MT3018	S6	NA	NA	Plate 1	N	Looking N at Desert Range; thin cap of basalt over Tertiary seds	WTL	10/6/2006
MT3018_WTL_0067_06Oct06.jpg	MT3018	S6	NA	NA	Plate 1	N	Looking N at Desert Range; thin cap of basalt over Tertiary seds	WTL	10/6/2006
MT3019_WTL_0068_06Oct06.jpg	MT3019	S6	NA	NA	Plate 1		Back side of Desert Range; thin cap of basalt over Tertiary seds	WTL	10/6/2006
MT3019_WTL_0069_06Oct06.jpg	MT3019	S6	NA	NA	Plate 1		Back side of Desert Range; thin cap of basalt over Tertiary seds	WTL	10/6/2006
MT3020_WTL_0070_06Oct06.jpg	MT3020	S6	NA	NA	2		Existing UPRR line N of Schur	WTL	10/6/2006
MT3020_WTL_0071_06Oct06.jpg	MT3020	S6	NA	NA	2	E	Looking E at point of divergence of new RR alignment	WTL	10/6/2006
MT3020_WTL_0072_06Oct06.jpg	MT3020	S6	NA	NA	2	N	Thin cap of basalt over Tertiary seds to N	WTL	10/6/2006
MT3021_WTL_0073_06Oct06.jpg	MT3021	S6	NA	NA	Plate 1		Andesite over Tertiary lake beds (mudstone) N of Walker River	WTL	10/6/2006
MT3022_WTL_0074_06Oct06.jpg	MT3022	S4	10106+76	2	2		Andesite over Tertiary lake beds (mudstone) N of Walker River; andesite in distance	WTL	10/6/2006
MT3022_WTL_0075_06Oct06.jpg	MT3022	S4	10106+76	2	2	S	Walker River crossing; looking S from N abutment area	WTL	10/6/2006
MT3022_WTL_0076_06Oct06.jpg	MT3022	S4	10106+76	2	2	E	Looking E along Tertiary lake bed bench	WTL	10/6/2006
MT3022_WTL_0077_06Oct06.jpg	MT3022	S4	10106+76	2	2		Looking across Walker River at S abutment	WTL	10/6/2006
MT3022_WTL_0078_06Oct06.jpg	MT3022	S4	10106+76	2	2	E	Looking E at alignment from top of ridge composed of Tertiary lake beds	WTL	10/6/2006
MT3022_WTL_0079_06Oct06.jpg	MT3022	S4	10106+76	2	2		Team 1, Art Geldon and Scott Pawling	WTL	10/6/2006
MT3023_WTL_0080_06Oct06.jpg	MT3023	S2	10707+19	2799	5		Left abutment of Weber Dam	WTL	10/6/2006
MT3023_WTL_0081_06Oct06.jpg	MT3023	S2	10707+19	2799	5		Looking downstream along Walker River, RR alignment above bench	WTL	10/6/2006
MT3024_WTL_0082_06Oct06.jpg	MT3024	S3	NA	NA	5		Weber Dam quarry site; quartz monzonite	WTL	10/6/2006
MT3024_WTL_0083_06Oct06.jpg	MT3024	S3	NA	NA	5		Weber Dam quarry site; quartz monzonite	WTL	10/6/2006
MT3024_WTL_0084_06Oct06.jpg	MT3024	S3	NA	NA	5		Weber Dam quarry site; quartz monzonite	WTL	10/6/2006
MT3024_WTL_0085_06Oct06.jpg	MT3024	S3	NA	NA	5		Weber Dam quarry site; quartz monzonite	WTL	10/6/2006
MT3025_WTL_0330_16Nov06.jpg	MT3025	MCS1	NA	NA	Plate 1		Garfield Hills quarry site	WTL	11/16/2006
MT3025_WTL_0331_16Nov06.jpg	MT3025	MCS1	NA	NA	Plate 1		Garfield Hills quarry site	WTL	11/16/2006
MT3025_WTL_0332_16Nov06.jpg	MT3025	MCS1	NA	NA	Plate 1		Garfield Hills quarry site	WTL	11/16/2006
MT3025_WTL_0333_16Nov06.jpg	MT3025	MCS1	NA	NA	Plate 1		Garfield Hills rock closeup	WTL	11/16/2006
MT3025A_WTL_0195_09Oct06.jpg	MT3025A	MN1	6703+44	412	54	NE	Looking NE along alignment at curve (hills)	WTL	10/9/2006
MT3026_WTL_0196_09Oct06.jpg	MT3026	MN1	6711+61	-79	54		Cut bank and TP ridge and Swale relief at approx. 5 to 20 feet, amplitude of ridges approx. 100 to 150 feet	WTL	10/9/2006
MT3027_WTL_0197_09Oct06.jpg	MT3027	MN1	6739+49	-51	54		4.5 feet high W edge of dry wash, slity sandy to sandy, silty GRAVEL (angular clasts)	WTL	10/9/2006
MT3027_WTL_0198_09Oct06.jpg	MT3027	MN1	6739+49	-51	54		4.5 feet high W edge of dry wash, slity sandy to sandy, silty GRAVEL (angular clasts)	WTL	10/9/2006
MT3028_WTL_0199_09Oct06.jpg	MT3028	MN1	6756+82	439	54		Looking NE at hill of Harkless Fm; note green color of Harkless	WTL	10/9/2006
MT3029_WTL_0200_09Oct06.jpg	MT3029	MN1	6764+89	428	54		Green slate exposure (small expos)	WTL	10/9/2006
MT3029_WTL_0201_09Oct06.jpg	MT3029	MN1	6764+89	428	54		Green slate exposure (small expos)	WTL	10/9/2006
MT3030_WTL_0202_09Oct06.jpg	MT3030	MN1	6783+51	322	54	NW	Slate outcrop dipping S	WTL	10/9/2006
MT3031_WTL_0203_09Oct06.jpg	MT3031	MN1	6792+45	277	55		Facies change from slate to silty SS, green	WTL	10/9/2006
MT3031_WTL_0204_09Oct06.jpg	MT3031	MN1	6792+45	277	55		Facies change from slate to silty SS, green	WTL	10/9/2006
MT3032_WTL_0205_09Oct06.jpg	MT3032	MN1	6793+96	93	55		View looking W and E from top of knoll	WTL	10/9/2006
MT3032_WTL_0206_09Oct06.jpg	MT3032	MN1	6793+96	93	55		View looking W and E from top of knoll	WTL	10/9/2006
MT3032_WTL_0207_09Oct06.jpg	MT3032	MN1	6793+96	93	55		Exposure of slate dipping N (N limb of anticline)	WTL	10/9/2006
MT3034_WTL_0208_09Oct06.jpg	MT3034	MN1	6803+06	107	55		Quartzite outcrop in draw on alignment	WTL	10/9/2006
MT3036_WTL_0209_09Oct06.jpg	MT3036	MN1	6810+49	-33	55		Quartz monzonite outcrop on narrow ridge (approx. 150 feet wide)	WTL	10/9/2006
MT3036_WTL_0210_09Oct06.jpg	MT3036	MN1	6810+49	-33	55	N	Narrow outcrop of quartz monz. looking N, adit in for ridge approx. 1,500 feet to N	WTL	10/9/2006
MT3037_WTL_0211_09Oct06.jpg	MT3037	MN1	6813+84	-196	55		Test trench prospect	WTL	10/9/2006
MT3038_WTL_0212_09Oct06.jpg	MT3038	MN1	6825+98	-212	55		Granodiorite knob, just E of alignment	WTL	10/9/2006
MT3038_WTL_0213_09Oct06.jpg	MT3038	MN1	6825+98	-212	55		Closeup of granodiorite outcrop	WTL	10/9/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT3038_WTL_0214_09Oct06.jpg	MT3038	MN1	6825+98	-212	55	N	Looking N at pluton (both bulges)	WTL	10/9/2006
MT3039_WTL_0215_09Oct06.jpg	MT3039	MN1	6852+33	1177	55		Small TP in side of dry wash, gravelly, fine sandy SILT	WTL	10/9/2006
MT3040_WTL_0216_09Oct06.jpg	MT3040	MN3	766+49	520	55		Test hole with slightly sandy, angular to subangular GRAVEL, trace silt, beautiful subballast and embankment	WTL	10/9/2006
MT3041_WTL_0217_09Oct06.jpg	MT3041	MN1	6895+54	23	55		Test hole on N side of wash slightly silty, sandy GRAVEL	WTL	10/9/2006
MT3041_WTL_0218_09Oct06.jpg	MT3041	MN1	6895+54	23	55		Looking S and N along alignment on fan, W of Montezuma Range	WTL	10/9/2006
MT3041_WTL_0219_09Oct06.jpg	MT3041	MN1	6895+54	23	55		Looking S and N along alignment on fan, W of Montezuma Range	WTL	10/9/2006
MT3042_WTL_0220_09Oct06.jpg	MT3042	MN1	6922+46	294	55		Test hole in S side of wash, silty, fine to coarse SAND, trace gravel	WTL	10/9/2006
MT3043_WTL_0221_09Oct06.jpg	MT3043	MN1	6932+80	307	54		Test hole in S side of dry wash approx 2 feet deep	WTL	10/9/2006
MT3044_WTL_0222_09Oct06.jpg	MT3044	MN1	6965+50	658	54		10-foot cut into S side of dry wash, slightly silty to silty, gravelly SAND	WTL	10/9/2006
MT3045_WTL_0223_09Oct06.jpg	MT3045	MN1	7061+31	129	56		8- to 9-foot cut bank in wash on RR alignment, slightly silty, sandy GRAVEL, upper 12 to 15 inches is rich in calcrete	WTL	10/9/2006
MT3045_WTL_0224_09Oct06.jpg	MT3045	MN1	7061+31	129	56		8- to 9-foot cut bank in wash on RR alignment, slightly silty, sandy GRAVEL, upper 12 to 15 inches is rich in calcrete	WTL	10/9/2006
MT3045_WTL_0225_09Oct06.jpg	MT3045	MN1	7061+31	129	56		8-to 9-foot cut bank in wash on RR alignment, slightly silty, sandy GRAVEL, upper 12 to 15 inches is rich in calcrete	WTL	10/9/2006
MT3046_WTL_0226_09Oct06.jpg	MT3046	MN1	7223+10	4	57		On alignment, slightly silty, sandy GRAVEL, dense, angular, trace cobbles, old dissected fan	WTL	10/9/2006
MT3046_WTL_0227_09Oct06.jpg	MT3046	MN1	7223+10	4	57		On alignment, slightly silty, sandy GRAVEL, dense, angular, trace cobbles, old dissected fan	WTL	10/9/2006
MT3046_WTL_0228_09Oct06.jpg	MT3046	MN1	7223+10	4	57		On alignment, slightly silty, sandy GRAVEL, dense, angular, trace cobbles, old dissected fan	WTL	10/9/2006
MT3046_WTL_0229_09Oct06.jpg	MT3046	MN1	7223+10	4	57		On alignment, slightly silty, sandy GRAVEL, dense, angular, trace cobbles, old dissected fan	WTL	10/9/2006
MT3047_WTL_0230_10Oct06.jpg	MT3047	MN1	7264+54	29	57		Topography on old fan (dissected, but rounded off)	WTL	10/10/2006
MT3047_WTL_0231_10Oct06.jpg	MT3047	MN1	7264+54	29	57		Topography on old fan (dissected, bu rounded off)	WTL	10/10/2006
MT3047_WTL_0232_10Oct06.jpg	MT3047	MN1	7264+54	29	57		Test hole on N side of dry wash, W of Montezuma Pass	WTL	10/10/2006
MT3048_WTL_0233_10Oct06.jpg	MT3048	MN1	7313+73	-521	57		Ash (tuff) outcrop, tuff with gravel (fan) a few feet thick overlying	WTL	10/10/2006
MT3049_WTL_0234_10Oct06.jpg	MT3049	MN1	7304+39	143	57	SW	S-dipping outcrop of welded tuff (typical of area)	WTL	10/10/2006
MT3049_WTL_0235_10Oct06.jpg	MT3049	MN1	7304+39	143	57	SW	S-dipping outcrop of welded tuff (typical of area)	WTL	10/10/2006
MT3049_WTL_0236_10Oct06.jpg	MT3049	MN1	7304+39	143	57	W	Looking W from just N of MT3049, ridges on both sides of dry wash are cored by tuff	WTL	10/10/2006
MT3050_WTL_0240_10Oct06.jpg	MT3050	MN1	7299+16	-207	57		Small outcrop of welded tuff with limestone chunks (tuff breccia)	WTL	10/10/2006
MT3050_WTL_0241_10Oct06.jpg	MT3050	MN1	7299+16	-207	57	NW	Looking NW along alignment	WTL	10/10/2006
MT3051_WTL_0242_10Oct06.jpg	MT3051	MN1	7293+28	532	57		Large (60-foot-high) outcrop of light gray,weak (locally friable) tuff, non-uniform jointing, local 1- to 2-foot cores and small rugs	WTL	10/10/2006
MT3051_WTL_0243_10Oct06.jpg	MT3051	MN1	7293+28	532	57		Closeup of tuff with cavity	WTL	10/10/2006
MT3052_WTL_0244_10Oct06.jpg	MT3052	MN1	7290+15	116	57		Large outcrop on N side of ridge, tuff, white to buff, very weak fine grained jointed 3 to 18 inches relatively massive	WTL	10/10/2006
MT3052_WTL_0245_10Oct06.jpg	MT3052	MN1	7290+15	116	57	SE	Cavernous tuff, looking back SE	WTL	10/10/2006
MT3052_WTL_0246_10Oct06.jpg	MT3052	MN1	7290+15	116	57		Mining activity on slope to N of Montezuma Pass	WTL	10/10/2006
MT3054_WTL_0247_10Oct06.jpg	MT3054	MN1	7332+27	358	57		Unknown metamorphic approx halfway uphill, probably Zd unit	WTL	10/10/2006
MT3054_WTL_0248_10Oct06.jpg	MT3054	MN1	7332+27	358	57		Overlying rhyolite unit at top of hill on S side of pass	WTL	10/10/2006
MT3056_WTL_0249_10Oct06.jpg	MT3056	MN1	7332+38	383	57		Rhyolite outcrop at Montezuma Pass	WTL	10/10/2006
MT3056_WTL_0250_10Oct06.jpg	MT3056	MN1	7332+38	383	57		Rhyolite outcrop at Montezuma Pass	WTL	10/10/2006
MT3056_WTL_0251_10Oct06.jpg	MT3056	MN1	7332+38	383	57		Rhyolite outcrop at Montezuma Pass	WTL	10/10/2006
MT3056_WTL_0252_10Oct06.jpg	MT3056	MN1	7332+38	383	57		N side of Montezuma Pass	WTL	10/10/2006
MT3057_WTL_0253_10Oct06.jpg	MT3057	MN1	7328+45	-521	57		S side of Montezuma Pass	WTL	10/10/2006
MT3058_WTL_0254_10Oct06.jpg	MT3058	MN1	7332+54	-320	57		Quartzite-Tertiary ash flow contact	WTL	10/10/2006
MT3058_WTL_0255_10Oct06.jpg	MT3058	MN1	7332+54	-320	57		Quartzite-Tertiary ash flow contact	WTL	10/10/2006
MT3058_WTL_0256_10Oct06.jpg	MT3058	MN1	7332+54	-320	57		S slope of Montezume Pass	WTL	10/10/2006
MT3058_WTL_0257_10Oct06.jpg	MT3058	MN1	7332+54	-320	57		Quartzite outcrop at Montezuma Pass	WTL	10/10/2006
MT3060_WTL_0258_10Oct06.jpg	MT3060	MN1	7367+62	-374	57		Outcrops of older tuffs and tuff breccias E of Montezuma Pass	WTL	10/10/2006
MT3060_WTL_0259_10Oct06.jpg	MT3060	MN1	7367+62	-374	57		Outcrops of older tuffs and tuff breccias E of Montezuma Pass	WTL	10/10/2006
MT3060_WTL_0260_10Oct06.jpg	MT3060	MN1	7367+62	-374	57		Outcrops of older tuffs and tuff breccias E of Montezuma Pass	WTL	10/10/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT4001_BKR_0152_28Oct06.jpg	MT4001	MN1	8444+03	-584	60		Lida Jct: basaltic outcrop on alignment	BKR	10/28/2006
MT4001_BKR_0153_28Oct06.jpg	MT4001	MN1	8444+03	-584	60		Lida Jct: paleolithic chert fragments	BKR	10/28/2006
MT4002_BKR_0154_28Oct06.jpg	MT4002	MN1	8402+52	-19	60		Lida Jct: Qao exposed in wash	BKR	10/28/2006
MT4003_BKR_0155_28Oct06.jpg	MT4003	MN1	8382+04	-527	60		Lida Jct: soft welded ash with angular inclusions of basalt & andesite	BKR	10/28/2006
MT4003_BKR_0156_28Oct06.jpg	MT4003	MN1	8382+04	-527	60		Lida Jct: soft welded ash with angular inclusions of basalt & andesite	BKR	10/28/2006
MT4004_BKR_0157_28Oct06.jpg	MT4004	MN1	NA	NA	Plate 1	E	Basalt flows in northern area of interest; active mining claims(?); looking E	BKR	10/28/2006
MT4005_BKR_0158_28Oct06.jpg	MT4005	MN1	NA	NA	Plate 1	SW	Basalt flows in southern area of interest; basaltic outcrops; looking SW	BKR	10/28/2006
MT4005_BKR_0159_28Oct06.jpg	MT4005	MN1	NA	NA	Plate 1	S	Basalt flows in southern area of interest; basaltic outcrops; looking S	BKR	10/28/2006
MT4005_BKR_0160_28Oct06.jpg	MT4005	MN1	NA	NA	Plate 1	SE	Basalt flows in southern area of interest; basaltic outcrops; looking SE	BKR	10/28/2006
MT4006_BKR_0161_28Oct06.jpg	MT4006	MN1	NA	NA	Plate 1	W	Basalt flows in southern area of interest; basaltic outcrops; looking W	BKR	10/28/2006
MT4006_BKR_0162_28Oct06.jpg	MT4006	MN1	NA	NA	Plate 1	E	Basalt flows in southern area of interest; basaltic outcrops; looking E	BKR	10/28/2006
MT4006_BKR_0163_28Oct06.jpg	MT4006	MN1	NA	NA	Plate 1	S	Basalt flows in southern area of interest; basaltic outcrops; looking S toward alignment	BKR	10/28/2006
MT4007_BKR_0164_28Oct06.jpg	MT4007	MN1	6828+13	-286	55	N	Panoramic view of granodiorite (?) sampled area; looking N	BKR	10/28/2006
MT4007_BKR_0165_28Oct06.jpg	MT4007	MN1	6828+13	-286	55	NE	Panoramic view of granodiorite(?) sampled area: looking NE	BKR	10/28/2006
MT4007_BKR_0166_28Oct06.jpg	MT4007	MN1	6828+13	-286	55	SE	Panoramic view of granodiorite(?) sampled area; looking SE	BKR	10/28/2006
MT4008_BKR_0167_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	W	Contact between 2 intrusive units, S end of outcrop; looking W	BKR	10/31/2006
MT4008_BKR_0168_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	NW	View of outcrop along wash; looking NW	BKR	10/31/2006
MT4008_BKR_0169_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	NW	View of outcrop along wash; looking NW	BKR	10/31/2006
MT4008_BKR_0170_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	W	Close jointing, 50/282 & 75/310; looking W	BKR	10/31/2006
MT4008_BKR_0171_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	W	Close jointing, 50/282 & 75/310; looking W	BKR	10/31/2006
MT4008_BKR_0172_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	NW	Contact between 2 intrusive units, N end of outcrop; looking NW	BKR	10/31/2006
MT4008_BKR_0173_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22		Using the Schmidt-Hammer instrument on an outcrop	BKR	10/31/2006
MT4008_BKR_0174_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	SW	Panorama of sampled outcrop; looking SW	BKR	10/31/2006
MT4008_BKR_0175_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	W	Panorama of sampled outcrop; looking W	BKR	10/31/2006
MT4008_BKR_0176_31Oct06.jpg	MT4008	MCS1	2346+35	-4525	22	NW	Panorama of sampled outcrop; looking NW	BKR	10/31/2006
MT4009_BKR_0177_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	N	Panorama of sampled outcrop; looking N	BKR	11/2/2006
MT4009_BKR_0178_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	NE	Panorama of sampled outcrop; looking NE	BKR	11/2/2006
MT4009_BKR_0179_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	E	Panorama of sampled outcrop; looking E	BKR	11/2/2006
MT4009_BKR_0180_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	SE	Panorama of sampled outcrop; looking SE	BKR	11/2/2006
MT4009_BKR_0181_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	S	Panorama of sampled outcrop; looking S	BKR	11/2/2006
MT4009_BKR_0182_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	SE	Rubble(?) zone within flow; looking SE	BKR	11/2/2006
MT4009_BKR_0183_02Nov06.jpg	MT4009	MCS1	NA	NA	Plate 1	S	Rubble(?) zone within flow; looking S	BKR	11/2/2006
MT4010_BKR_0184_03Nov06.jpg	MT4010	S3	10000+41	5071	5	S	Panorama of sampled outcrop; looking S	BKR	11/3/2006
MT4010_BKR_0185_03Nov06.jpg	MT4010	S3	10000+41	5071	5	SE	Panorama of sampled outcrop; looking SE	BKR	11/3/2006
MT4010_BKR_0186_03Nov06.jpg	MT4010	S3	10000+41	5071	5	E	Panorama of sampled outcrop; looking E	BKR	11/3/2006
MT4010_BKR_0187_03Nov06.jpg	MT4010	S3	10000+41	5071	5	NE	Panorama of sampled outcrop; looking NE	BKR	11/3/2006
MT4010_BKR_0188_03Nov06.jpg	MT4010	S3	10000+41	5071	5	N	Panorama of sampled outcrop; looking N	BKR	11/3/2006
MT5001_WTL_0261_13Nov06.jpg	MT5001	MN1	7326+80	36	57	E	Looking east at northern side of S. Montezuma Pass	WTL	11/13/2006
MT5001_WTL_0262_13Nov06.jpg	MT5001	MN1	7326+80	36	57	E	Looking east at so. side of S. Montezuma Pass	WTL	11/13/2006
MT5002_WTL_0263_13Nov06.jpg	MT5002	MN1	7320+41	-345	57	E	Looking east at S. Montezuma Pass	WTL	11/13/2006
MT5004_WTL_0264_14Nov06.jpg	MT5004	MN1	NA	NA	59		Old bridge crossing on old RR alignment no. of Goldfield	WTL	11/14/2006
MT5005_WTL_0265_14Nov06.jpg	MT5005	MN2	7437+48	-2140	45		Old RR grade east of US95	WTL	11/14/2006
MT5005_WTL_0266_14Nov06.jpg	MT5005	MN2	7437+48	-2140	45		Old RR embankment	WTL	11/14/2006
MT5005_WTL_0267_14Nov06.jpg	MT5005	MN2	7437+48	-2140	45		Old RR embankment	WTL	11/14/2006
MT5006_WAH_0002_14Nov06.jpg	MT5006	MN1	NA	NA	Plate 1	SW	View SW towards Malpais Mesa	WAH	11/14/2006
MT5006_WTL_0268_14Nov06.jpg	MT5006	MN1	NA	NA	Plate 1	S	Top of Malpais Mesa S., looking south	WTL	11/14/2006
MT5006_WTL_0269_14Nov06.jpg	MT5006	MN1	NA	NA	Plate 1	S	Top of Malpais Mesa S., looking south	WTL	11/14/2006
MT5006_WTL_0270_14Nov06.jpg	MT5006	MN1	NA	NA	Plate 1		Mesa top at Malpais S	WTL	11/14/2006
MT5006_WTL_0271_14Nov06.jpg	MT5006	MN1	NA	NA	Plate 1	S	Looking south at outcrop sampled, Malpais S	WTL	11/14/2006
MT5007_WTL_0272_14Nov06.jpg	MT5007	MN1	NA	NA	Plate 1		Sampled outcrop at Malpais S	WTL	11/14/2006
MT5007_WTL_0273_14Nov06.jpg	MT5007	MN1	NA	NA	Plate 1		Sampled outcrop at Malpais S	WTL	11/14/2006
MT5008_WAH_0008_14Nov06.jpg	MT5008	MN2	6963+95	-128	42	WSW	Photograph of WTL changing tire	WAH	11/14/2006
MT5008_WTL_0275_14Nov06.jpg	MT5008	MN2	6963+95	-128	42	N	Old RR grade at Klondike siding, looking north	WTL	11/14/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT5008_WTL_0276_14Nov06.jpg	MT5008	MN2	6963+95	-128	42	S	Old RR grade at Klondike, looking south	WTL	11/14/2006
MT5009_WAH_0003_14Nov06.jpg	MT5009	MN1	NA	NA	Plate 1	NE	View towards Alkali Lake	WAH	11/14/2006
MT5009_WTL_0277_14Nov06.jpg	MT5009	MN1	NA	NA	Plate 1		Duck's Bill hill, from Silver Peak Road	WTL	11/14/2006
MT5009_WTL_0278_14Nov06.jpg	MT5009	MN1	NA	NA	Plate 1		Metamorphic hills north of Duck's Bill hill, from Silver Peak Road	WTL	11/14/2006
MT5009_WTL_0279_14Nov06.jpg	MT5009	MN1	NA	NA	Plate 1		Duck's Bill hill, from Silver Peak Road	WTL	11/14/2006
MT5010_WTL_0281_14Nov06.jpg	MT5010	MN1	6590+47	-183	54	NW	North-dipping dolomite at Clayton Pass	WTL	11/14/2006
MT5010_WTL_0282_14Nov06.jpg	MT5010	MN1	6590+47	-183	54	SW	North-dipping dolomite at Clayton Pass	WTL	11/14/2006
MT5010_WTL_0283_14Nov06.jpg	MT5010	MN1	6590+47	-183	54		North-dipping slab failures	WTL	11/14/2006
MT5010_WTL_0284_14Nov06.jpg	MT5010	MN1	6590+47	-183	54	SW	North-dipping slab failures	WTL	11/14/2006
MT5010_WTL_0285_14Nov06.jpg	MT5010	MN1	6590+47	-183	54	W	North-dipping slab failures	WTL	11/14/2006
MT5011_WAH_0004_14Nov06.jpg	MT5011	MN1	6586+20	-107	54	WNW	View towards Clayton Valley and Lithium evaporation ponds	WAH	11/14/2006
MT5011_WAH_0009_14Nov06.jpg	MT5011	MN1	6586+20	-107	54		Photo of Med High to High Strength, Fresh to Sl. Weathered, thinnly bedded, closely jointed, SLATE (CZs)	WAH	11/14/2006
MT5011_WTL_0287_14Nov06.jpg	MT5011	MN1	6586+20	-107	54		Big slab failure plane	WTL	11/14/2006
MT5011_WTL_0288_14Nov06.jpg	MT5011	MN1	6586+20	-107	54		Contact of big slab failure plane	WTL	11/14/2006
MT5011_WTL_0289_14Nov06.jpg	MT5011	MN1	6586+20	-107	54		Steep 40degree slab failure	WTL	11/14/2006
MT5013_WAH_0005_14Nov06.jpg	MT5013	MN1	6586+26	-673	54	S	View towards Clayton Ridge	WAH	11/14/2006
MT5013_WTL_0290_14Nov06.jpg	MT5013	MN1	6586+26	-673	54	S	Panorama of slabbing slope, Clayton Pass	WTL	11/14/2006
MT5013_WTL_0291_14Nov06.jpg	MT5013	MN1	6586+26	-673	54	S	Panorama of slabbing slope, Clayton Pass	WTL	11/14/2006
MT5013_WTL_0292_14Nov06.jpg	MT5013	MN1	6586+26	-673	54	S	Panorama of slabbing slope, Clayton Pass	WTL	11/14/2006
MT5014_WAH_0006_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50	SE	View towards Clayton Valley and Angle island	WAH	11/14/2006
MT5014_WTL_0293_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		White silt, south of The Crater	WTL	11/14/2006
MT5014_WTL_0294_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		White silt, south of The Crater	WTL	11/14/2006
MT5014_WTL_0295_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		White silt closeup, south of The Crater	WTL	11/14/2006
MT5014_WTL_0296_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		White silt, south of The Crater	WTL	11/14/2006
MT5014_WTL_0297_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		White silt, south of The Crater	WTL	11/14/2006
MT5014_WTL_0298_14Nov06.jpg	MT5014	MN1	5699+24	-2131	50		Excavation in white silt	WTL	11/14/2006
MT5015_WAH_0010_14Nov06.jpg	MT5015	MN1	5647+26	0	49	W	View W of cinder cone	WAH	11/14/2006
MT5015_WAH_0011_14Nov06.jpg	MT5015	MN1	5647+26	0	49	W	View W of cinder cone from N edge of flow	WAH	11/14/2006
MT5016_WTL_0299_14Nov06.jpg	MT5016	MN1	5752+23	-580	50		Lower valley white silt	WTL	11/14/2006
MT5016_WTL_0300_14Nov06.jpg	MT5016	MN1	5752+23	-580	50		Lower valley white silt	WTL	11/14/2006
MT5016_WTL_0301_14Nov06.jpg	MT5016	MN1	5752+23	-580	50		Lower valley white silt	WTL	11/14/2006
MT5016_WTL_0302_14Nov06.jpg	MT5016	MN1	5752+23	-580	50		Lower valley white silt	WTL	11/14/2006
MT5017_WTL_0303_15Nov06.jpg	MT5017	MN2	NA	NA	36		Reclaimed NDOT pit ES02-11	WTL	11/15/2006
MT5017_WTL_0304_15Nov06.jpg	MT5017	MN2	NA	NA	36		Reclaimed NDOT pit ES02-11	WTL	11/15/2006
MT5017_WTL_0305_15Nov06.jpg	MT5017	MN2	NA	NA	36		Reclaimed NDOT pit ES02-11	WTL	11/15/2006
MT5017_WTL_0306_15Nov06.jpg	MT5017	MN2	NA	NA	36		Furrows in reclaimed surface for erosion	WTL	11/15/2006
MT5018_WAH_0012_15Nov06.jpg	MT5018	MN2	NA	NA	35	E	View east of alluvial fan deposts at the west end of Lone Mountain	WAH	11/15/2006
MT5019_WAH_0013_15Nov06.jpg	MT5019	MN2	NA	NA	Plate 1	W	View west towards the Big Smokey Valley from an existing road at the base of Weepah Hills	WAH	11/15/2006
MT5020_WAH_0019_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1	NW	View NW of contact between Luning Formation and Cretaceous granitic pluton	WAH	11/15/2006
MT5020_WTL_0313_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1		Sharp contact of granitics with Luning Fm at Gabbs	WTL	11/15/2006
MT5020_WTL_0314_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1		North end of Gabbs pit outcrop	WTL	11/15/2006
MT5020_WTL_0315_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1		Toe of slope at Gabbs quarry	WTL	11/15/2006
MT5020_WTL_0316_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1		Quartz monzonite outcrop at Gabbs	WTL	11/15/2006
MT5020_WTL_0317_15Nov06.jpg	MT5020	MCS1	NA	NA	Plate 1		Joint pattern in quartz monzonite at Gabbs	WTL	11/15/2006
MT5021_WTL_0318_15Nov06.jpg	MT5021	MCS1	4520+81	21	33		Welded tuff outcrop at Coaldale	WTL	11/15/2006
MT5021_WTL_0319_15Nov06.jpg	MT5021	MCS1	4520+81	21	33		Tuffaceous hills at Coaldale	WTL	11/15/2006
MT5021_WTL_0320_15Nov06.jpg	MT5021	MCS1	4520+81	21	33		Vuggy tuffaceous beds at Coaldale	WTL	11/15/2006
MT5022_WTL_0321_15Nov06.jpg	MT5022	MCS1	4516+74	28	33	W	Looking west from top of Coaldale cut	WTL	11/15/2006
MT5022_WTL_0322_15Nov06.jpg	MT5022	MCS1	4516+74	28	33	E	Looking east from top of Coaldale cut	WTL	11/15/2006
MT5023_WTL_0326_15Nov06.jpg	MT5023	S3	10611+53	2705	7		North-dipping granular deposits in cut	WTL	11/15/2006
MT5023_WTL_0327_15Nov06.jpg	MT5023	S3	10611+53	2705	7		North-dipping seds along dry wash	WTL	11/15/2006
MT5023_WTL_0328_15Nov06.jpg	MT5023	S3	10611+53	2705	7		North-dipping granular seds	WTL	11/15/2006

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1&2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT5023_WTL_0329_15Nov06.jpg	MT5023	S3	10611+53	2705	7		North-dipping granular seds	WTL	11/15/2006
MT5023_WTL_0336_16Nov06.jpg	MT5023	S3	10611+53	2705	7		Road cut in dune sand (Qe) at Schurz	WTL	11/16/2006
MT5024_WAH_0033_16Nov06.jpg	MT5024	S2	10729+82	3225	5	W	Photo of dense, lt. brown, medium SAND, w/ 1/4 inch interbeds of plastic clay (Qc)	WAH	11/16/2006
MT5024_WTL_0348_16Nov06.jpg	MT5024	S2	10729+82	3225	5		Tertiary lake beds north of east abut Walker R crossing	WTL	11/16/2006
MT5024_WTL_0349_16Nov06.jpg	MT5024	S2	10729+82	3225	5		Tertiary lake beds north of east abut Walker R crossing	WTL	11/16/2006
MT5025_WAH_0022_16Nov06.jpg	MT5025	S2	10715+09	2898	5	E	View of Qay, QTf, and Tsy deposits on west facing slope above Weber Reservoir and Walker River	WAH	11/16/2006
MT5025_WTL_0350_16Nov06.jpg	MT5025	S2	10715+09	2898	5		Tertiary lake beds to east from Weber Dam	WTL	11/16/2006
MT5025_WTL_0351_16Nov06.jpg	MT5025	S2	10715+09	2898	5		Tertiary lake beds to east from Weber Dam	WTL	11/16/2006
MT5026_WAH_0023_16Nov06.jpg	MT5026	S2	10700+67	2070	5	S	View south towards Weber Reservoir and Walker River	WAH	11/16/2006
MT5026_WTL_0352_16Nov06.jpg	MT5026	S2	10700+67	2070	5		Tertiary lake and fluvial strata east of Weber Dam	WTL	11/16/2006
MT5026_WTL_0353_16Nov06.jpg	MT5026	S2	10700+67	2070	5		Tertiary lake and fluvial beds east of Weber Dam	WTL	11/16/2006
MT5026_WTL_0354_16Nov06.jpg	MT5026	S2	10700+67	2070	5		Weathered soil horizon east of Weber Dam	WTL	11/16/2006
MT5026_WTL_0355_16Nov06.jpg	MT5026	S2	10700+67	2070	5		Tertiary lake beds east of Weber Dam	WTL	11/16/2006
MT5027_WAH_0024_16Nov06.jpg	MT5027	S6	10078+37	-4630	2	NE	View thin basalt flow overlying Tertiary lake bed deposits	WAH	11/16/2006
MT5027_WAH_0034_16Nov06.jpg	MT5027	S6	10078+37	-4630	2	NE	View thin basalt flow overlying Tertiary lake bed deposits	WAH	11/16/2006
MT5027_WTL_0356_16Nov06.jpg	MT5027	S6	10078+37	-4630	2		Lookin east from top of cut near WalkerR crossing	WTL	11/16/2006
MT5027_WTL_0358_16Nov06.jpg	MT5027	S6	10078+37	-4630	2		Basalt Andesite overlying weak sediments	WTL	11/16/2006
MT5028_WAH_0025_16Nov06.jpg	MT5028	S6	NA	NA	Plate 1	NNE	View of thrust fault in Tertiary lake bed deposits	WAH	11/16/2006
MT5028_WTL_0357_16Nov06.jpg	MT5028	S6	NA	NA	Plate 1		Basalt lag on top of cut area at Walker R bridge	WTL	11/16/2006
MT5028_WTL_0359_16Nov06.jpg	MT5028	S6	NA	NA	Plate 1		Thrust fault in Tertiary lake beds	WTL	11/16/2006
MT5028_WTL_0360_16Nov06.jpg	MT5028	S6	NA	NA	Plate 1		Thrust fault in Tertiary lake beds	WTL	11/16/2006
MT7001_WTL_0361_18Feb07.jpg	MT7001	MN1	8280+39	1383	60		NDOT Pit ES 03-08 appears to be part bedrock quarry and part alluvial fan.	WTL	2/18/2007
MT7001_WTL_0362_18Feb07.jpg	MT7001	MN1	8280+39	1383	60		NDOT Pit ES 03-08 appears to be part bedrock quarry and part alluvial fan.	WTL	2/18/2007
MT7002_WTL_0363_18Feb07.jpg	MT7002	MN1	7503+42	1289	58	N	Dissected tuff beds	WTL	2/18/2007
MT7002_WTL_0364_18Feb07.jpg	MT7002	MN1	7503+42	1289	58	E	Along alignment; light colored tuff as far as can be seen	WTL	2/18/2007
MT7003_WTL_0365_18Feb07.jpg	MT7003	MN1	7501+60	525	58		Tuff (Tt3) outcrop, approx. 6' high	WTL	2/18/2007
MT7003_WTL_0366_18Feb07.jpg	MT7003	MN1	7501+60	525	58		Tuff (Tt3) outcrop, approx. 6' high	WTL	2/18/2007
MT7004_WTL_0367_18Feb07.jpg	MT7004	MN1	7510+91	-5	58		Tt3/Qao contact.	WTL	2/18/2007
MT7005_WTL_0368_18Feb07.jpg	MT7005	MN1	7531+89	4	58		Tuff (Tt3) outcrop	WTL	2/18/2007
MT7007_WTL_0369_19Feb07.jpg	MT7007	MN2	7368+23	-3496	45		Gravel pit excavation reclaimed.	WTL	2/19/2007
MT7007_WTL_0370_19Feb07.jpg	MT7007	MN2	7368+23	-3496	45		Stock piles on north side of NDOT Pit ES 04-01.	WTL	2/19/2007
MT7008_WTL_0371_19Feb07.jpg	MT7008	MN2	7402+40	756	45	W	Level ground in Qao.	WTL	2/19/2007
MT7008_WTL_0372_19Feb07.jpg	MT7008	MN2	7402+40	756	45	E	Level ground in Qao.	WTL	2/19/2007
MT7009_WTL_0373_19Feb07.jpg	MT7009	MN3	421+15	66	44	E	Along alignment on Qao.	WTL	2/19/2007
MT7009_WTL_0374_19Feb07.jpg	MT7009	MN3	421+15	66	44	W	Along alignment on Qao.	WTL	2/19/2007
MT7009_WTL_0375_19Feb07.jpg	MT7009	MN3	421+15	66	44		12 degree cut slope in fan alluvial.	WTL	2/19/2007
MT7010_WTL_0376_19Feb07.jpg	MT7010	MN3	418+43	-2834	44		Closeup of small mound from test pit excavation.	WTL	2/19/2007
MT7010_WTL_0377_19Feb07.jpg	MT7010	MN3	418+43	-2834	44		Overview of small mound from test pit excavation.	WTL	2/19/2007
MT7011_WTL_0378_19Feb07.jpg	MT7011	MN3	396+68	-532	44		Closeup of welded TUFF outcrop.	WTL	2/19/2007
MT7011_WTL_0379_19Feb07.jpg	MT7011	MN3	396+68	-532	44		Red rock knob.	WTL	2/19/2007
MT7012_WTL_0380_19Feb07.jpg	MT7012	MN3	493+69	-22	55	E	Along alignment at intersection of MN3 and power line.	WTL	2/19/2007
MT7013_WTL_0381_19Feb07.jpg	MT7013	MN3	490+83	-121	55	E	Test pit on east side of wash.	WTL	2/19/2007
MT7014_WTL_0382_19Feb07.jpg	MT7014	MN3	485+01	-86	55	W	Dry wash bank and test hole.	WTL	2/19/2007
MT7014_WTL_0383_19Feb07.jpg	MT7014	MN3	485+01	-86	55	W	Closeup of dry wash bank and test hole.	WTL	2/19/2007
MT7015_WTL_0384_19Feb07.jpg	MT7015	MN3	505+50	-3	55		Dry wash with ephemeral channel.	WTL	2/19/2007
MT7016_WTL_0385_19Feb07.jpg	MT7016	MN3	515+01	-79	55	N	Sandy GRAVEL in channel (Qc).	WTL	2/19/2007
MT7017_WTL_0386_19Feb07.jpg	MT7017	MN3	537+53	73	55		Test hole at edge of wide dry wash.	WTL	2/19/2007
MT7020_WTL_0389_19Feb07.jpg	MT7020	MN3	728+22	145	55		SE edge of granite outcrop at Kjg/Qao contact.	WTL	2/19/2007
MT7022_WTL_0390_19Feb07.jpg	MT7022	MN3	732+15	293	55		Kjg/Qc/Qao contact.	WTL	2/19/2007
MT7024_WTL_0391_19Feb07.jpg	MT7024	MN3	719+13	181	55		East edge of Kjg/Qao contact; then heads north along drainage swale.	WTL	2/19/2007
MT7027_WTL_0395_19Feb07.jpg	MT7027	MN3	427+47	568	44		Outcrop of Siebert Tuff (Tt3) in dry wash.	WTL	2/19/2007
MT7028_WTL_0396_20Feb07.jpg	MT7028	MN2	NA	NA	42		Road with ruts in playa deposit	WTL	2/20/2007
MT7029_WTL_0397_20Feb07.jpg	MT7029	MN2	NA	NA	42	S	Alkali Flats panorama of MN3	WTL	2/20/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT7029_WTL_0398_20Feb07.jpg	MT7029	MN2	NA	NA	42	S	Alkali Flats panorama of MN3	WTL	2/20/2007
MT7031_WTL_0399_20Feb07.jpg	MT7031	MN3	704+49	-186	55		Dry wash with small TUFF (100ft2) exposure.	WTL	2/20/2007
MT7032_WTL_0400_20Feb07.jpg	MT7032	MN3	683+33	22	55		Closeup of test hole in small dry wash ~6' deep (Qao).	WTL	2/20/2007
MT7032_WTL_0401_20Feb07.jpg	MT7032	MN3	683+33	22	55		Overview of test hole in small dry wash ~6' deep (Qao).	WTL	2/20/2007
MT7033_WTL_0402_20Feb07.jpg	MT7033	MN3	669+99	157	55		Granite outcrop; moderately weathered.	WTL	2/20/2007
MT7035_WTL_0403_20Feb07.jpg	MT7035	MN3	670+26	-319	55		Foothills of granite area; source of/connected to outcrop out on fan [pediment surface].	WTL	2/20/2007
MT7036_WTL_0404_20Feb07.jpg	MT7036	MN3	650+34	-32	55	S	Granite subcrop at shallow depth (?) with small outcrops poking through.	WTL	2/20/2007
MT7036_WTL_0405_20Feb07.jpg	MT7036	MN3	650+34	-32	55	E	Granite subcrop at shallow depth (?) with small outcrops poking through.	WTL	2/20/2007
MT7036_WTL_0406_20Feb07.jpg	MT7036	MN3	650+34	-32	55		Test hole in grus	WTL	2/20/2007
MT7038_WTL_0407_20Feb07.jpg	MT7038	MN3	622+08	-410	55		Closeup of tuff exposure.	WTL	2/20/2007
MT7038_WTL_0408_20Feb07.jpg	MT7038	MN3	622+08	-410	55		Overview of tuff exposure.	WTL	2/20/2007
MT7039_WTL_0409_20Feb07.jpg	MT7039	MN3	600+70	-491	55	S	Northern toe of Tuff hill.	WTL	2/20/2007
MT7039_WTL_0410_20Feb07.jpg	MT7039	MN3	600+70	-491	55	N	Northern toe of Tuff hill.	WTL	2/20/2007
MT7040_WTL_0411_20Feb07.jpg	MT7040	MN3	600+04	-695	55		Tt3 outcrop	WTL	2/20/2007
MT7040_WTL_0412_20Feb07.jpg	MT7040	MN3	600+04	-695	55	NE	Panorama of fan along alignment.	WTL	2/20/2007
MT7041_WTL_0413_20Feb07.jpg	MT7041	MN3	596+03	-17	55		Test hole in side of dry wash; Qao.	WTL	2/20/2007
MT7043_WTL_0415_20Feb07.jpg	MT7043	MN2	4826+53	105	34	W	NDOT Pit ES 2-06	WTL	2/20/2007
MT7044_WTL_0416_20Feb07.jpg	MT7044	MCS1	4273+21	1610	32	E	View of NDOT Pit ES 05-02 face.	WTL	2/20/2007
MT7045_WTL_0417_20Feb07.jpg	MT7045	MCS1	NA	NA	30		View of borrow pit cut face - west side.	WTL	2/20/2007
MT7046_WTL_0418_20Feb07.jpg	MT7046	MCS1	NA	NA	Plate 1		NDOT Pit MI 01-03	WTL	2/20/2007
MT7047_WTL_0419_20Feb07.jpg	MT7047	MCS1	NA	NA	25		NDOT Pit MI 01-04	WTL	2/20/2007
MT7048_WTL_0420_20Feb07.jpg	MT7048	MCS1	NA	NA	24		NDOT Pit MI 01-06A	WTL	2/20/2007
MT7049_WTL_0421_20Feb07.jpg	MT7049	MCS1	NA	NA	23		NDOT Pit MI 01-08	WTL	2/20/2007
MT7050_WTL_0422_20Feb07.jpg	MT7050	MCS1	NA	NA	22		NDOT Pit MI 01-09	WTL	2/20/2007
MT7051_WTL_0423_21Feb07.jpg	MT7051	S6	11043+50	-1942	12		NDOT Pit CH 08-04	WTL	2/21/2007
MT7051_WTL_0424_21Feb07.jpg	MT7051	S6	11043+50	-1942	12		NDOT Pit CH 08-04	WTL	2/21/2007
MT7052_WTL_0425_21Feb07.jpg	MT7052	S6	10235+74	1814	10	W	On alignment at west end of narrow channel	WTL	2/21/2007
MT7052_WTL_0426_21Feb07.jpg	MT7052	S6	10235+74	1814	10	E	On alignment at west end of narrow channel	WTL	2/21/2007
MT7053_WTL_0427_21Feb07.jpg	MT7053	S5	10212+35	1748	10		Test hole in brown, silty, fine SAND.	WTL	2/21/2007
MT7054_WTL_0428_21Feb07.jpg	MT7054	S5	10194+37	1206	10	NE	View up fan toward bedrock outcrop.	WTL	2/21/2007
MT7055_WTL_0429_21Feb07.jpg	MT7055	S5	10196+97	613	10	N	View upward of basalt float-covered Tsy	WTL	2/21/2007
MT7060_WTL_0432_22Feb07.jpg	MT7060	S6	11035+06	-1961	11	N	Alluvial fan (Qay): silty fine SAND to fine sandy SILT	WTL	2/22/2007
MT7062_WTL_0434_22Feb07.jpg	MT7062	S6	11029+59	-1392	12		Test hole showing horizontally bedded, silty, fine SAND and fine sandy SILT	WTL	2/22/2007
MT7063_WTL_0435_22Feb07.jpg	MT7063	S6	11021+88	-1140	12		Bank of dry wash; site of Qay debris flow	WTL	2/22/2007
MT7063_WTL_0436_22Feb07.jpg	MT7063	S6	11021+88	-1140	12		Boulders at site of Qay debris flow	WTL	2/22/2007
MT7063_WTL_0437_22Feb07.jpg	MT7063	S6	11021+88	-1140	12		Box culvert at site of Qay debris flow	WTL	2/22/2007
MT7065_WTL_0438_22Feb07.jpg	MT7065	S6	11010+07	-1024	12		Test hole at top of higher terrace alluvium (Qay2)	WTL	2/22/2007
MT7068_WTL_0439_23Feb07.jpg	MT7068	MCS1	NA	NA	18	NW	Test hole showing slightly fine gravelly, silty, fine SAND/fine sandy SILT (Ql)	WTL	2/23/2007
MT7068_WTL_0440_23Feb07.jpg	MT7068	MCS1	NA	NA	18	NW	Along alignment	WTL	2/23/2007
MT7069_WTL_0441_23Feb07.jpg	MT7069	MCS1	NA	NA	18	N	View up channel in Ql.	WTL	2/23/2007
MT7070_WTL_0442_23Feb07.jpg	MT7070	MCS1	NA	NA	18		Test hole showing light brown, slightly silty, sandy GRAVEL (angular), tr. cobbles.	WTL	2/23/2007
MT7071_WTL_0443_23Feb07.jpg	MT7071	MCS1	NA	NA	18	NW	View of Qay/Ql exposure in channel	WTL	2/23/2007
MT7071_WTL_0444_23Feb07.jpg	MT7071	MCS1	NA	NA	18	NW	Overview of Qay/Ql exposure in channel	WTL	2/23/2007
MT7071_WTL_0445_23Feb07.jpg	MT7071	MCS1	NA	NA	18	NW	Overview of Qay/Ql exposure in channel	WTL	2/23/2007
MT7071_WTL_0446_23Feb07.jpg	MT7071	MCS1	NA	NA	18	NW	Closeup of Qay/Ql exposure in channel	WTL	2/23/2007
MT7072_WTL_0447_23Feb07.jpg	MT7072	MCS1	NA	NA	18		Overview of channel bank; Qay overlying Ql	WTL	2/23/2007
MT7072_WTL_0448_23Feb07.jpg	MT7072	MCS1	NA	NA	18		View of channel bank; Qay crust over very loose Qay	WTL	2/23/2007
MT7072_WTL_0449_23Feb07.jpg	MT7072	MCS1	NA	NA	18		Closeup of channel bank; Qay crust over very loose Qay	WTL	2/23/2007
MT7073_WTL_0450_23Feb07.jpg	MT7073	MCS1	NA	NA	18	NW	On alignment, Qay/Ql surface	WTL	2/23/2007
MT7073_WTL_0451_23Feb07.jpg	MT7073	MCS1	NA	NA	18	NW	Test hole in Qay/Ql	WTL	2/23/2007
MT7074_WTL_0452_23Feb07.jpg	MT7074	MCS1	NA	NA	18		Side slope of channel; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7074_WTL_0453_23Feb07.jpg	MT7074	MCS1	NA	NA	18		Side slope of channel; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7074_WTL_0454_23Feb07.jpg	MT7074	MCS1	NA	NA	18		View of yard area, UPRR track, ammo depot	WTL	2/23/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1b] (feet)	FIGURE 3 SHEET[1]	DIRECTION	COMMENT	SOURCE	DATE
MT7075_WTL_0455_23Feb07.jpg	MT7075	MCS1	NA	NA	18		Pile of Qay; excellent subballast material	WTL	2/23/2007
MT7076_WTL_0456_23Feb07.jpg	MT7076	MCS1	NA	NA	18		Side slope of channel; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7076_WTL_0457_23Feb07.jpg	MT7076	MCS1	NA	NA	18		Side slope of channel; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7076_WTL_0458_23Feb07.jpg	MT7076	MCS1	NA	NA	18	NE	View up channel; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7077_WTL_0459_23Feb07.jpg	MT7077	MCS1	NA	NA	18		Closeup of exposure in old borrow pit; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7077_WTL_0460_23Feb07.jpg	MT7077	MCS1	NA	NA	18		Exposure in old borrow pit; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7077_WTL_0461_23Feb07.jpg	MT7077	MCS1	NA	NA	18		Vicinity of exposure in old borrow pit; interbedded Qay/Ql deposit	WTL	2/23/2007
MT7077_WTL_0462_23Feb07.jpg	MT7077	MCS1	NA	NA	18		Rip-up chunk of laminated silt and sand with mini-extensional faults	WTL	2/23/2007
MT7078_WTL_0463_23Feb07.jpg	MT7078	MCS1	NA	NA	18		Test hole in side slope of existing trench	WTL	2/23/2007
MT7079_WTL_0464_23Feb07.jpg	MT7079	MCS1	NA	NA	18		View of RR embankment (Qay?) with 25 degree slope	WTL	2/23/2007
MT7080_WTL_0465_23Feb07.jpg	MT7080	MCS1	NA	NA	18	E	Test hole in Ql on east bank of borrow pit	WTL	2/23/2007
MT7080_WTL_0466_23Feb07.jpg	MT7080	MCS1	NA	NA	18		Closeup of Ql with shell fragment	WTL	2/23/2007
MT7080_WTL_0467_23Feb07.jpg	MT7080	MCS1	NA	NA	18	E	Closeup of test hole in Ql on east bank of borrow pit	WTL	2/23/2007
MT7081_WTL_0468_23Feb07.jpg	MT7081	MCS1	NA	NA	18	E	View of whole pit and east bank	WTL	2/23/2007
MT8001_PHZ_0001_22Feb07.jpg	MT8001	S6	10663+09	204	11	W	View over eolian sand (Qe)	PHZ	2/22/2007
MT8001_PHZ_0002_22Feb07.jpg	MT8001	S6	10663+09	204	11	E	View over eolian sand (Qe)	PHZ	2/22/2007
MT8002_PHZ_0003_22Feb07.jpg	MT8002	S6	10667+84	15	11	E	View over older alluvium (Qao)	PHZ	2/22/2007
MT8002_WTL_0430_22Feb07.jpg	MT8002	S6	10667+84	15	11		Team MT8 group photo; near west end of Long Valley	WTL	2/22/2007
MT8004_PHZ_0004_22Feb07.jpg	MT8004	S5	10743+57	-255	11	W	View over eolian sand (Qe)	PHZ	2/22/2007
MT8004_PHZ_0005_22Feb07.jpg	MT8004	S5	10743+57	-255	11	E	View over eolian sand (Qe)	PHZ	2/22/2007
MT8004_WTL_0431_22Feb07.jpg	MT8004	S5	10743+57	-255	11		View of bedrock hills to north of alignment.	WTL	2/22/2007
MT8005_PHZ_0006_22Feb07.jpg	MT8005	S5	10747+92	-309	11	E	View over eolian sand (Qe) and small area of playa deposits (Qp).	PHZ	2/22/2007
MT8007_PHZ_0007_22Feb07.jpg	MT8007	S6	10759+83	82	11	S	View of varnished boulders on older alluvial (Qao) surface	PHZ	2/22/2007
MT8008_PHZ_0008_22Feb07.jpg	MT8008	S6	10791+12	-489	11	E	View along road down valley to east	PHZ	2/22/2007
MT8010_PHZ_0009_22Feb07.jpg	MT8010	S6	10823+29	-194	12	W	On bedrock hill (Ta4), view of boulders and road	PHZ	2/22/2007
MT8010_PHZ_0010_22Feb07.jpg	MT8010	S6	10823+29	-194	12	E	On bedrock hill (Ta4), view of boulders and road	PHZ	2/22/2007
MT8011_PHZ_0011_22Feb07.jpg	MT8011	S6	10825+52	-144	12	E	View of basaltic andesite (Ta4) outcrop on slope	PHZ	2/22/2007
MT8012_PHZ_0012_22Feb07.jpg	MT8012	S6	10829+60	58	12	W	View of basaltic andesite (Ta4) slope	PHZ	2/22/2007
MT8012_PHZ_0013_22Feb07.jpg	MT8012	S6	10829+60	58	12	N	View of basaltic andesite bedrock (Ta4) slope	PHZ	2/22/2007
MT8012_PHZ_0014_22Feb07.jpg	MT8012	S6	10829+60	58	12	E	View of bedrock (Ta4) slope	PHZ	2/22/2007
MT8013_PHZ_0015_22Feb07.jpg	MT8013	S6	10827+16	392	12	E	Closeup of test hole in older alluvium (Qao)	PHZ	2/22/2007
MT8014_PHZ_0016_22Feb07.jpg	MT8014	S6	10848+10	178	12	W	View of channel	PHZ	2/22/2007
MT8015_PHZ_0017_22Feb07.jpg	MT8015	S6	10864+20	-374	12	E	View of bedrock (Ta4) slope	PHZ	2/22/2007
MT8016_PHZ_0018_22Feb07.jpg	MT8016	S6	10870+67	-497	12	W	View of small fans at base of bedrock (Ta4) slope	PHZ	2/22/2007
MT8016_PHZ_0019_22Feb07.jpg	MT8016	S6	10870+67	-497	12	E	View of bedrock (Ta4) slope, small boulders, and road in background	PHZ	2/22/2007
MT8017_PHZ_0020_22Feb07.jpg	MT8017	S6	10902+16	-1430	12	W	Base of basaltic andesite bedrock (Ta4) slope and channel	PHZ	2/22/2007
MT8017_PHZ_0021_22Feb07.jpg	MT8017	S6	10902+16	-1430	12	E	Base of bedrock (Ta4) slope and channel	PHZ	2/22/2007
MT8017_PHZ_0022_22Feb07.jpg	MT8017	S6	10902+16	-1430	12	N	View of bedrock (Ta4) slope	PHZ	2/22/2007
MT8018_PHZ_0023_22Feb07.jpg	MT8018	S6	10908+84	-1460	12	NE	View at base of bedrock (Ta4) slope along alignment	PHZ	2/22/2007
MT8019_PHZ_0024_22Feb07.jpg	MT8019	S6	10910+77	-1643	12	SW	View of bedrock (Ta4) on ridge along alignment	PHZ	2/22/2007
MT8019_PHZ_0025_22Feb07.jpg	MT8019	S6	10910+77	-1643	12	NE	View of bedrock (Ta4) on ridge along alignment	PHZ	2/22/2007
MT8020_PHZ_0026_22Feb07.jpg	MT8020	S6	10948+31	-1613	12	N	View over bedrock slopes (Ta4) and rills	PHZ	2/22/2007
MT8020_PHZ_0027_22Feb07.jpg	MT8020	S6	10948+31	-1613	12	E	View of bedrock (Ta4) lower slope	PHZ	2/22/2007
MT8020_PHZ_0028_22Feb07.jpg	MT8020	S6	10948+31	-1613	12	S	View of bedrock (Ta4) lower slope	PHZ	2/22/2007
MT8021_PHZ_0029_22Feb07.jpg	MT8021	S6	10952+71	-1153	12	N	View over bedrock exposure in Ta4	PHZ	2/22/2007
MT8021_PHZ_0030_22Feb07.jpg	MT8021	S6	10952+71	-1153	12	S	View over Ta4	PHZ	2/22/2007
MT8021_PHZ_0031_22Feb07.jpg	MT8021	S6	10952+71	-1153	12	S	Facing toward bedrock (Ta4) cliff	PHZ	2/22/2007
MT8022_PHZ_0032_22Feb07.jpg	MT8022	S6	10961+01	-756	12	S	Knob of heavily weathered bedrock (Ta4)	PHZ	2/22/2007
MT8022_PHZ_0033_22Feb07.jpg	MT8022	S6	10961+01	-756	12	N	Knob of heavily weathered bedrock (Ta4)	PHZ	2/22/2007
MT8023_PHZ_0034_22Feb07.jpg	MT8023	S6	10965+20	-634	12	W	View of channel	PHZ	2/22/2007
MT8024_PHZ_0035_23Feb07.jpg	MT8024	S6	11127+68	14	12	S	View across channel	PHZ	2/23/2007
MT8024_PHZ_0036_23Feb07.jpg	MT8024	S6	11127+68	14	12	W	View up channel incised into bedrock	PHZ	2/23/2007
MT8024_PHZ_0037_23Feb07.jpg	MT8024	S6	11127+68	14	12	NE	View down alluvial (Qay) surface	PHZ	2/23/2007
MT8025_PHZ_0038_23Feb07.jpg	MT8025	S6	11137+50	51	12	E	View across alluvial (Qay) surface	PHZ	2/23/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8025_PHZ_0039_23Feb07.jpg	MT8025	S6	11137+50	51	12	W	Looking up steep slope towards bedrock cliff and potential rock-fall hazard	PHZ	2/23/2007
MT8026_PHZ_0040_23Feb07.jpg	MT8026	S6	11144+18	194	12		Close-up of rock outcrop (lithified lahar deposit)	PHZ	2/23/2007
MT8027_PHZ_0041_23Feb07.jpg	MT8027	S6	11146+98	-161	12	S	Channel on alluvial fan (Qay) surface	PHZ	2/23/2007
MT8028_PHZ_0042_23Feb07.jpg	MT8028	S6	11176+02	-71	12	N	View towards outcrop of gabbro (KJm) and slopes. Adjacent to KJm and Qay contact	PHZ	2/23/2007
MT8028_PHZ_0043_23Feb07.jpg	MT8028	S6	11176+02	-71	12	SE	View over alluvium (Qay)	PHZ	2/23/2007
MT8029_PHZ_0044_23Feb07.jpg	MT8029	S6	11180+05	-328	12	S	View of test hole in alluvium (Qay)	PHZ	2/23/2007
MT8030_PHZ_0045_23Feb07.jpg	MT8030	S6	11184+97	-443	12	N	View of fan apex	PHZ	2/23/2007
MT8030_PHZ_0046_23Feb07.jpg	MT8030	S6	11184+97	-443	12	S	Close-up of gabbro outcrop (KJm)	PHZ	2/23/2007
MT8031_PHZ_0047_23Feb07.jpg	MT8031	S6	11195+28	-124	12	S	View of test hole and rhyodacite tuff outcrop (Tt3)	PHZ	2/23/2007
MT8032_PHZ_0048_23Feb07.jpg	MT8032	S6	11212+22	-351	14	S	View of dike outcrop	PHZ	2/23/2007
MT8034_PHZ_0049_23Feb07.jpg	MT8034	S6	11231+99	-235	14	N	View of bedrock (Tt3) outcrop and fan surface	PHZ	2/23/2007
MT8034_PHZ_0050_23Feb07.jpg	MT8034	S6	11231+99	-235	14	S	View of fan surface	PHZ	2/23/2007
MT8035_PHZ_0051_23Feb07.jpg	MT8035	S6	11245+75	-543	14	S	View of channel wall - channel incised into bedrock (Tt3)	PHZ	2/23/2007
MT8035_PHZ_0052_23Feb07.jpg	MT8035	S6	11245+75	-543	14	E	View down channel (Qc)	PHZ	2/23/2007
MT8035_PHZ_0053_23Feb07.jpg	MT8035	S6	11245+75	-543	14	N	Looking over channel (Qc) and across fan surface	PHZ	2/23/2007
MT8039_PHZ_0058_24Feb07.jpg	MT8039	S6	11274+65	-882	14	N	View of test hole and alluvial (Qay) surface	PHZ	2/24/2007
MT8039_PHZ_0059_24Feb07.jpg	MT8039	S6	11274+65	-882	14	S	Along alignment over fan (Qay) surface	PHZ	2/24/2007
MT8040_PHZ_0060_24Feb07.jpg	MT8040	S6	11288+53	-252	14	E	View of prospect pit in vicinity of Camp Terrill	PHZ	2/24/2007
MT8040_PHZ_0061_24Feb07.jpg	MT8040	S6	11288+53	-252	14	E	View of prospect pit in vicinity of Camp Terrill	PHZ	2/24/2007
MT8040_PHZ_0062_24Feb07.jpg	MT8040	S6	11288+53	-252	14	S	Looking towards alluvial (Qay) surface and prospect hole	PHZ	2/24/2007
MT8041_PHZ_0063_24Feb07.jpg	MT8041	S6	11289+52	-326	14	NE	View down channel	PHZ	2/24/2007
MT8042_PHZ_0064_24Feb07.jpg	MT8042	S6	11302+53	-638	14	S	View of test hole and fan (Qay) surface	PHZ	2/24/2007
MT8042_PHZ_0065_24Feb07.jpg	MT8042	S6	11302+53	-638	14	W	View up channel and bars	PHZ	2/24/2007
MT8042_PHZ_0066_24Feb07.jpg	MT8042	S6	11302+53	-638	14	N	View across fan surface (Qay)	PHZ	2/24/2007
MT8043_PHZ_0067_24Feb07.jpg	MT8043	S6	11315+23	-411	14	NW	View of channel network	PHZ	2/24/2007
MT8044_PHZ_0068_24Feb07.jpg	MT8044	S6	11322+77	-491	14		Close-up of test hole and older fan surface (Qao)	PHZ	2/24/2007
MT8044_PHZ_0069_24Feb07.jpg	MT8044	S6	11322+77	-491	14	N	View across older alluvium (Qao) dissected by younger channels	PHZ	2/24/2007
MT8045_PHZ_0070_24Feb07.jpg	MT8045	S6	11336+92	-296	14	N	Test pit and fan surface (Qao)	PHZ	2/24/2007
MT8046_PHZ_0071_24Feb07.jpg	MT8046	S6	11340+50	-214	14	NE	View down channel	PHZ	2/24/2007
MT8047_PHZ_0072_24Feb07.jpg	MT8047	S6	11349+66	193	14		View of fan surface (Qao) and desert pavement	PHZ	2/24/2007
MT8048_PHZ_0073_24Feb07.jpg	MT8048	S6	11357+53	211	15		View down channel	PHZ	2/24/2007
MT8048_PHZ_0074_24Feb07.jpg	MT8048	S6	11357+53	211	15		Linear northwest-trending feature that appears control channelization locally	PHZ	2/24/2007
MT8049_PHZ_0075_24Feb07.jpg	MT8049	S6	11378+86	42	15		View down channel	PHZ	2/24/2007
MT8049_PHZ_0076_24Feb07.jpg	MT8049	S6	11378+86	42	15		Close-up of cut bank along channel exposing earlier channel deposits	PHZ	2/24/2007
MT8051_PHZ_0077_24Feb07.jpg	MT8051	S6	11403+94	-95	15	NE	View down alluvial (Qao) surface	PHZ	2/24/2007
MT8051_PHZ_0078_24Feb07.jpg	MT8051	S6	11403+94	-95	15	S	View across weathered, rhyolitic tuff bedrock (Tt3) buried by alluvium (Qao)	PHZ	2/24/2007
MT8052_PHZ_0079_24Feb07.jpg	MT8052	S6	11425+68	-1	15		View of test hole in grus-covered bedrock (Tt3)	PHZ	2/24/2007
MT8052_PHZ_0080_24Feb07.jpg	MT8052	S6	11425+68	-1	15	N	View across rhyolitic tuff (Tt3) hills	PHZ	2/24/2007
MT8052_PHZ_0081_24Feb07.jpg	MT8052	S6	11425+68	-1	15	S	View across rhyolitic tuff (Tt3) hills	PHZ	2/24/2007
MT8053_PHZ_0082_24Feb07.jpg	MT8053	S6	11444+07	-113	15	E	View of test hole in erosional gully between weathered tuff (Tt3) hills.	PHZ	2/24/2007
MT8053_PHZ_0083_24Feb07.jpg	MT8053	S6	11444+07	-113	15	S	View towards tuff (Tt3) hills	PHZ	2/24/2007
MT8054_PHZ_0084_24Feb07.jpg	MT8054	S6	11456+60	-158	15	E	Close-up of rhyodacite outcrop (Tt3)	PHZ	2/24/2007
MT8054_PHZ_0085_24Feb07.jpg	MT8054	S6	11456+60	-158	15		View of rhyodacite (Tt3) hill to north of waypoint	PHZ	2/24/2007
MT8055_PHZ_0086_24Feb07.jpg	MT8055	S6	11464+32	-46	15	N	View of bedrock (Tt3) and alluvium (Qay) between hills	PHZ	2/24/2007
MT8055_PHZ_0087_24Feb07.jpg	MT8055	S6	11464+32	-46	15	S	Older alluvium (Qao) overlying bedrock (Tt3)	PHZ	2/24/2007
MT8057_PHZ_0088_24Feb07.jpg	MT8057	S6	11477+23	-53	15	N	View of rhyolitic bedrock (Tt3)	PHZ	2/24/2007
MT8057_PHZ_0089_24Feb07.jpg	MT8057	S6	11477+23	-53	15	S	Looking over alluvium (Qay)	PHZ	2/24/2007
MT8058_PHZ_0090_24Feb07.jpg	MT8058	S6	11491+18	-61	15	E	View of test hole in younger alluvium (Qay)	PHZ	2/24/2007
MT8058_PHZ_0091_24Feb07.jpg	MT8058	S6	11491+18	-61	15	N	Looking over younger fan surface (Qay) and fence	PHZ	2/24/2007
MT8058_PHZ_0092_24Feb07.jpg	MT8058	S6	11491+18	-61	15	S	View of younger fan surface (Qay)	PHZ	2/24/2007
MT8059_PHZ_0093_24Feb07.jpg	MT8059	S6	11517+34	123	15		View of test hole in younger alluvium (Qay)	PHZ	2/24/2007
MT8059_PHZ_0094_24Feb07.jpg	MT8059	S6	11517+34	123	15	N	View along alignment and over alluvial surface (Qay)	PHZ	2/24/2007
MT8059_PHZ_0095_24Feb07.jpg	MT8059	S6	11517+34	123	15	S	View along alignment over alluvial (Qay) surface)	PHZ	2/24/2007
MT8060_PHZ_0096_24Feb07.jpg	MT8060	S6	11553+61	4	16		View of test hole in alluvium (Qay)	PHZ	2/24/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8060_PHZ_0097_24Feb07.jpg	MT8060	S6	11553+61	4	16	N	View over younger fan surface (Qay)	PHZ	2/24/2007
MT8061_PHZ_0098_25Feb07.jpg	MT8061	S4	11019+96	105	6		View of test hole in remnant alluvial fan surface (QTg)	PHZ	2/25/2007
MT8061_PHZ_0099_25Feb07.jpg	MT8061	S4	11019+96	105	6	S	Looking across remnant alluvial fan (Qtg) surface thinly veneered by eolian sand	PHZ	2/25/2007
MT8062_PHZ_0100_25Feb07.jpg	MT8062	S4	11033+61	-11	6		View of test hole in remnant alluvial fan (QTg)	PHZ	2/25/2007
MT8063_PHZ_0101_25Feb07.jpg	MT8063	S4	11040+70	100	6	SE	View of channel	PHZ	2/25/2007
MT8064_PHZ_0102_25Feb07.jpg	MT8064	S4	11045+31	132	6	S	View of test hole in remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8066_PHZ_0103_25Feb07.jpg	MT8066	S4	11052+61	61	6		View up channel incised into younger alluvium (Qay)	PHZ	2/25/2007
MT8066_PHZ_0104_25Feb07.jpg	MT8066	S4	11052+61	61	6	S	View of cutbank exposing alluvium (Qay) to the south	PHZ	2/25/2007
MT8068_PHZ_0105_25Feb07.jpg	MT8068	S5	11258+74	-3	6		View of test hole in remnant alluvial fan (QTg) buried partially by eolian sand	PHZ	2/25/2007
MT8068_PHZ_0106_25Feb07.jpg	MT8068	S5	11258+74	-3	6	S	View over remnant alluvial fan (QTg) surface veneered by eolian sand	PHZ	2/25/2007
MT8069_PHZ_0107_25Feb07.jpg	MT8069	S4	11072+25	5	6	S	View across eroded remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8069_PHZ_0108_25Feb07.jpg	MT8069	S4	11072+25	5	6	NE	Looking towards gulley wall and exposure of remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8069_PHZ_0109_25Feb07.jpg	MT8069	S4	11072+25	5	6	W	View over incised remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8070_PHZ_0110_25Feb07.jpg	MT8070	S5	11272+33	-191	6		View of incised remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8071_PHZ_0111_25Feb07.jpg	MT8071	S4	11096+76	83	6		View of test hole in younger alluvium (Qay)	PHZ	2/25/2007
MT8071_PHZ_0112_25Feb07.jpg	MT8071	S4	11096+76	83	6	N	View across younger alluvium (Qay)	PHZ	2/25/2007
MT8072_PHZ_0113_25Feb07.jpg	MT8072	S5	11302+40	-234	6	E	View of test hole in remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8072_PHZ_0114_25Feb07.jpg	MT8072	S5	11302+40	-234	6	S	View down channel	PHZ	2/25/2007
MT8073_PHZ_0115_25Feb07.jpg	MT8073	S5	11318+10	606	6	E	View of rock outcrop (Tt3)	PHZ	2/25/2007
MT8073_PHZ_0116_25Feb07.jpg	MT8073	S5	11318+10	606	6		View up channel towards alignment	PHZ	2/25/2007
MT8073_PHZ_0117_25Feb07.jpg	MT8073	S5	11318+10	606	6		View down channel towards exposure of remnant alluvial fan deposits (QTg) in channel wall	PHZ	2/25/2007
MT8074_PHZ_0118_25Feb07.jpg	MT8074	S5	11319+24	161	6		Contact of bedrock (Tt3) and remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8075_PHZ_0119_25Feb07.jpg	MT8075	S5	11334+12	-99	6	N	Looking across rhyolitic tuff hills (Tt3)	PHZ	2/25/2007
MT8075_PHZ_0120_25Feb07.jpg	MT8075	S5	11334+12	-99	6	E	View across bedrock Tt3 and remnant alluvial fan (QTg)	PHZ	2/25/2007
MT8076_PHZ_0121_25Feb07.jpg	MT8076	S5	11338+07	-48	6		View of cutbank along channeland exposure of remnant alluvial fan deposits (QTg)	PHZ	2/25/2007
MT8077_PHZ_0122_25Feb07.jpg	MT8077	S4	11146+43	0	6	NE	View along contact of remnant alluvial fan (QTg) and bedrock (Tt3)	PHZ	2/25/2007
MT8078_PHZ_0123_25Feb07.jpg	MT8078	S5	11349+65	-65	16		View of tuff (Tt3) and varnished alluvial cover	PHZ	2/25/2007
MT8079_PHZ_0124_25Feb07.jpg	MT8079	S4	11162+56	121	16		View of a small pit	PHZ	2/25/2007
MT8079_PHZ_0125_25Feb07.jpg	MT8079	S4	11162+56	121	16		Close-up of chert	PHZ	2/25/2007
MT8081_PHZ_0126_25Feb07.jpg	MT8081	S5	11363+32	-26	16		View of test hole in younger alluvium (Qay)	PHZ	2/25/2007
MT8081_PHZ_0127_25Feb07.jpg	MT8081	S5	11363+32	-26	16	S	View down channel	PHZ	2/25/2007
MT8084_PHZ_0128_25Feb07.jpg	MT8084	S5	11374+98	-33	16	S	View across older alluvium (Qao) surface	PHZ	2/25/2007
MT8084_PHZ_0129_25Feb07.jpg	MT8084	S5	11374+98	-33	16	E	View across older alluvium (Qao) surface	PHZ	2/25/2007
MT8085_PHZ_0130_25Feb07.jpg	MT8085	S5	11385+89	-10	16		View down channel, older alluvium (Qao) and channel (Qc) contact	PHZ	2/25/2007
MT8087_PHZ_0131_26Feb07.jpg	MT8087	S4	10856+30	-16	13	E	View of test hole in remnant alluvial fan deposits (QTg) veneered by eolian sand	PHZ	2/26/2007
MT8087_PHZ_0132_26Feb07.jpg	MT8087	S4	10856+30	-16	13	N	View across remnant alluvial fan (Qtg) surface	PHZ	2/26/2007
MT8088_PHZ_0133_26Feb07.jpg	MT8088	S4	10864+03	-2	13	W	View of test hole in eolian sand over remnant alluvial fan (QTg)	PHZ	2/26/2007
MT8088_PHZ_0134_26Feb07.jpg	MT8088	S4	10864+03	-2	13	N	View over eolian sand (Qe)	PHZ	2/26/2007
MT8089_PHZ_0135_26Feb07.jpg	MT8089	S4	10876+89	127	13	SE	View of test hole and remnant alluvial fan (Qtg) surface	PHZ	2/26/2007
MT8090_PHZ_0136_26Feb07.jpg	MT8090	S4	10886+69	152	13	SE	View over small playa surface (Qp)	PHZ	2/26/2007
MT8092_PHZ_0137_26Feb07.jpg	MT8092	S4	10905+00	-63	13	N	View of test hole in remnant alluvial fan deposit (QTg) covered by veneer of eolian sand	PHZ	2/26/2007
MT8092_PHZ_0138_26Feb07.jpg	MT8092	S4	10905+00	-63	13	S	View over remnant alluvial fan (QTg) veneered by eolian sand. View of road	PHZ	2/26/2007
MT8093_PHZ_0139_26Feb07.jpg	MT8093	S4	10916+43	-9	13	N	View over rills	PHZ	2/26/2007
MT8094_PHZ_0140_26Feb07.jpg	MT8094	S4	10931+48	84	13	W	View of test hole in eolian sand over remnant alluvial fan deposits (QTg)	PHZ	2/26/2007
MT8094_PHZ_0141_26Feb07.jpg	MT8094	S4	10931+48	84	13	N	View along dune	PHZ	2/26/2007
MT8094_PHZ_0142_26Feb07.jpg	MT8094	S4	10931+48	84	13	S	View over dune field	PHZ	2/26/2007
MT8096_PHZ_0143_26Feb07.jpg	MT8096	S4	10958+51	44	13	E	View of test hole in eolian sand	PHZ	2/26/2007
MT8096_PHZ_0144_26Feb07.jpg	MT8096	S4	10958+51	44	13	SW	View over dunes	PHZ	2/26/2007
MT8097_PHZ_0145_26Feb07.jpg	MT8097	S4	10963+90	74	6		View of remnant alluvial fan (QTg) exposed between dunes of eolian sand (Qe)	PHZ	2/26/2007
MT8098_PHZ_0146_26Feb07.jpg	MT8098	S4	10987+72	-233	6	S	View over eolian sand (Qe)	PHZ	2/26/2007
MT8099_PHZ_0147_26Feb07.jpg	MT8099	S5	11213+80	-68	6	N	View over eolian sand (Qe)	PHZ	2/26/2007
MT8099_PHZ_0148_26Feb07.jpg	MT8099	S5	11213+80	-68	6	S	View over remnant alluvial fan (QTg) surface	PHZ	2/26/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8100_PHZ_0149_26Feb07.jpg	MT8100	S5	11195+05	48	6		View of test hole in colian sand (Qc)	PHZ	2/26/2007
MT8101_PHZ_0150_26Feb07.jpg	MT8101	S5	11184+70	-14	6	N	View of test hole in channel wall	PHZ	2/26/2007
MT8101_PHZ_0151_26Feb07.jpg	MT8101	S5	11184+70	-14	6	NE	View up channel	PHZ	2/26/2007
MT8102_PHZ_0152_26Feb07.jpg	MT8102	S5	11182+23	-8	6	N	View over remnant alluvial fan (QTg)	PHZ	2/26/2007
MT8103_PHZ_0153_26Feb07.jpg	MT8103	S5	11147+06	50	13	NW	View over remnant alluvial fan (QTg) and colian sand (Qc)	PHZ	2/26/2007
MT8104_PHZ_0154_26Feb07.jpg	MT8104	S5	11139+29	-33	13	N	Looking at remnant alluvial fan (QTg) exposure in channel	PHZ	2/26/2007
MT8104_PHZ_0155_26Feb07.jpg	MT8104	S5	11139+29	-33	13	W	View down channel	PHZ	2/26/2007
MT8106_PHZ_0156_26Feb07.jpg	MT8106	S5	11114+97	-18	13	N	View across alluvium (Qay)	PHZ	2/26/2007
MT8106_PHZ_0157_26Feb07.jpg	MT8106	S5	11114+97	-18	13	E	Looking up debris-flow filled channel	PHZ	2/26/2007
MT8108_PHZ_0158_26Feb07.jpg	MT8108	S5	11102+00	57	13		Looking up debris-flow deposit	PHZ	2/26/2007
MT8109_PHZ_0159_26Feb07.jpg	MT8109	S5	11090+33	-17	13		View of test hole in younger alluvium (Qay)	PHZ	2/26/2007
MT8109_PHZ_0160_26Feb07.jpg	MT8109	S5	11090+33	-17	13	S	View over fan surface (Qay)	PHZ	2/26/2007
MT8110_PHZ_0161_26Feb07.jpg	MT8110	S5	11078+05	23	13	NE	View of test hole in younger fan deposits (Qay)	PHZ	2/26/2007
MT8110_PHZ_0162_26Feb07.jpg	MT8110	S5	11078+05	23	13	S	View over younger fan (Qay) surface	PHZ	2/26/2007
MT8111_PHZ_0163_26Feb07.jpg	MT8111	S5	11069+17	49	13		Close-up of alluvium (Qay) exposed in channel wall	PHZ	2/26/2007
MT8111_PHZ_0164_26Feb07.jpg	MT8111	S5	11069+17	49	13	NE	View up channel	PHZ	2/26/2007
MT8113_PHZ_0165_26Feb07.jpg	MT8113	S5	11045+72	54	13		View over remnant alluvial fan (QTg) surface	PHZ	2/26/2007
MT8114_PHZ_0166_26Feb07.jpg	MT8114	S5	11024+56	-7	13		View of test hole and CaCO3 accumulation on underside of rock	PHZ	2/26/2007
MT8114_PHZ_0167_26Feb07.jpg	MT8114	S5	11024+56	-7	13	S	View of erosional gulley	PHZ	2/26/2007
MT8115_PHZ_0168_26Feb07.jpg	MT8115	S5	11019+10	-4	13	E	View of test hole in older alluvium (Qao)	PHZ	2/26/2007
MT8115_PHZ_0169_26Feb07.jpg	MT8115	S5	11019+10	-4	13	N	View over older alluvium (Qao) towards remnant alluvial fan (QTg) hills	PHZ	2/26/2007
MT8117_PHZ_0170_26Feb07.jpg	MT8117	S5	11005+36	23	13	NW	View along alignment	PHZ	2/26/2007
MT8117_PHZ_0171_26Feb07.jpg	MT8117	S5	11005+36	23	13	SE	View along alignment	PHZ	2/26/2007
MT8118_PHZ_0172_26Feb07.jpg	MT8118	S5	10989+58	-35	13		View of test hole in older alluvium (Qao)	PHZ	2/26/2007
MT8118_PHZ_0173_26Feb07.jpg	MT8118	S5	10989+58	-35	13	NW	View over older alluvium (Qao) toward US Highway 95	PHZ	2/26/2007
MT8119_PHZ_0174_27Feb07.jpg	MT8119	S4	10849+39	338	13	S	View of test hole in colian sand over remnant alluvial fan (QTg)	PHZ	2/27/2007
MT8119_PHZ_0175_27Feb07.jpg	MT8119	S4	10849+39	338	13	N	View over remnant alluvial fan (QTg), light snow cover	PHZ	2/27/2007
MT8120_PHZ_0176_27Feb07.jpg	MT8120	S4	10838+96	463	13	S	View of test hole	PHZ	2/27/2007
MT8120_PHZ_0177_27Feb07.jpg	MT8120	S4	10838+96	463	13	E	View over remnant alluvial fan (QTg) hillsides	PHZ	2/27/2007
MT8121_PHZ_0178_27Feb07.jpg	MT8121	S4	10837+44	386	13	W	View of bedrock outcrop (Ta4)	PHZ	2/27/2007
MT8122_PHZ_0179_27Feb07.jpg	MT8122	S4	10835+98	52	13		View of test hole in alluvium (Qay)	PHZ	2/27/2007
MT8122_PHZ_0180_27Feb07.jpg	MT8122	S4	10835+98	52	13	W	View along contact of alluvium (Qay) and bedrock (Ta4)	PHZ	2/27/2007
MT8123_PHZ_0181_27Feb07.jpg	MT8123	S4	10834+71	-235	13		Test hole and view of alluvial surface (Qay)	PHZ	2/27/2007
MT8124_PHZ_0182_27Feb07.jpg	MT8124	S4	10827+48	-137	13	W	Looking down channel incised into alluvium (Qay)	PHZ	2/27/2007
MT8124_PHZ_0183_27Feb07.jpg	MT8124	S4	10827+48	-137	13		View of quarried area	PHZ	2/27/2007
MT8124_PHZ_0184_27Feb07.jpg	MT8124	S4	10827+48	-137	13		View of cut slope along road/channel	PHZ	2/27/2007
MT8125_PHZ_0185_27Feb07.jpg	MT8125	S4	10828+86	-644	13	E	View over remnant alluvial fan (QTg) surface	PHZ	2/27/2007
MT8125_PHZ_0186_27Feb07.jpg	MT8125	S4	10828+86	-644	13	W	View towards bedrock (Ta4) and alluvium (Qay)	PHZ	2/27/2007
MT8126_PHZ_0187_27Feb07.jpg	MT8126	S4	10823+29	-561	13	E	View of sheared bedron (Ta4)	PHZ	2/27/2007
MT8127_PHZ_0188_27Feb07.jpg	MT8127	S4	10812+88	-293	13		View of test holein remnant alluvial fan deposits (QTg)	PHZ	2/27/2007
MT8127_PHZ_0189_27Feb07.jpg	MT8127	S4	10812+88	-293	13	E	View towards Long Valley	PHZ	2/27/2007
MT8127_PHZ_0190_27Feb07.jpg	MT8127	S4	10812+88	-293	13	W	View towards Walker River	PHZ	2/27/2007
MT8127_PHZ_0191_27Feb07.jpg	MT8127	S4	10812+88	-293	13	W	View over remnant alluvial fan (QTg) slope	PHZ	2/27/2007
MT8128_PHZ_0192_27Feb07.jpg	MT8128	S4	10805+49	632	13	E	View from south side of alluvium (Qay) and alignment	PHZ	2/27/2007
MT8129_PHZ_0193_27Feb07.jpg	MT8129	S4	10807+18	-412	13	SW	View of volcanic ash deposits	PHZ	2/27/2007
MT8130_PHZ_0194_27Feb07.jpg	MT8130	S4	10800+22	-108	13	N	View up channel	PHZ	2/27/2007
MT8131_PHZ_0195_27Feb07.jpg	MT8131	S4	10772+41	0	13		View of test pit in alluvium (Qay)	PHZ	2/27/2007
MT8131_PHZ_0196_27Feb07.jpg	MT8131	S4	10772+41	0	13	W	View over alluvium (Qay)	PHZ	2/27/2007
MT8133_PHZ_0197_27Feb07.jpg	MT8133	S4	10616+93	-10	4		View of test hole in basin fill deposits (Qbf)	PHZ	2/27/2007
MT8133_PHZ_0198_27Feb07.jpg	MT8133	S4	10616+93	-10	4	E	View over basin fill (Qbf) surface	PHZ	2/27/2007
MT8134_PHZ_0199_27Feb07.jpg	MT8134	S4	10680+13	630	4		View of test hole	PHZ	2/27/2007
MT8134_PHZ_0200_27Feb07.jpg	MT8134	S4	10680+13	630	4	E	View over Tertiary sedimentary rock (Tsy) surface veneered by alluvium (Qay)	PHZ	2/27/2007
MT8135_PHZ_0201_27Feb07.jpg	MT8135	S4	10683+34	2	4	E	View of test hole	PHZ	2/27/2007
MT8136_PHZ_0202_27Feb07.jpg	MT8136	S4	10689+14	-1019	4		View of test hole	PHZ	2/27/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8136_PHZ_0203_27Feb07.jpg	MT8136	S4	10689+14	-1019	4	S	View over Qao contact with Qay	PHZ	2/27/2007
MT8137_PHZ_0204_27Feb07.jpg	MT8137	S4	10724+10	-679	4		View of test hole	PHZ	2/27/2007
MT8137_PHZ_0205_27Feb07.jpg	MT8137	S4	10724+10	-679	4	NW	View over Qao	PHZ	2/27/2007
MT8147_PHZ_0223_01Mar07.jpg	MT8147	S6	11813+96	-28	17	W	Channel wall with exposed basin fill (Qbf) deposits	PHZ	3/1/2007
MT8147_PHZ_0224_01Mar07.jpg	MT8147	S6	11813+96	-28	17	N	View down channel showing exposed basin fill (Qbf)	PHZ	3/1/2007
MT8148_PHZ_0225_01Mar07.jpg	MT8148	S6	11787+15	-126	17		Test hole in eolian sand (Qe over basin fill deposits (Qbf)	PHZ	3/1/2007
MT8148_PHZ_0226_01Mar07.jpg	MT8148	S6	11787+15	-126	17	SW	View over eolian sand (Qe) over basin fill (Qbf)	PHZ	3/1/2007
MT8148_PHZ_0227_01Mar07.jpg	MT8148	S6	11787+15	-126	17	NE	View along alignment	PHZ	3/1/2007
MT8149_PHZ_0228_01Mar07.jpg	MT8149	S6	11762+01	-41	17	N	View over dune field	PHZ	3/1/2007
MT8149_PHZ_0229_01Mar07.jpg	MT8149	S6	11762+01	-41	17	W	View over dunes towards playa	PHZ	3/1/2007
MT8149_PHZ_0230_01Mar07.jpg	MT8149	S6	11762+01	-41	17	SW	View along alignment	PHZ	3/1/2007
MT8150_PHZ_0231_01Mar07.jpg	MT8150	S6	11745+70	49	17	N	Test hole in eolian sand (Qe) over basin fill (Qbf)	PHZ	3/1/2007
MT8150_PHZ_0232_01Mar07.jpg	MT8150	S6	11745+70	49	17	N	View over eolian sand (Qe) surface towards dune	PHZ	3/1/2007
MT8151_PHZ_0233_01Mar07.jpg	MT8151	S6	11721+41	-483	17		Test hole in older alluvium (Qao) exposed between dunes	PHZ	3/1/2007
MT8151_PHZ_0234_01Mar07.jpg	MT8151	S6	11721+41	-483	17	NE	View over older alluvium (Qao) towards dunes	PHZ	3/1/2007
MT8152_PHZ_0235_01Mar07.jpg	MT8152	S6	11711+88	-447	16	NW	View over older alluvium (Qao) towards dunes	PHZ	3/1/2007
MT8152_PHZ_0236_01Mar07.jpg	MT8152	S6	11711+88	-447	16	SW	View over older alluvium (Qao) towards dune	PHZ	3/1/2007
MT8153_PHZ_0237_01Mar07.jpg	MT8153	S6	11856+96	-84	17		Test hole in basin fill (Qbf)	PHZ	3/1/2007
MT8153_PHZ_0238_01Mar07.jpg	MT8153	S6	11856+96	-84	17	W	View over basin fill (Qbf)	PHZ	3/1/2007
MT8153_PHZ_0239_01Mar07.jpg	MT8153	S6	11856+96	-84	17	SE	View up channel	PHZ	3/1/2007
MT8153_PHZ_0240_01Mar07.jpg	MT8153	S6	11856+96	-84	17	E	View along railroad grade showing fill in foreground	PHZ	3/1/2007
MT8154_PHZ_0241_01Mar07.jpg	MT8154	S6	11842+32	-173	17	N	Test hole in basin fill	PHZ	3/1/2007
MT8154_PHZ_0242_01Mar07.jpg	MT8154	S6	11842+32	-173	17	W	View over basin fil (Qbf)	PHZ	3/1/2007
MT8154_PHZ_0243_01Mar07.jpg	MT8154	S6	11842+32	-173	17	E	View over basin fill surface (Qbf)	PHZ	3/1/2007
MT8155_PHZ_0244_01Mar07.jpg	MT8155	S4	11705+71	93	17		Channel wall with exposed basin fill deposits (Qbf)	PHZ	3/1/2007
MT8155_PHZ_0245_01Mar07.jpg	MT8155	S4	11705+71	93	17	S	View up channel	PHZ	3/1/2007
MT8155_PHZ_0246_01Mar07.jpg	MT8155	S4	11705+71	93	17	E	View over basin fill (Qbf)	PHZ	3/1/2007
MT8156_PHZ_0247_01Mar07.jpg	MT8156	S6	11909+43	-24	17		Test hole in surface of old railroad grade fill	PHZ	3/1/2007
MT8156_PHZ_0248_01Mar07.jpg	MT8156	S6	11909+43	-24	17	W	View over old railroad grade	PHZ	3/1/2007
MT8157_PHZ_0249_01Mar07.jpg	MT8157	S6	11900+16	-34	17	S	View up channel	PHZ	3/1/2007
MT8157_PHZ_0250_01Mar07.jpg	MT8157	S6	11900+16	-34	17	E	View over old railroad grade and basin fill	PHZ	3/1/2007
MT8158_PHZ_0251_01Mar07.jpg	MT8158	S6	11953+23	-69	8		Test hole in basin fill deposits (Qbf)	PHZ	3/1/2007
MT8158_PHZ_0252_01Mar07.jpg	MT8158	S6	11953+23	-69	8	E	View over basin fill (Qbf)	PHZ	3/1/2007
MT8158_PHZ_0253_01Mar07.jpg	MT8158	S6	11953+23	-69	8	NW	View of channel and eroded railroad grade	PHZ	3/1/2007
MT8159_PHZ_0254_01Mar07.jpg	MT8159	S4	11806+69	16	8		Test hole in basin fill (Qbf)	PHZ	3/1/2007
MT8159_PHZ_0255_01Mar07.jpg	MT8159	S4	11806+69	16	8	E	View over basin fill (Qbf)	PHZ	3/1/2007
MT8159_PHZ_0256_01Mar07.jpg	MT8159	S4	11806+69	16	8	W	View over basin fill (Qbf)	PHZ	3/1/2007
MT8160_PHZ_0257_01Mar07.jpg	MT8160	S4	11824+90	50	8	W	View over basin fill surface (Qbf)	PHZ	3/1/2007
MT8160_PHZ_0258_01Mar07.jpg	MT8160	S4	11824+90	50	8	E	View over basin fill surface (Qbf)	PHZ	3/1/2007
MT8161_PHZ_0259_02Mar07.jpg	MT8161	S5	11526+88	-73	16	N	View of road cut and exposure of remnant alluvial fan (QTg)	PHZ	3/2/2007
MT8161_PHZ_0260_02Mar07.jpg	MT8161	S5	11526+88	-73	16	W	View over remnant alluvial fan (QTg) surface	PHZ	3/2/2007
MT8162_PHZ_0261_02Mar07.jpg	MT8162	S4	11316+55	68	16		Test hole in remnant alluvial fan surface (QTg)	PHZ	3/2/2007
MT8162_PHZ_0262_02Mar07.jpg	MT8162	S4	11316+55	68	16	W	View over remnant alluvial fan (QTg) ridges	PHZ	3/2/2007
MT8163_PHZ_0263_02Mar07.jpg	MT8163	S4	11308+16	126	16		View up channel between erosional remnants of fan (QTg)	PHZ	3/2/2007
MT8164_PHZ_0264_02Mar07.jpg	MT8164	S4	11289+42	392	16	E	View over remnant alluvial fan surface (QTg)	PHZ	3/2/2007
MT8164_PHZ_0265_02Mar07.jpg	MT8164	S4	11289+42	392	16		Closeup of desert pavement on remnant alluvial fan surface (QTg)	PHZ	3/2/2007
MT8164_PHZ_0266_02Mar07.jpg	MT8164	S4	11289+42	392	16	W	View over channel	PHZ	3/2/2007
MT8165_PHZ_0267_02Mar07.jpg	MT8165	S4	11273+70	230	16		View of remnant alluvial fan deposits (QTg) in channel cut exposure	PHZ	3/2/2007
MT8165_PHZ_0268_02Mar07.jpg	MT8165	S4	11273+70	230	16		View of remnant alluvial fan (QTg) deposits in channel cut exposure	PHZ	3/2/2007
MT8165_PHZ_0269_02Mar07.jpg	MT8165	S4	11273+70	230	16		View up channel	PHZ	3/2/2007
MT8166_PHZ_0270_02Mar07.jpg	MT8166	S4	11268+95	186	16		Test hole in older alluvium (Qao)	PHZ	3/2/2007
MT8166_PHZ_0271_02Mar07.jpg	MT8166	S4	11268+95	186	16	E	View over older alluvium (Qao)	PHZ	3/2/2007
MT8167_PHZ_0272_02Mar07.jpg	MT8167	S4	11253+56	26	16		View of stream cut exposing earlier channel deposits	PHZ	3/2/2007
MT8167_PHZ_0273_02Mar07.jpg	MT8167	S4	11253+56	26	16	N	View up channel	PHZ	3/2/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1,2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8168_PHZ_0274_02Mar07.jpg	MT8168	S4	11250+04	49	16	E	View over channel	PHZ	3/2/2007
MT8169_PHZ_0275_02Mar07.jpg	MT8169	S4	11232+48	234	16		Test hole in younger alluvial fan surface (Qay)	PHZ	3/2/2007
MT8169_PHZ_0276_02Mar07.jpg	MT8169	S4	11232+48	234	16	E	View over alluvium (Qay)	PHZ	3/2/2007
MT8170_PHZ_0277_02Mar07.jpg	MT8170	S4	11225+26	273	16	NE	View over Qay/Qc	PHZ	3/2/2007
MT8170_PHZ_0278_02Mar07.jpg	MT8170	S4	11225+26	273	16	W	View over older alluvial fan surface (Qao)	PHZ	3/2/2007
MT8171_PHZ_0279_02Mar07.jpg	MT8171	S5	11545+61	148	16		Test hole in younger alluvium (Qay)	PHZ	3/2/2007
MT8171_PHZ_0280_02Mar07.jpg	MT8171	S5	11545+61	148	16	SE	View over younger alluvium (Qay)	PHZ	3/2/2007
MT8172_PHZ_0281_02Mar07.jpg	MT8172	S5	11563+39	-48	16	S	View over dunes	PHZ	3/2/2007
MT8172_PHZ_0282_02Mar07.jpg	MT8172	S5	11563+39	-48	16	NE	View along alignment	PHZ	3/2/2007
MT8173_PHZ_0283_02Mar07.jpg	MT8173	S5	11582+53	-25	16	E	Test hole in younger alluvium (Qay)	PHZ	3/2/2007
MT8173_PHZ_0284_02Mar07.jpg	MT8173	S5	11582+53	-25	16	N	View over alluvium (Qay)	PHZ	3/2/2007
MT8175_PHZ_0285_02Mar07.jpg	MT8175	S5	11599+75	19	16		Test hole in older alluvium (Qao)	PHZ	3/2/2007
MT8175_PHZ_0286_02Mar07.jpg	MT8175	S5	11599+75	19	16	S	View overolder alluvium (Qao) patch towards dunes. Patch is approximately 300 ft. long along alignment.	PHZ	3/2/2007
MT8176_PHZ_0287_02Mar07.jpg	MT8176	S6	11638+03	-50	16	S	View to S from S side of eolian sand dune looking over patch of older alluvium (Qao) with overlapping dunes	PHZ	3/2/2007
MT8178_PHZ_0288_02Mar07.jpg	MT8178	S6	11596+86	-158	16		Test hole in surface of lacustrine strandline and view of rounded pebbles (in shovel)	PHZ	3/2/2007
MT8178_PHZ_0289_02Mar07.jpg	MT8178	S6	11596+86	-158	16	SE	View over lacustrine strandline (Ql)	PHZ	3/2/2007
MT8179_PHZ_0290_02Mar07.jpg	MT8179	S6	11562+83	151	16	N	View of exposure of carbonate-cemented beach sand in lacustrine strandline (Ql)	PHZ	3/2/2007
MT8179_PHZ_0291_02Mar07.jpg	MT8179	S6	11562+83	151	16		Exposure of lacustrine deposits in lacustrine strandline	PHZ	3/2/2007
MT8179_PHZ_0292_02Mar07.jpg	MT8179	S6	11562+83	151	16	N	View across channel at towards lacustrine (Ql) deposit	PHZ	3/2/2007
MT8180_PHZ_0293_02Mar07.jpg	MT8180	S5	11528+76	-298	16	E	View towards strandlines. Strandlines form dark, parallel lines below ridgeline	PHZ	3/2/2007
MT8181_PHZ_0294_03Mar07.jpg	MT8181	S5	10929+57	21	12		Test hole in older alluvium (Qao)	PHZ	3/3/2007
MT8181_PHZ_0295_03Mar07.jpg	MT8181	S5	10929+57	21	12	N	View towards channel wall and contact with older alluvium (Qao) over bedrock (Tt3)	PHZ	3/3/2007
MT8181_PHZ_0296_03Mar07.jpg	MT8181	S5	10929+57	21	12	S	View over bedrock (Tt3) and older alluvium (Qao)	PHZ	3/3/2007
MT8181_PHZ_0297_03Mar07.jpg	MT8181	S5	10929+57	21	12	N	Closeup of bedrock (Tt3) outcrop	PHZ	3/3/2007
MT8182_PHZ_0298_03Mar07.jpg	MT8182	S5	10937+34	-105	12	W	View up channel	PHZ	3/3/2007
MT8183_PHZ_0299_03Mar07.jpg	MT8183	S5	10944+54	36	12	S	View over bedrock (Tt3) ridge	PHZ	3/3/2007
MT8184_PHZ_0300_03Mar07.jpg	MT8184	S5	10961+22	606	12	NW	View of bedrock (Tt3) hill	PHZ	3/3/2007
MT8184_PHZ_0301_03Mar07.jpg	MT8184	S5	10961+22	606	12	SE	View of older alluvium (Qao) incised by channel	PHZ	3/3/2007
MT8185_PHZ_0302_03Mar07.jpg	MT8185	S5	10924+48	222	12	W	View towards mines possibly associated with Afterthought Prospects	PHZ	3/3/2007
MT8186_PHZ_0303_03Mar07.jpg	MT8186	S5	10905+02	83	12	NW	View over drill pad and well	PHZ	3/3/2007
MT8187_PHZ_0304_03Mar07.jpg	MT8187	S5	10899+38	249	12	SE	View over older alluvium (Qao)	PHZ	3/3/2007
MT8187_PHZ_0305_03Mar07.jpg	MT8187	S5	10899+38	249	12	NW	View of rhyolitic bedrock (Tt3) hill	PHZ	3/3/2007
MT8187_PHZ_0306_03Mar07.jpg	MT8187	S5	10899+38	249	12		Closeup of rhyolitic (Tt3) outcrop	PHZ	3/3/2007
MT8188_PHZ_0307_03Mar07.jpg	MT8188	S5	10891+69	214	12		View of younger alluvium (Qay) and bedrock knob	PHZ	3/3/2007
MT8189_PHZ_0308_03Mar07.jpg	MT8189	S5	10883+68	186	12		Test hole in older alluvium (Qao)	PHZ	3/3/2007
MT8189_PHZ_0309_03Mar07.jpg	MT8189	S5	10883+68	186	12	N	View over older alluvium (Qao)	PHZ	3/3/2007
MT8189_PHZ_0310_03Mar07.jpg	MT8189	S5	10883+68	186	12	S	View over older alluvium (Qao) towards bedock hills (Tt3)	PHZ	3/3/2007
MT8190_PHZ_0311_03Mar07.jpg	MT8190	S6	10927+48	150	12	E	Closeup of bedrock surface (Ta4)	PHZ	3/3/2007
MT8190_PHZ_0312_03Mar07.jpg	MT8190	S6	10927+48	150	12	N	View of channel incised into bedrock (Ta4)	PHZ	3/3/2007
MT8191_PHZ_0313_03Mar07.jpg	MT8191	S6	11029+56	-56	12	S	View over rhyodacite hills (Tt3)	PHZ	3/3/2007
MT8191_PHZ_0314_03Mar07.jpg	MT8191	S6	11029+56	-56	12	N	View over rhyolitic tuff hills (Tt3)	PHZ	3/3/2007
MT8191_PHZ_0315_03Mar07.jpg	MT8191	S6	11029+56	-56	12	N	Closeup of outcrop of rhyolitic tuff (Tt3)	PHZ	3/3/2007
MT8192_PHZ_0316_03Mar07.jpg	MT8192	S6	11023+80	-260	12	N	View over lacustrine deposits (Ql)	PHZ	3/3/2007
MT8192_PHZ_0317_03Mar07.jpg	MT8192	S6	11023+80	-260	12	N	View of younger alluvium (Qay) over lacustrine deposits (Ql) in channel wall	PHZ	3/3/2007
MT8193_PHZ_0318_03Mar07.jpg	MT8193	S6	11016+12	-83	12	NE	Closeup of rhyodacitic rock outcrop (Tt3)	PHZ	3/3/2007
MT8194_PHZ_0319_03Mar07.jpg	MT8194	S6	11007+47	-84	12	S	View over bedrock (Tt3) towards younger alluvial surface (Qay)	PHZ	3/3/2007
MT8194_PHZ_0320_03Mar07.jpg	MT8194	S6	11007+47	-84	12	N	View over bedrock (Tt3) slope	PHZ	3/3/2007
MT8195_PHZ_0321_03Mar07.jpg	MT8195	S6	10998+52	16	12		Test hole in older alluvium (Qao)	PHZ	3/3/2007
MT8195_PHZ_0322_03Mar07.jpg	MT8195	S6	10998+52	16	12	N	View over older alluvial surface (Qao)	PHZ	3/3/2007
MT8196_PHZ_0323_03Mar07.jpg	MT8196	S6	10996+76	-314	12	NE	View along flood control ditch	PHZ	3/3/2007
MT8196_PHZ_0324_03Mar07.jpg	MT8196	S6	10996+76	-314	12	SW	View along flood control ditch to culvert at US Highway 95	PHZ	3/3/2007
MT8197_PHZ_0325_04Mar07.jpg	MT8197	S6	10361+42	104	10	N	Closeup of bedrock (Ta4) outcrop	PHZ	3/4/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8197_PHZ_0326_04Mar07.jpg	MT8197	S6	10361+42	104	10	W	View along alignment and over younger alluvium (Qay)	PHZ	3/4/2007
MT8197_PHZ_0327_04Mar07.jpg	MT8197	S6	10361+42	104	10	E	View along alignment and boulder-strewn hillside of basaltic andesite (Ta4)	PHZ	3/4/2007
MT8198_PHZ_0328_04Mar07.jpg	MT8198	S6	10372+96	47	10		Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8198_PHZ_0329_04Mar07.jpg	MT8198	S6	10372+96	47	10		View of canyon incised into bedrock (Ta4)	PHZ	3/4/2007
MT8198_PHZ_0330_04Mar07.jpg	MT8198	S6	10372+96	47	10	E	View over younger alluvium (Qay) and bedrock (Ta4) incised by channel	PHZ	3/4/2007
MT8199_PHZ_0331_04Mar07.jpg	MT8199	S6	10382+64	-77	10	E	View over alignment	PHZ	3/4/2007
MT8200_PHZ_0332_04Mar07.jpg	MT8200	S6	10385+73	187	10	N	View up channel	PHZ	3/4/2007
MT8200_PHZ_0333_04Mar07.jpg	MT8200	S6	10385+73	187	10	N	View up channel incised into bedrock	PHZ	3/4/2007
MT8201_PHZ_0334_04Mar07.jpg	MT8201	S6	10397+21	116	10		Test hole in older alluvium (Qao)	PHZ	3/4/2007
MT8201_PHZ_0335_04Mar07.jpg	MT8201	S6	10397+21	116	10	E	View over older alluvial surface (Qao)	PHZ	3/4/2007
MT8201_PHZ_0336_04Mar07.jpg	MT8201	S6	10397+21	116	10	W	View over older alluvium (Qao) towards bedrock (Ta4) hill and channels	PHZ	3/4/2007
MT8202_PHZ_0337_04Mar07.jpg	MT8202	S6	10425+00	93	10	E	Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8202_PHZ_0338_04Mar07.jpg	MT8202	S6	10425+00	93	10	N	View up channel	PHZ	3/4/2007
MT8202_PHZ_0339_04Mar07.jpg	MT8202	S6	10425+00	93	10	E	View over younger alluvium (Qay) surface	PHZ	3/4/2007
MT8203_PHZ_0340_04Mar07.jpg	MT8203	S6	10439+69	150	10		Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8203_PHZ_0341_04Mar07.jpg	MT8203	S6	10439+69	150	10	E	View over younger alluvium (Qay)	PHZ	3/4/2007
MT8204_PHZ_0342_04Mar07.jpg	MT8204	S5	10335+77	-84	10	N	Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8204_PHZ_0343_04Mar07.jpg	MT8204	S5	10335+77	-84	10	E	View over younger alluvial surface (Qay)	PHZ	3/4/2007
MT8204_PHZ_0344_04Mar07.jpg	MT8204	S5	10335+77	-84	10	NW	View into channel and over boulders in younger alluvium (Qay)	PHZ	3/4/2007
MT8205_PHZ_0345_04Mar07.jpg	MT8205	S6	10318+35	45	10		Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8205_PHZ_0346_04Mar07.jpg	MT8205	S6	10318+35	45	10	W	View over alluvium (Qay)	PHZ	3/4/2007
MT8206_PHZ_0347_04Mar07.jpg	MT8206	S5	10305+71	-36	10		Closeup of basaltic andesite (Ta4) boulders	PHZ	3/4/2007
MT8206_PHZ_0348_04Mar07.jpg	MT8206	S5	10305+71	-36	10	W	View over bedrock (Ta4) slope	PHZ	3/4/2007
MT8207_PHZ_0349_04Mar07.jpg	MT8207	S6	10289+83	155	10	E	View over bedrock (Ta4)	PHZ	3/4/2007
MT8207_PHZ_0350_04Mar07.jpg	MT8207	S6	10289+83	155	10	W	View over channel and younger alluvium (Qay)	PHZ	3/4/2007
MT8208_PHZ_0351_04Mar07.jpg	MT8208	S5	10272+53	-219	10		Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8208_PHZ_0352_04Mar07.jpg	MT8208	S5	10272+53	-219	10	NW	View over channel	PHZ	3/4/2007
MT8208_PHZ_0353_04Mar07.jpg	MT8208	S5	10272+53	-219	10	E	View over younger alluvium (Qay)	PHZ	3/4/2007
MT8209_PHZ_0354_04Mar07.jpg	MT8209	S5	10257+18	83	10		Test hole in younger alluvium (Qay)	PHZ	3/4/2007
MT8209_PHZ_0355_04Mar07.jpg	MT8209	S5	10257+18	83	10	W	View over younger alluvium (Qay)	PHZ	3/4/2007
MT8210_PHZ_0356_04Mar07.jpg	MT8210	S5	10199+76	122	10		Test hole in surface of Tertiary sedimentary rocks (Tsy) veneered by older alluvium.	PHZ	3/4/2007
MT8210_PHZ_0357_04Mar07.jpg	MT8210	S5	10199+76	122	10	E	View over Tertiary sedimentary rock bench (Tsy) veneered by older alluvium	PHZ	3/4/2007
MT8210_PHZ_0358_04Mar07.jpg	MT8210	S5	10199+76	122	10	W	View over Tertiary sedimentary rock bench (Tsy) veneered by older alluvium	PHZ	3/4/2007
MT8211_PHZ_0359_04Mar07.jpg	MT8211	S5	10189+70	94	10	E	View across channel incised into Tertiary sedimentary rocks (Tsy)	PHZ	3/4/2007
MT8211_PHZ_0360_04Mar07.jpg	MT8211	S5	10189+70	94	10		Closeup of Tertiary sedimentary rock (Tsy) outcrop (sandstone)	PHZ	3/4/2007
MT8212_PHZ_0361_05Mar07.jpg	MT8212	S6	10615+87	-73	11		Test hole in colluvial cover cover that buries Ta4	PHZ	3/5/2007
MT8212_PHZ_0362_05Mar07.jpg	MT8212	S6	10615+87	-73	11	E	View over colluvial cover (Qc dune at left)	PHZ	3/5/2007
MT8212_PHZ_0363_05Mar07.jpg	MT8212	S6	10615+87	-73	11	W	View over colluvial cover and bedrock knob (Ta4)	PHZ	3/5/2007
MT8213_PHZ_0364_05Mar07.jpg	MT8213	S6	10610+09	-536	11		Closeup of bedrock (Ta4) outcrop	PHZ	3/5/2007
MT8213_PHZ_0365_05Mar07.jpg	MT8213	S6	10610+09	-536	11	E	View over alignment	PHZ	3/5/2007
MT8214_PHZ_0366_05Mar07.jpg	MT8214	S6	10595+92	-34	11		Test hole in colluvial cover cover that buries Ta4	PHZ	3/5/2007
MT8214_PHZ_0367_05Mar07.jpg	MT8214	S6	10595+92	-34	11	NE	View over bedrock (Ta4)	PHZ	3/5/2007
MT8214_PHZ_0368_05Mar07.jpg	MT8214	S6	10595+92	-34	11	W	View over bedrock slope (Ta4)	PHZ	3/5/2007
MT8215_PHZ_0369_05Mar07.jpg	MT8215	S6	10584+79	88	11		Test hole in eolian sand deposit (Qe)	PHZ	3/5/2007
MT8215_PHZ_0370_05Mar07.jpg	MT8215	S6	10584+79	88	11	NE	View along crest of dune. Contact with bedrock (Ta4) to right	PHZ	3/5/2007
MT8216_PHZ_0371_05Mar07.jpg	MT8216	S5	10578+32	84	11	NE	View up channel, bedrock (Ta4) at left, eolian dune at right	PHZ	3/5/2007
MT8217_PHZ_0372_05Mar07.jpg	MT8217	S6	10532+08	153	11	NW	View over bedrock exposure (Ta4)	PHZ	3/5/2007
MT8217_PHZ_0373_05Mar07.jpg	MT8217	S6	10532+08	153	11	SE	View towards bedrock (Ta4) hillsides	PHZ	3/5/2007
MT8218_PHZ_0374_05Mar07.jpg	MT8218	S6	10525+27	182	10	E	View up channel	PHZ	3/5/2007
MT8218_PHZ_0375_05Mar07.jpg	MT8218	S6	10525+27	182	10		View of younger alluvium (Qay) in channel wall	PHZ	3/5/2007
MT8219_PHZ_0376_05Mar07.jpg	MT8219	S5	10509+86	20	10	NE	View up channel	PHZ	3/5/2007
MT8219_PHZ_0377_05Mar07.jpg	MT8219	S5	10509+86	20	10	W	View along alignment	PHZ	3/5/2007
MT8220_PHZ_0378_05Mar07.jpg	MT8220	S6	10503+39	-31	10	W	View of Ta4 outcrop - quartz vein is light colored rock	PHZ	3/5/2007
MT8220_PHZ_0379_05Mar07.jpg	MT8220	S6	10503+39	-31	10	SE	View over bedrock (Ta4) and colluvial cover	PHZ	3/5/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8221_PHZ_0380_05Mar07.jpg	MT8221	S6	10485+65	-146	10		Test hole in younger alluvium (Qay)	PHZ	3/5/2007
MT8221_PHZ_0381_05Mar07.jpg	MT8221	S6	10485+65	-146	10	W	View over younger alluvium (Qay)	PHZ	3/5/2007
MT8221_PHZ_0382_05Mar07.jpg	MT8221	S6	10485+65	-146	10	E	View over younger alluvium (Qay)	PHZ	3/5/2007
MT8222_PHZ_0383_05Mar07.jpg	MT8222	S6	10568+22	-217	11		Test hole in eolian sand	PHZ	3/5/2007
MT8222_PHZ_0384_05Mar07.jpg	MT8222	S6	10568+22	-217	11	W	View towards eolian dune	PHZ	3/5/2007
MT8223_PHZ_0385_05Mar07.jpg	MT8223	S6	10594+13	576	11		Test hole in colluvium-covered bedrock (Ta4)	PHZ	3/5/2007
MT8223_PHZ_0386_05Mar07.jpg	MT8223	S6	10594+13	576	11	W	View over surface of colluvium-covered bedrock (Ta4)	PHZ	3/5/2007
MT8223_PHZ_0387_05Mar07.jpg	MT8223	S6	10594+13	576	11	E	View over surface of colluvium-covered bedrock (Ta4)	PHZ	3/5/2007
MT8224_PHZ_0388_05Mar07.jpg	MT8224	S5	10604+31	22	11		Test hole in colluvial cover over bedrock (Ta4)	PHZ	3/5/2007
MT8224_PHZ_0389_05Mar07.jpg	MT8224	S5	10604+31	22	11	N	View over saddle of bedrock (Ta4)	PHZ	3/5/2007
MT8225_PHZ_0390_05Mar07.jpg	MT8225	S6	10623+37	327	11		Closeup of bedrock (Ta4)	PHZ	3/5/2007
MT8225_PHZ_0391_05Mar07.jpg	MT8225	S6	10623+37	327	11	E	View over colluvium-covered bedrock (Ta4)	PHZ	3/5/2007
MT8225_PHZ_0392_05Mar07.jpg	MT8225	S6	10623+37	327	11	W	View over colluvium-covered bedrock (Ta4)	PHZ	3/5/2007
MT8226_PHZ_0393_05Mar07.jpg	MT8226	S6	10651+20	-429	11		Test hole in basin fill (Qbf)	PHZ	3/5/2007
MT8226_PHZ_0394_05Mar07.jpg	MT8226	S6	10651+20	-429	11	E	View over basin fill (Qbf)	PHZ	3/5/2007
MT8227_PHZ_0395_05Mar07.jpg	MT8227	S6	10949+86	118	12	N	Closeup of younger alluvium (Qay) outcrop (lake beds in lower right)	PHZ	3/5/2007
MT8227_PHZ_0396_05Mar07.jpg	MT8227	S6	10949+86	118	12	S	View over channel	PHZ	3/5/2007
MT8227_PHZ_0397_05Mar07.jpg	MT8227	S6	10949+86	118	12	W	View towards culvert	PHZ	3/5/2007
MT8228_PHZ_0398_06Mar07.jpg	MT8228	S6	11275+45	72	14	NW	Closeup of rhyolitic rock (Tt3)	PHZ	3/6/2007
MT8228_PHZ_0399_06Mar07.jpg	MT8228	S6	11275+45	72	14	SE	View over channel and younger alluvium (Qay)	PHZ	3/6/2007
MT8228_PHZ_0400_06Mar07.jpg	MT8228	S6	11275+45	72	14		Closeup of younger alluvium (Qay) in channel wall	PHZ	3/6/2007
MT8229_PHZ_0401_06Mar07.jpg	MT8229	S6	11286+50	-142	14		Test hole in older alluvium (Qao)	PHZ	3/6/2007
MT8229_PHZ_0402_06Mar07.jpg	MT8229	S6	11286+50	-142	14	NE	View over rhyolitic tuff (Tt3) hills	PHZ	3/6/2007
MT8229_PHZ_0403_06Mar07.jpg	MT8229	S6	11286+50	-142	14	NW	View over older alluvium (Qao) towards rangefront	PHZ	3/6/2007
MT8230_PHZ_0404_06Mar07.jpg	MT8230	S6	11290+95	280	14	S	View over younger alluvium (Qay)	PHZ	3/6/2007
MT8231_PHZ_0405_06Mar07.jpg	MT8231	S6	11306+20	384	14		Test hole in younger alluvium (Qay)	PHZ	3/6/2007
MT8231_PHZ_0406_06Mar07.jpg	MT8231	S6	11306+20	384	14	S	View over younger alluvium (Qay)	PHZ	3/6/2007
MT8232_PHZ_0407_06Mar07.jpg	MT8232	S6	11269+44	-343	14		View of eastern mine shaft at Camp Terrill	PHZ	3/6/2007
MT8232_PHZ_0408_06Mar07.jpg	MT8232	S6	11269+44	-343	14		View of middle mine shaft at Camp Terrill	PHZ	3/6/2007
MT8232_PHZ_0409_06Mar07.jpg	MT8232	S6	11269+44	-343	14		View of western mine shaftat Camp Terrill	PHZ	3/6/2007
MT8233_PHZ_0410_06Mar07.jpg	MT8233	S6	11270+65	-470	14		View of mine shaft at Camp Terrill	PHZ	3/6/2007
MT8233_PHZ_0411_06Mar07.jpg	MT8233	S6	11270+65	-470	14	NE	View of Camp Terrill mine area	PHZ	3/6/2007
MT8234_PHZ_0412_06Mar07.jpg	MT8234	S6	11251+03	-10	14		Closeup of rhyolitic rock (Tt3) outcrop	PHZ	3/6/2007
MT8234_PHZ_0413_06Mar07.jpg	MT8234	S6	11251+03	-10	14	N	View over rhyolitic rock (Tt3) exposure	PHZ	3/6/2007
MT8234_PHZ_0414_06Mar07.jpg	MT8234	S6	11251+03	-10	14	SW	View into bedrock (Tt3) incised by rills emanating from rangefront	PHZ	3/6/2007
MT8235_PHZ_0415_06Mar07.jpg	MT8235	S6	11179+93	152	12		Closeup of gabbro (KJm) outcrop	PHZ	3/6/2007
MT8235_PHZ_0416_06Mar07.jpg	MT8235	S6	11179+93	152	12	S	View along rangefront	PHZ	3/6/2007
MT8235_PHZ_0417_06Mar07.jpg	MT8235	S6	11179+93	152	12	N	View along rangefront	PHZ	3/6/2007
MT8236_PHZ_0418_06Mar07.jpg	MT8236	S6	11180+21	2	12		Test hole in younger alluvium (Qay)	PHZ	3/6/2007
MT8236_PHZ_0419_06Mar07.jpg	MT8236	S6	11180+21	2	12	NW	View over alluvial apron	PHZ	3/6/2007
MT8238_PHZ_0421_06Mar07.jpg	MT8238	S6	11100+07	23	12		Closeup of bedrock (Tt3) outcrop	PHZ	3/6/2007
MT8238_PHZ_0422_06Mar07.jpg	MT8238	S6	11100+07	23	12	SE	View over valley along alignment	PHZ	3/6/2007
MT8239_PHZ_0423_06Mar07.jpg	MT8239	S6	11098+26	21	12	NW	View along alignment over valley	PHZ	3/6/2007
MT8240_PHZ_0424_06Mar07.jpg	MT8240	S6	11094+08	43	12		Test hole in lacustrine deposits (Ql)	PHZ	3/6/2007
MT8240_PHZ_0425_06Mar07.jpg	MT8240	S6	11094+08	43	12	NW	View over lacustrine deposits	PHZ	3/6/2007
MT8241_PHZ_0426_06Mar07.jpg	MT8241	S6	11089+86	38	12	NW	View up talus slope at bedrock (Tt3) outcrop	PHZ	3/6/2007
MT8241_PHZ_0427_06Mar07.jpg	MT8241	S6	11089+86	38	12	SE	View over channel and narrow swath of younger alluvium (Qay)	PHZ	3/6/2007
MT8242_PHZ_0428_06Mar07.jpg	MT8242	S6	11077+55	116	12	N	View up rill along contact of rhyolitic tuff (Tt3) and volcaniclastic conglomerate	PHZ	3/6/2007
MT8242_PHZ_0429_06Mar07.jpg	MT8242	S6	11077+55	116	12	SE	View across valley along alignment	PHZ	3/6/2007
MT8243_PHZ_0430_06Mar07.jpg	MT8243	S6	11068+74	68	12	SE	View over rhyolitic tuff (Tt3) hills	PHZ	3/6/2007
MT8243_PHZ_0431_06Mar07.jpg	MT8243	S6	11068+74	68	12	NW	View over rhyolitic tuff (Tt3) hills	PHZ	3/6/2007
MT8244_PHZ_0432_06Mar07.jpg	MT8244	S6	11095+90	-1108	12		View of tufa and wave cut bench	PHZ	3/6/2007
MT8244_PHZ_0433_06Mar07.jpg	MT8244	S6	11095+90	-1108	12		Closeup of tufa boulders	PHZ	3/6/2007

PHOTO ID	WAYPT	ROUTE	STATION[1] (feet)	OFFSET[1][2] (feet)	FIGURE 3 SHEET[3]	DIRECTION	COMMENT	SOURCE	DATE
MT8245_PHZ_0434_06Mar07.jpg	MT8245	S6	11105+62	-169	12	S	View along debris apron	PHZ	3/6/2007

NOTES:

1. Station and offset are not shown for those waypoints that are not adjacent to an alignment segment. Station and offset are not shown for those waypoints that are greater than one mile from any alignment segment.
2. When shown, offset distance is the minimum distance in feet from the closest point on the alignment to the waypoint. When viewed upstation, a negative offset indicates that the waypoint is to the left of the alignment; a positive offset indicates that the waypoint is located to the right of the alignment
3. Denotes the sheet number of Figure 3 on which the waypoint is plotted. Also indicates those waypoints plotted only on Plate 1.

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SPECIAL INSTRUCTION SHEET

This is a placeholder page for records that cannot be scanned.

2. Record Date	3. Accession Number
07/24/2007	ATTN to: ENG.20070910.0022
4. Author Name(s)	5. Authorization Organization
N/A	Shannon & Wilson

6. Title/Description
Geotechnical Report Mina Rail Corridor, APPENDIX G: Photographs

7. Document Number(s)	8. Version Designator
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9. Document Type	10. Medium
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11. Access Control Code
N/A

12. Traceability Designator
V0-CY05-NHC4-00197-00024-001-004

13. Comments
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Validation of complete file transferred. All files copied. Software used: Corel Photo-Paint 8.0

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14. RPC Electronic Media Verification

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MD5 Validation

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10/06/2006	06:15p	1,358,806	MT2018_BKR_0029_06Oct06.jpg
10/06/2006	04:08p	1,263,634	MT2018_EAK_0015_06Oct06.jpg
10/06/2006	04:11p	1,315,404	MT2018_EAK_0016_06Oct06.jpg
10/07/2006	09:36a	322,718	MT2018_WTL_0090_07Oct06.jpg
10/07/2006	09:37a	323,324	MT2018_WTL_0091_07Oct06.jpg
10/07/2006	09:46a	305,473	MT2018_WTL_0092_07Oct06.jpg
10/07/2006	09:46a	312,111	MT2018_WTL_0093_07Oct06.jpg
10/07/2006	09:51a	327,486	MT2018_WTL_0094_07Oct06.jpg
10/06/2006	04:19p	1,069,616	MT2019_EAK_0017_06Oct06.jpg
10/07/2006	08:57a	1,428,944	MT2020_BKR_0030_07Oct06.jpg
10/07/2006	08:00a	3,093,977	MT2020_EAK_0018_07Oct06.jpg
10/07/2006	08:04a	3,504,288	MT2020_EAK_0019_07Oct06.jpg
10/07/2006	09:00a	337,071	MT2020_WTL_0086_07Oct06.jpg
10/07/2006	09:00a	324,275	MT2020_WTL_0087_07Oct06.jpg
10/07/2006	09:10a	309,692	MT2020_WTL_0088_07Oct06.jpg
10/07/2006	09:11a	316,082	MT2020_WTL_0089_07Oct06.jpg
10/07/2006	10:25a	1,444,360	MT2021_BKR_0031_07Oct06.jpg
10/07/2006	09:31a	1,348,204	MT2021_EAK_0020_07Oct06.jpg
10/07/2006	09:32a	3,309,672	MT2021_EAK_0021_07Oct06.jpg
10/07/2006	10:36a	320,134	MT2021_WTL_0095_07Oct06.jpg
10/07/2006	10:36a	312,345	MT2021_WTL_0096_07Oct06.jpg
10/07/2006	12:08p	1,478,450	MT2022_BKR_0035_07Oct06.jpg
10/07/2006	12:41p	1,475,085	MT2022_BKR_0036_07Oct06.jpg
10/07/2006	10:22a	1,357,694	MT2022_EAK_0022_07Oct06.jpg
10/07/2006	11:23a	316,150	MT2022_WTL_0097_07Oct06.jpg
10/07/2006	11:24a	312,224	MT2022_WTL_0098_07Oct06.jpg
10/07/2006	11:34a	303,948	MT2024_WTL_0099_07Oct06.jpg
10/07/2006	11:49a	320,338	MT2026_WTL_0102_07Oct06.jpg
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10/07/2006	12:46p	307,738	MT2028_WTL_0108_07Oct06.jpg
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10/07/2006	12:03p	1,436,068	MT2029_EAK_0024_07Oct06.jpg
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10/07/2006	01:31p	339,369	MT2031_WTL_0114_07Oct06.jpg
10/07/2006	01:31p	328,822	MT2031_WTL_0115_07Oct06.jpg
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10/07/2006	06:20p	392,128	MT2035_WTL_0143_07Oct06.jpg
10/07/2006	06:20p	381,072	MT2035_WTL_0144_07Oct06.jpg
10/07/2006	06:20p	379,279	MT2035_WTL_0145_07Oct06.jpg
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10/10/2006	11:12p	1,479,268	MT2063_BKR_0093_10Oct06.jpg
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10/10/2006	11:12p	1,462,779	MT2073_BKR_0103_10Oct06.jpg
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10/11/2006	10:58p	1,494,446	MT2077_BKR_0115_10Oct06.jpg
10/11/2006	10:58p	1,467,537	MT2078_BKR_0117_10Oct06.jpg
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10/11/2006	10:58p	1,487,944	MT2079_BKR_0120_10Oct06.jpg
10/11/2006	10:58p	1,418,134	MT2079_BKR_0121_10Oct06.jpg
10/11/2006	10:58p	1,443,787	MT2079_BKR_0127_10Oct06.jpg
10/11/2006	10:58p	1,421,679	MT2079_BKR_0128_10Oct06.jpg
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10/13/2006	09:53a	1,472,630	MT2083_BKR_0137_12Oct06.jpg
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