U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232G
Rev. 2 - 81

Soil type FRANDSEN | File No:

Area TRAIL MTN | Date 10-27-93 | Stop No. TMTN 19

Classification Fine-loamy, mixed, frigid Calcic Ustochrept (mod-deep)

Location NW¼, SW¼, Section 34, T17S, R6E

N. veg. (or crop) PJ w understory including sage, grass, mixed brush | Climate

Parent material mixed alluvium and residuum from sedimentary rks

Physiography outer shoulder of bench

Relief | Drainage well | Salt or alkali –

Elevation | Gr. water deep | Stoniness surface - 15% LS small boulders

Slope 4% | Moisture dry

Aspect SSW | Root distrib. Com F, VF & few M 0-12", Few CO, | % Clay *

Erosion status - moderate | % Coarse fragments * see below 7 M, F, VF 12-32 | % Coarser than V.F.S. *

Permeability moderate

Additional notes

although vegt is different from pad (PJ) to access rd (grass) soil is basically similar because pad is not very far into PJ - one difference - pad has scattered ss boulders on surface (100%) & rd does not

Salvage 12" on both pad and access rd

in FS map unit 25
Frandsen has a cambic & should be Ustochrept, not Ustorthent

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A	0-3	7.5YR 6/4	7.5YR 5/4	Loam	MMGR	SO	VFR	SS/SP	EM	CS	15%GR
Bw	3-12	7.5YR 5/4	7.5YR 4/4	Loam	MMSBK	SH	VFR	SS/SP	EM	GS	10%GR
Bk	12-24	10YR 6/3	10YR 5/3	SICL	Massive	H	FR	S/P	ES	GW	15%GR 5%CB
C	24-32	2.5YR 5/4	2.5YR 4/4	SICL	Massive	H	FR	S/P	ES	GW	15%GR 10%CB
Cr	32+	weath shale									

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SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232G
Rev. 2 - 81

Soil type REVA

File No.

Area TRAIL MTN | Date 10-26-93 | Stop No. TMTN 20

Classification Loamy-skeletal, mixed (calcareous) frigid Lithic Ustorthent (shallow)

Location NW¼, NW¼, Section 2, T18S, R6E

N. veg. (or crop) low sage, grass, occ small PJ | Climate

Parent material sloperwash and residuum from mixed sedimentary

Physiography upland bench - lower slope

Relief | Drainage well | Salt or alkali —

Elevation | Gr. water deep | Stoniness

Slope 3% at pad 3-8% on rd. | Moisture AC sl. moist

Aspect SW W | Root distrib. Com F, VF and Few M 0-10" | % Clay *

Erosion status - moderate → erosion is present between sage clumps | % Coarse fragments * see below | Few F, VF 10-18" | % Coarser than V.F.S. *

Permeability

Additional notes

in FS map unit 24

Vegetation is the same on the drill pad as on the access road, but soil gets thinner as you move down slope on this bench

* Salvage 10" at pad and 10-14" on access road, $\bar{x}$ = 12"

15% rounded sandstone boulders imbedded in profile

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (Clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A	0-3	7.5YR 5/4	7.5YR 4/4	Loam 18%	MM PL	SO	VFR	SS/SP	EM	CS	15% GR 15% CB* 15% ST, BD
AC	3-10	7.5YR 5/4	7.5YR 4/4	Loam 19%	WM SBK	SH	FR	SS/SP	EM	GW	
Ck	10-18	10YR 6/4	10YR 5/3	Loam 20%	Massive	H	FI	S/SP	ES	—	
R	18+	layered hard somewhat hard shale and sandstone									

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SOIL DESCRIPTION

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Rev. 2 - 81

Soil type REVA — File No.

Area TRAIL MTN — Date 10-28-93 — Stop No. TMTN 21

Classification Loamy-skeletal, mixed (calcareous), frigid Lithic Ustorthent

Location SW¼ NW¼, Section 2, T18S, R6E

N. veg. (or crop) PJ (mature), also timber pine, serviceberry — Climate

Parent material mixed colluvium over residuum from Usage, grass / mixed sedimentary

Physiography somewhat steep ridge sideslope

Relief — Drainage well — Salt or alkali —

Elevation — Gr. water deep — Stoniness cobbly surface 10% GR, 15% CB 5% ST, BD

Slope 16% — Moisture dry

Aspect SSW — Root distrib. — % Clay *

Erosion at site - none to slight under trees — % Coarse fragments * see below — % Coarser than V.F.S. *

Permeability moderate bet trees

Additional notes

in FS mapunit 23 but an inclusion

Salvage to 8" at pad and along rd in PJ - outside PJ, salvage 12"

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A	0-2	10YR 6/3	10YR 5/3	SL 17	WCO GR	SO	VFR	SS/SP	ES	CS	10% GR 15% CB 5% ST, BD
Bw	2-6	2.5 5/4	2.5Y 4/4	SICL 31	MCO SBK	H	FR	S/P	ES	GW	15% GR 15% CB 10% ST, BD
C	8-18	2.5Y 6/4	2.5Y 5/4	SICL 30	Massive	H	FR	S/P	ES	CW	15% GR 20% CB 25% ST, BD
R	18+	hard sandstone (may be large boulders)									

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232G
Rev. 2 - 81

Soil type Trag Variant — File No.

Area TRAIL MTN — Date 10-28-93 — Stop No. TMTN 22

Classification Fine-loamy, mixed Typic Argiborolls (med deep)

Location SE¼, NW¼, Section 2, T18S, R8E

N. veg. (or crop) PJ sage-grass understory also limber pine — Climate

Parent material local slopewash alluv. over residuum from mixed sedimentary rx

Physiography ridge sides/slope

Relief — Drainage well — Salt or alkali —

Elevation — Gr. water deep — Stoniness 15% mixed GR on surface

Slope 15% — Moisture Bt sl. moist

Aspect SSW — Root distrib. Few F, VF 0-2; Com F, VF and Few M 2-15" — % Clay *

Erosion slight to moderate — % Coarse fragments * see below — Few M, F, VF 15-24" — % Coarser than V.F.S. *

Permeability

Additional notes

variant due to med deep (20 to 40" to bedrock) Trag is deep

Salvage 15" at drill site and along both road options (except 6" along first 150' of road option from main rd to north - option to east is less preferred due to large drainage gully adj. to pad site

*Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (Clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A1	0-2	10YR 6/3, 5/3	10YR 4/3	SL 14	M CO PL	SO	VFR	SS/NP	EM	CS	15% GR
A2	2-10	10YR 5/3	10YR 4/3	Loam 18	M M SBK	SH	FR	SS/SP	EM	GS	10% GR
Bt	10-15	10YR 3/3 ped face	10YR 4/3 crushed	CL 32	S M SBK	H	FR-FI	S/P	EM	CW	5% GR
BC	15-24	10YR 5/3	10YR 4/3	CL 29	Massive	SH	FR	S/P	ES	GW	15% GR 5% CB
C	24-30	2.5Y 5/4	2.5Y 4/4	SICL 31	Massive	H	FI	VS/P	ES	GW	15% GR 15% CB
Cn	30+	weath mixed shales									

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SOIL DESCRIPTION

SCS - SOI - 232C
Rev. 2 - 81

Soil type Frandsen | File No.

Area TRAIL MTN | Date 10-26-93 | Stop No. TMTN 23

Classification Fine-loamy, mixed Calcic Ustochrept (med deep to deep)

Location NW¼, NE¼, Section 2, T18S, R6E

N. veg. (or crop) low sage, grass, occ. PJ & MTN brush | Climate

Parent material some aeolian influence over residuum from mixed sedimentary

Physiography upland bench - upper slope

Relief	Drainage well	Salt or alkali —
Elevation	Gr. water deep	Stoniness see below
Slope 7%	Moisture Bw sl. moist	
Aspect SW	Root distrib Com F, VF and Few M 0-14, Few F, VF 14-22	% Clay *
Erosion (status) moderate	% Coarse fragments * see description	% Coarser than V.F.S. *
Permeability moderate		

Additional notes EROSION HAZARD - Moderate
in FS map unit 24

drill pad site and short access road are uniform soil
Salvage 14" both pad and road

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A	0-3	10YR 5/3 6/3	10YR 4/3	SIL (25%)	MCOPL	SH	FR	S/NP	ES	GS	15% GR 3% CB
Bw	3-14	10YR 5/3	10YR 4/3	Loam (27%)	MCOSBK	SH	FR	S/P	ES	GW	5% GR 1% CB
BC	14-22	10YR 5/4	10YR 4/4	L-SL (20%)	Massive	H	FR	SS/SP	ES	GW	20% GR 5% CB
Ck	22-40	10YR 6/3	10YR 5/3	SL-L (20%)	Massive	H	FI	SS/SP	ES	—	30% GR 15% CB

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232C
Rev. 2 - 81

Soil type Rabbitex | File No.

Area TRAIL MTN | Date 10-28-94 | Stop No. TMTN 24

Classification Fine-loamy, mixed Typic Calciborroll (deep)

Location NE¼, NE¼, Section 34, T17S, R6E

N. veg. (or crop) Sage, grass, serviceberry | Climate

Parent material

Physiography ridge steep sideslope - on lower slope

Relief | Drainage well | Salt or alkali

Elevation | Gr. water deep | Stoniness 15% GR on surface

Slope 2-7% | Moisture Bt sl. moist

Aspect West | Root distrib. Com M, F, VF 0-13, Few CO, M, F, VF 13- | % Clay *

Erosion status - slight to moderate | % Coarse fragments * see below | % Coarser than V.F.S. *

Permeability moderate

Additional notes

NOT shallow on this lower sideslope position - can see skeletal upslope but not at pad

Salvage to 13" at pad and along rd. ↓ will go right along a trench and berm

* Control section average

Horizon	Depth	Color Dry	Color Moist	Clay % / Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments		
A	0-3	10YR 5/3	10YR 4/3	15 SIL	WCO PL	SO	VFR	SS/NP	EM	CS	15%	GR	
Bt	3-13	10YR 4/3	10YR 3/3	30 CLAY LOAM	M CO SBK	SH	FR	S/P	EM	GS	15%	GR	
											15%	CB	
BC	13-21	10YR 6/3	10YR 5/3	25 Loam	Massive/ M M SBK	SH	FR	S/P	ES	GW	15%	GR	
											15%	CB	
C	21-34+	10YR 5/4	10YR 4/4	30 SICL	Massive	H	FI	VS/P	ES	-	15%	GR	
											15%	CB	

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SOIL DESCRIPTION

SCS - SOI - 232C
Rev. 2 - 81

Soil type Rabbitex — File No.

Area TRAIL MTN — Date 10-28-93 — Stop No. TMTN 25

Classification Fine-loamy, mixed Typic Calciborolls (deep)

Location NE¼, SE¼, Section 34, T 17S, R6E

N. veg. (or crop) big sage, rabbitbrush, grass — Climate

Parent material mixed alluvium (local)

Physiography upland alluvial surface - old alluvium from steep ridge above

Relief — Drainage well — Salt or alkali —

Elevation — Gr. water deep — Stoniness < 5% GR on surface

Slope 4% — Moisture all dry

Aspect NW — Root distrib. Many M, F, VF 0-24, Few CO M F, VF 24-36" — % Clay *

Erosion none to slight — % Coarse fragments * see below — % Coarser than V.F.S. *

Permeability moderate

Additional notes

Soltage 24" at pad and along access rd except for first 160' where is 16" (Clayburn)

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments		
A	0-7	10YR 5/3	10YR 4/3	Loam	SM GR	SH	VFR	SS/SP	EM	CS	5% GR		
B_w	7-24	10YR 4/3	10YR 4/4	Loam	MM SBK	SH	FR	SS/SP	EM	GS	5% GR		
BC	24-36	10YR 6/4	10YR 5/4	SCL	MM SBK	H	FR	S/P	ES	GW	10% small GR 5% CB		
C1	36-42	10YR 5/3	10YR 4/3	Loam	Massive	SH	FR	SS/SP	ES	GW	10% GR 10% CB		
C2	42-56+	10YR 5/4	10YR 4/4	SCL	Massive	H	FR	S/P	ES	—	10% GR 10% CB		

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SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232
Rev. 2 - 81

Soil type Rabbitex | File No.

Area TRAIL MTN | Date 10-26-93 | Stop No. TMTN 26

Classification Fine-loamy, mixed Typic Calciborolls (deep)

Location NE¼, SE¼ Section 2, T18S, R6E

N. veg. (or crop) Scattered PJ with sage grass | Climate

Parent material slopewash and residuum from

Physiography low ridge sideslope

Relief	Drainage well	Salt or alkali —
Elevation	Gr. water deep	Stoniness
Slope 4-8	Moisture	
Aspect SE	Root distrib. Com F, VF & Few M 0-18	% Clay *
Erosion slight to moderate	% Coarse fragments * Few F, VF 18+	% Coarser than V.F.S. *
Permeability slow		

Additional notes

in FS map unit 24

in area with trenches - nearby trench shows common large SS boulders coated w carbonate on lower sides

on fine-loamy / fine borderline

Salvage 18" both drill pad and short access road

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (clay %)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments		
A	0-3	10YR 5/2	10YR 4/2	Loam 24%	MMGR	SH	FR	S/SP	EM	CS	5% GR		
BA	3-7	10YR 5/3	10YR 4/3	Loam 25%	MM SBK	SH	FR	S/SP	EM	GS	5% GR		
Bt	7-18	ped face 10YR 4/3	crushed 10YR 5/4	Clay Loam 34%	SMPR	H	FI	VS/P	EM	GW	5% GR		
Bk	18-29	10YR 6/3 5/3	10YR 4/3	Clay Loam 30%	Massive/ MMSBK	H	FI	S/P	ES	GW	5% GR		
C	29-40+	10YR 5/3	10YR 4/3	Clay Loam 28%	Massive	H	FI	S/P	ES	—	15% 15%	GR CB	

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232 G
Rev. 2 - 81

Soil type Frandsen | File No.

Area TRAIL MTN | Date 10-27-93 | Stop No. TMTN 27

Classification Fine-loamy mixed frigid Calcic Ustachrept, med deep to deep

Location NW¼, NW¼ Section 1, T18S, R6E

N. veg. (or crop) sage - grass | Climate

Parent material local colluvium from mixed sedimentary rks

Physiography on short fan below steep ridge sideslope

Relief | Drainage well | Salt or alkali —

Elevation | Gr. water deep | Stoniness

Slope 17% | Moisture all dry

Aspect South | Root distrib. Many F, VF and com M 0-12 | % Clay *

Erosion slight to moderate | % Coarse fragments * see below | Few M, F, VF 12-27" | % Coarser than V.F.S. *

Permeability

Additional notes

in FS map unit

several 2-3' trenches cut across area

Salvage to 12" at drill pad and along access rd

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (% clay)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse Fragments
A	0-3½	10YR 5/3	10YR 4/3	SIL 20	WCO PL	SO	VFR	SS/SP	EM	CS	10% GR 2% CB
B_w	3½-12	10YR 4/3	10YR 3/3	Loam 28	MM SBK	SH	FR	S/P	EM	GW	10% GR 2% CB
BC	12-27	2.5Y 5/4	2.5Y 4/4	Loam	Massive/ MM SBK	H	FR	S/P	ES	GW	15% GR 10% CB
Ck	27-40	2.5Y 5/4	2.5Y 4/4	SICL	Massive	H	FI	VS/P	ES	GW	20% GR 10% CB
Cr	~40+	weath shale									

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SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

SCS - SOI - 232 G
Rev. 2 - 81

Soil type REVA

File No.

Area TRAIL MTN | Date 10-26-93 | Stop No. TMTN 28

Classification Loamy-skeletal, mixed (calcareous) frigid Lithic Ustorthent

Location SE¼, SW¼, Section 35, T17S, R6E

N. veg. (or crop) sage-grass with scattered PJ & MT brush adjacent | Climate

Parent material residuum from sandstone

Physiography upland ridge shoulder

Relief	Drainage well		Salt or alkali —
Elevation	Gr. water deep		Stoniness - see surface
Slope 2-8%	Moisture dry		
Aspect SW	Root distrib.	0-2½ few F, VF	% Clay *
Erosion (+ + +) slight to moderate	% Coarse fragments * (see below)	2½-8 Com F, VF, Few M	% Coarser than V.F.S. *
Permeability moderate		8-12 Few F, VF	

Additional notes

surface has 40% SS flat gravels, 10% flat SS cobbles, and 15% scattered SS flagstones (small areas around sage have fewer coarse frags)

* salvage 6", some small spots only 2-4" (15% of area), 5% EXT Flaggy surface with No soil

location is on 411-23 soil delineation line

runoff - moderately rapid

erosion hazard - moderate

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture (% clay)	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Coarse frags GR	Coarse frags CB	Coarse frags ST, BD
A	0-2½	7.5YR 6/4	7.5YR 4/4	SL-L (18%)	W CO PL	SH	VFR	SS/SP	EM	CS	26	5	5
AC	2½-8	7.5YR 5/4	7.5YR 4/4	Loam (20%)	WM SBK	SH	FR	S/P	ES	GW	26	5	5
C	8-12	10YR 6/4	10YR 5/4	SL-L (18%)	Massive	H	FR	SS/SP	ES	—	20	25	30
R	12+	hard sandstone bedrock											

SOIL PROFILE DESCRIPTION FOOTNOTES - LEGEND

Soil type		Date	Site No.
Classification 1			Area
Location			Elev.
N. veg. (or crop)			Climate
Parent material			
Physiography			
Relief	Drainage		Salt or alkali
Elevation	Gr. water		Stoniness
Slope	Moisture		
Aspect	Root distrib. 7		
Erosion			
Permeability			
Additional notes			

SCS-232A-Soil Description—Rev.

2 Horizon	Depth	4 Color Dry	Color Moist	8 Co. Frag. Texture 3	5 Structure	6 Consistence Dry	Consistence Moist	Consistence Wet	9 Reaction	10 Boundary

SOIL PROFILE DESCRIPTIONS FOOTNOTES

[redacted]oil Series, and Soil Classification according to current SCS information. Soil classification based on Keys to Soil Taxonomy, fifth edition (Soil Survey Staff 1992).

[2] Horizon and Depth based on site-specific conditions at the sample location.

[3] Texture and texture modifier abbreviations:

S	Sand	SCL	Sandy Clay Loam	CB	Cobbly	GR	Gravely
LS	Loamy Sand	CL	Clay Loam	CBV	Very Cobbly	GRV	Very Gravely
SL	Sandy Loam	SICL	Silty Clay Loam	CBX	Extremely Cobbly	GRX	Extremely Gravely
L	Loam	SIC	Silty Clay	CN	Channery	SH	Shaley
SIL	Silt Loam	C	Clay	CNV	Very Channery	SR	Stratified
SI	Silt			CNX	Extremely Channery		

[4] Color, Dry and Moist: Munsell Soil Color Chart, 1975 Edition.

[5] Structure:

Grade	Size	Type
W Weak	VF Very Fine	PL Platy
M Moderate	F Fine	GR Granular
S Strong	M Medium	SBK Subangular Blocky
	CO Coarse	ABK Angular Blocky
	VCO Very Coarse	PR Prismatic
		W Massive Weak Massive
		Massive
		S Massive Strong Massive
		SG Single Grained
		Cloddy

[redacted]nsistency:

Dry		Moist		Wet	
LO	Loose	LO	Loose	NS	Non Sticky
SO	Soft	VFR	Very Friable	SS	Slightly Sticky
SH	Slightly Hard	FR	Friable	S	Sticky
H	Hard	FI	Firm	VS	Very Sticky
VH	Very Hard	VFI	Very Firm	NP	Non Plastic
EH	Extremely Hard	EFI	Extremely Firm	SP	Slightly Plastic
				P	Plastic
				VP	Very Plastic

[7] Roots:

Number	Type	
Very Few	VF	Very Fine
Few	F	Fine
Com (Common)	M	Medium
Many	CO	Coarse

Roots are described in terms of a specified size (type) and quantity (number). The size classes are:

Very Fine: Less than 1 mm in diameter
Fine: 1 to 2 mm in diameter
Medium: 2 to 5 mm in diameter
Coarse: 5 mm or larger in diameter
Roots larger than 10 mm in diameter may be described separately.

Quantity classes or roots are defined in terms of numbers of each size per unit area - 1 square centimeter for very fine and fine roots, and 1 square decimeter for medium and coarse roots. All roots smaller than 10 mm in diameter are described in terms of the following quantity classes:

[redacted]: Less than 1 per unit area of the specified size
Common: 1 to 5 per unit area of the specified size
Many: More than 5 per unit area of the specified size
Roots are described as to number first, and type second.

FOOTNOTES continued

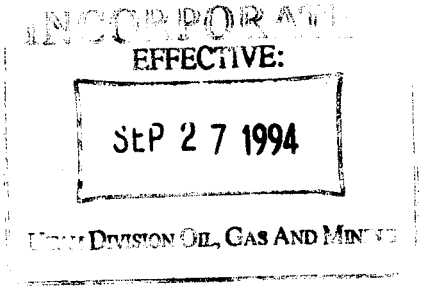
Coarse Fragments: All coarse fragment percentages (% by volume) are taken from the field soil profile descriptions. Lithologic modifier types (gravelly, channery, etc.) are also taken from the field soil profile description forms for each sampled profile.

[9] Reaction:

Effervescence		Reaction		pH
		Str. Acid	Strongly Acid	5.1 - 5.5
		Mod. Acid	Moderately Acid	5.6 - 6.0
EO	Non-Effervescent	Sl. Acid	Slightly Acid	6.1 - 6.5
SE	Slightly Effervescent	Neutral	Neutral	6.6 - 7.3
EM	Moderately Effervescent	Mild. Alk.	Mildly Alkaline	7.4 - 7.8
ES	Strongly Effervescent	Mod. Alk.	Moderately Alkaline	7.9 - 8.4
EV	Violently Effervescent	Strong Alk.	Strongly Alkaline	8.5 - 9.0
		Very Strong Alk.	Very Strongly Alkaline	>9.0

[10] Horizon Boundaries:

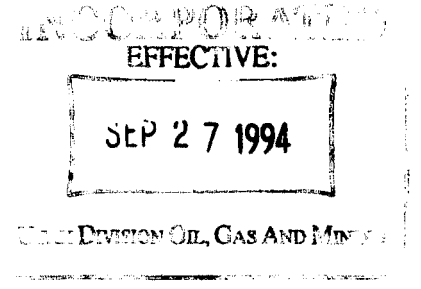
Distinctness		Topography	
A	Abrupt (<2 cm thick)	S	Smooth (the boundary is a plane with few or no irregularities)
C	Clear (2 to 5 cm thick)	W	Wavy (the boundary has undulations in which depressions are wider than they are deep)
G	Gradual (5 to 15 cm thick)	I	Irregular (the boundary has pockets that are deeper than they are wide)
D	Diffuse (>15 cm thick)	B	Broken (at least one of the horizons or layers separated by the boundary is discontinuous and the boundary is interrupted).

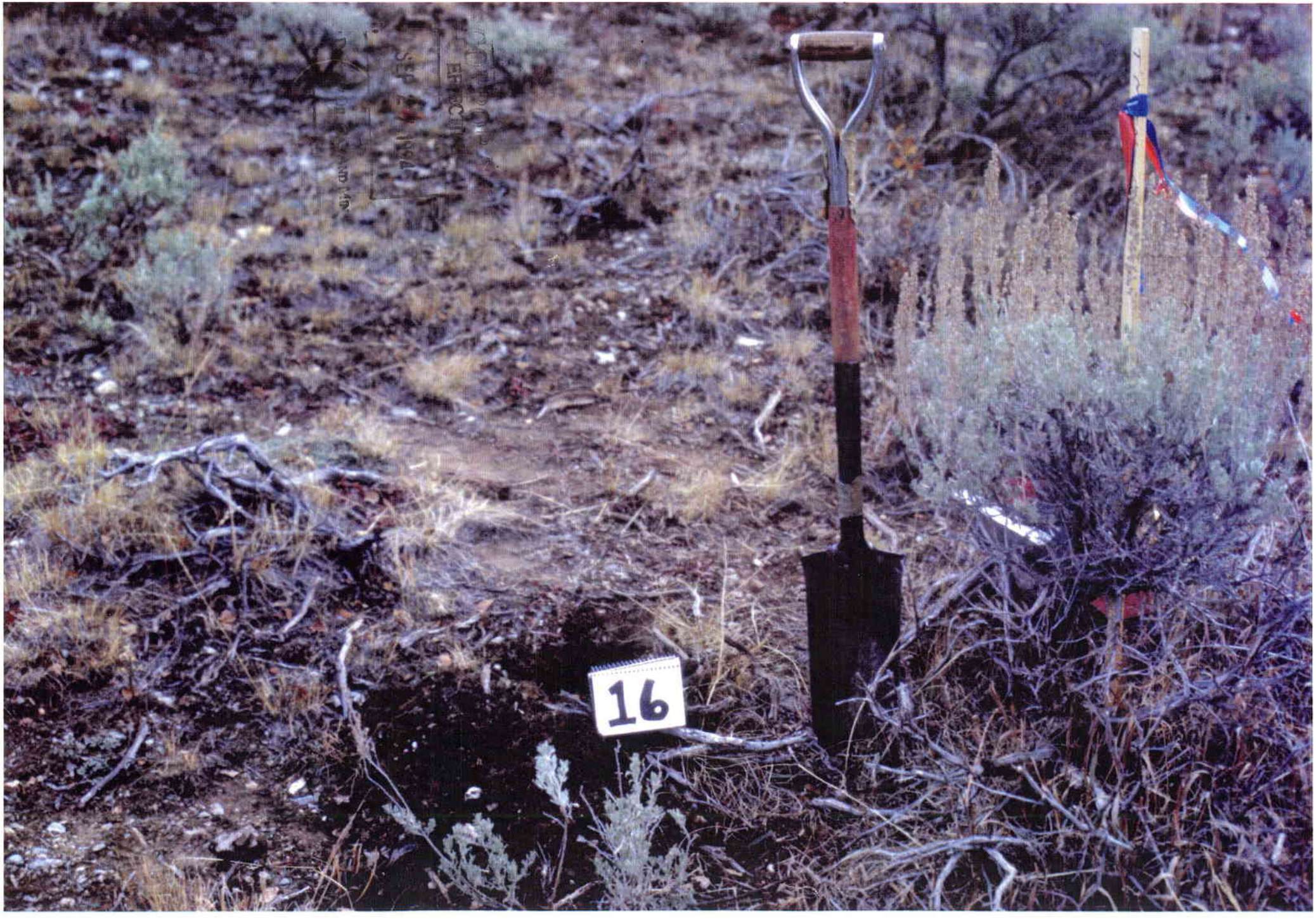


APPENDIX B

PROPOSED 1994 TRAIL MOUNTAIN EXPLORATORY DRILLING

DRILL HOLE SOIL LANDSCAPE PHOTOGRAPHS

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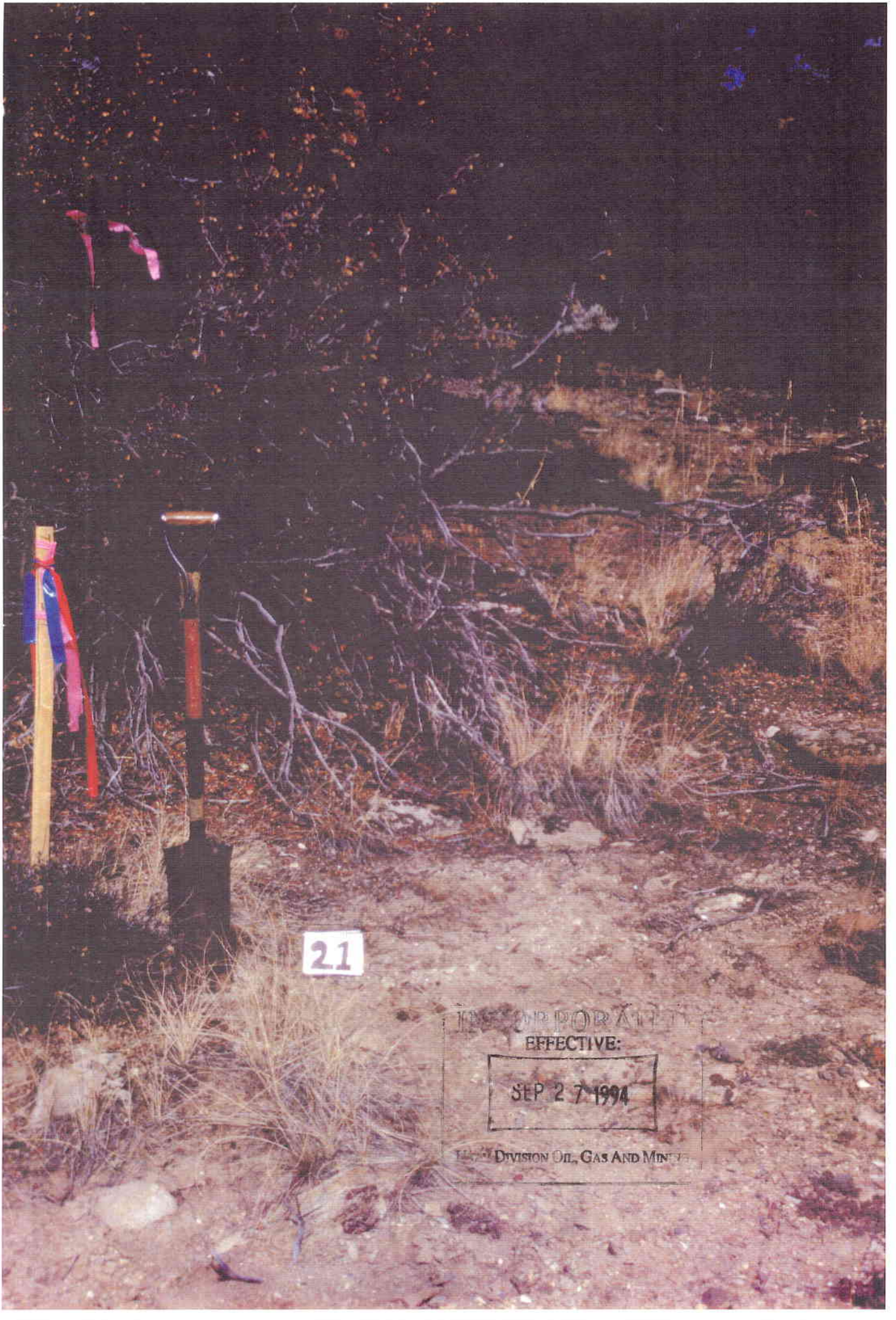
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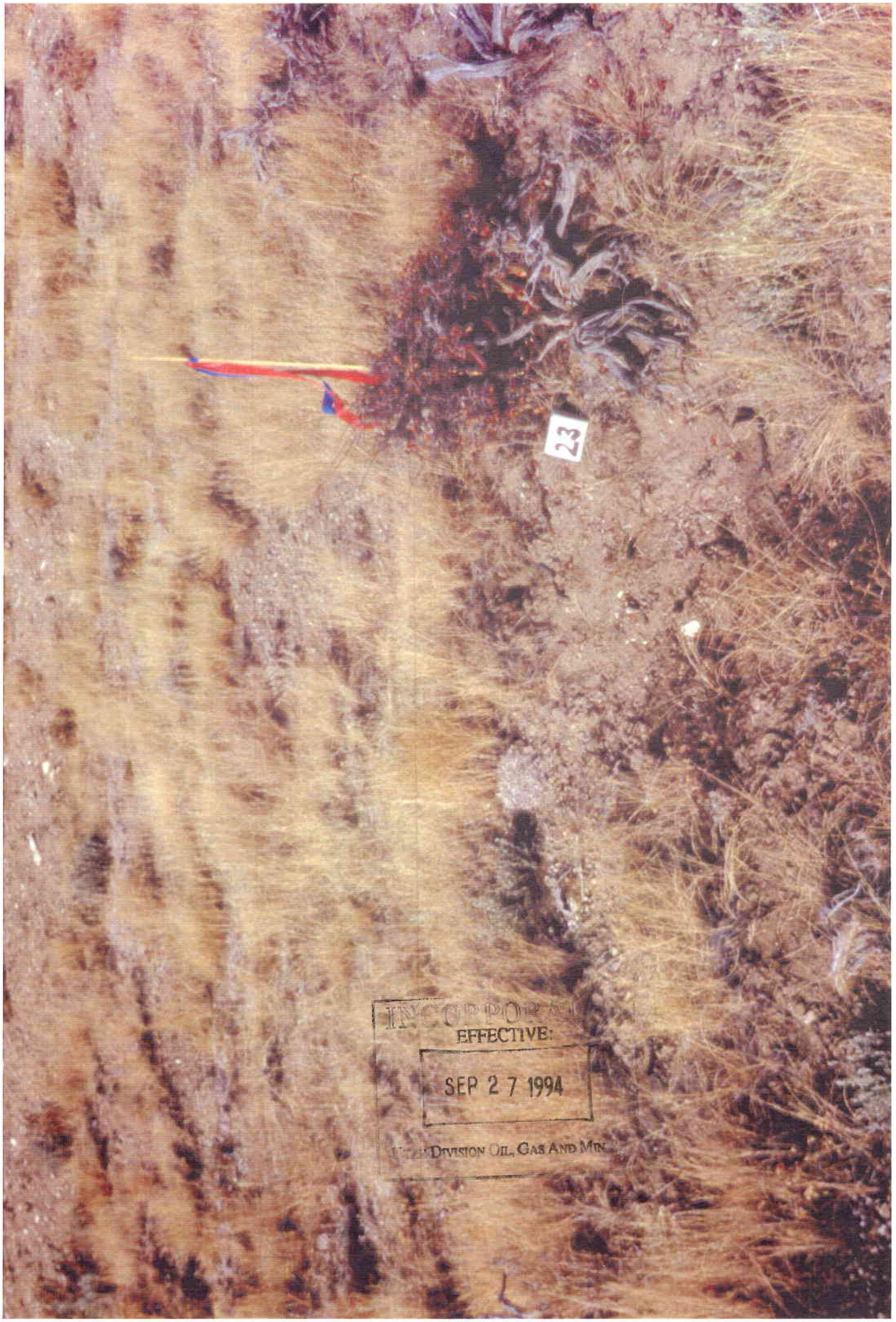
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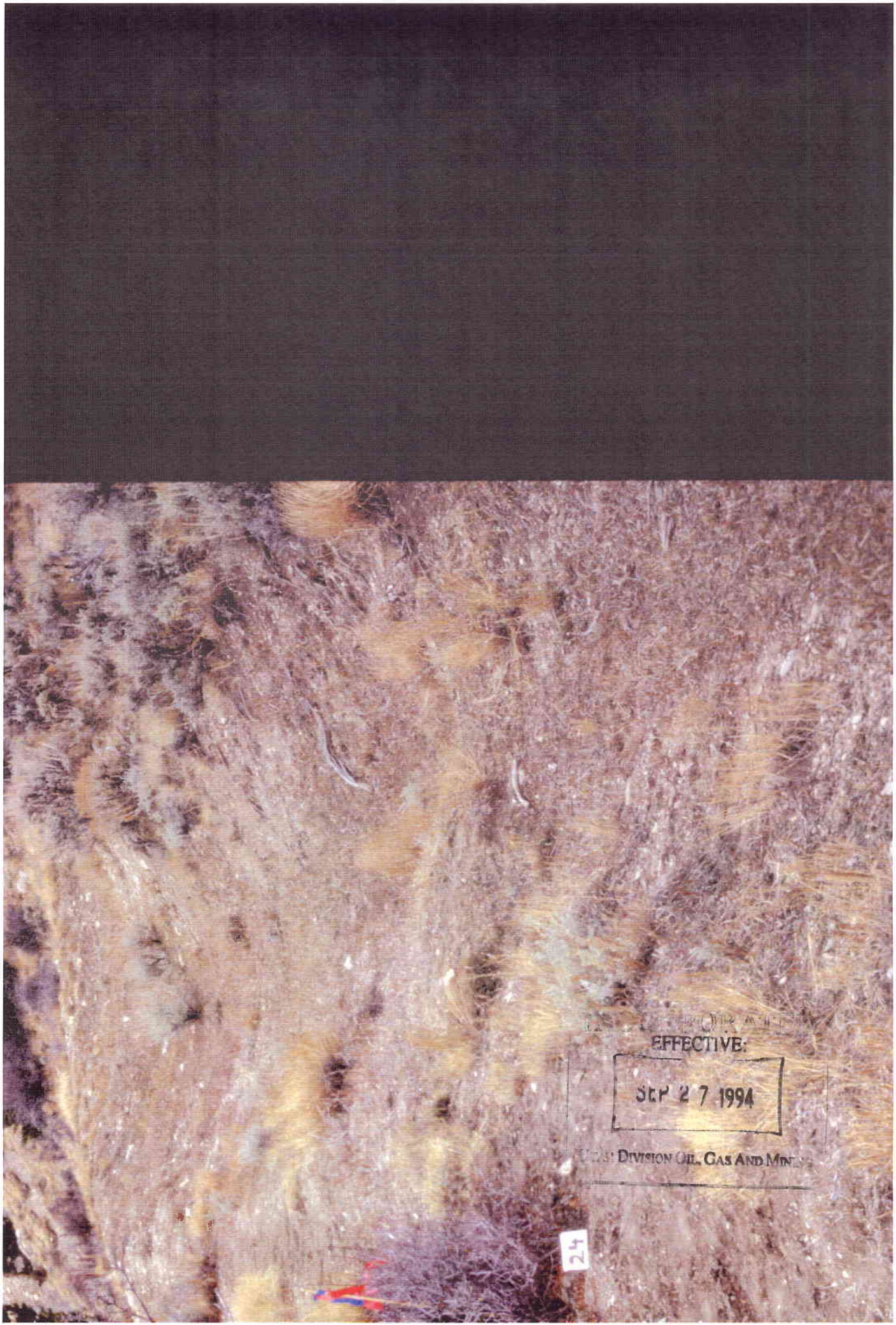
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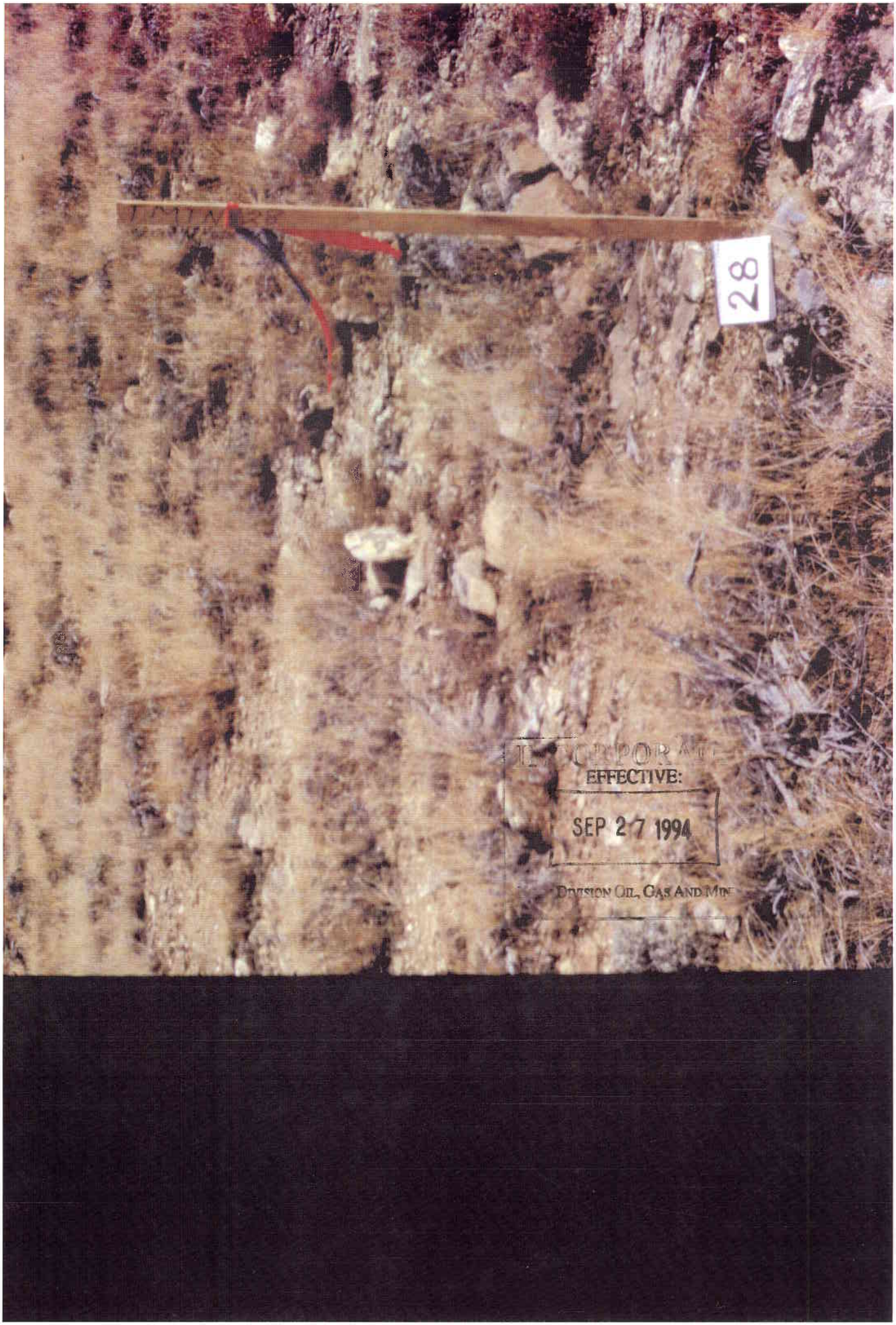
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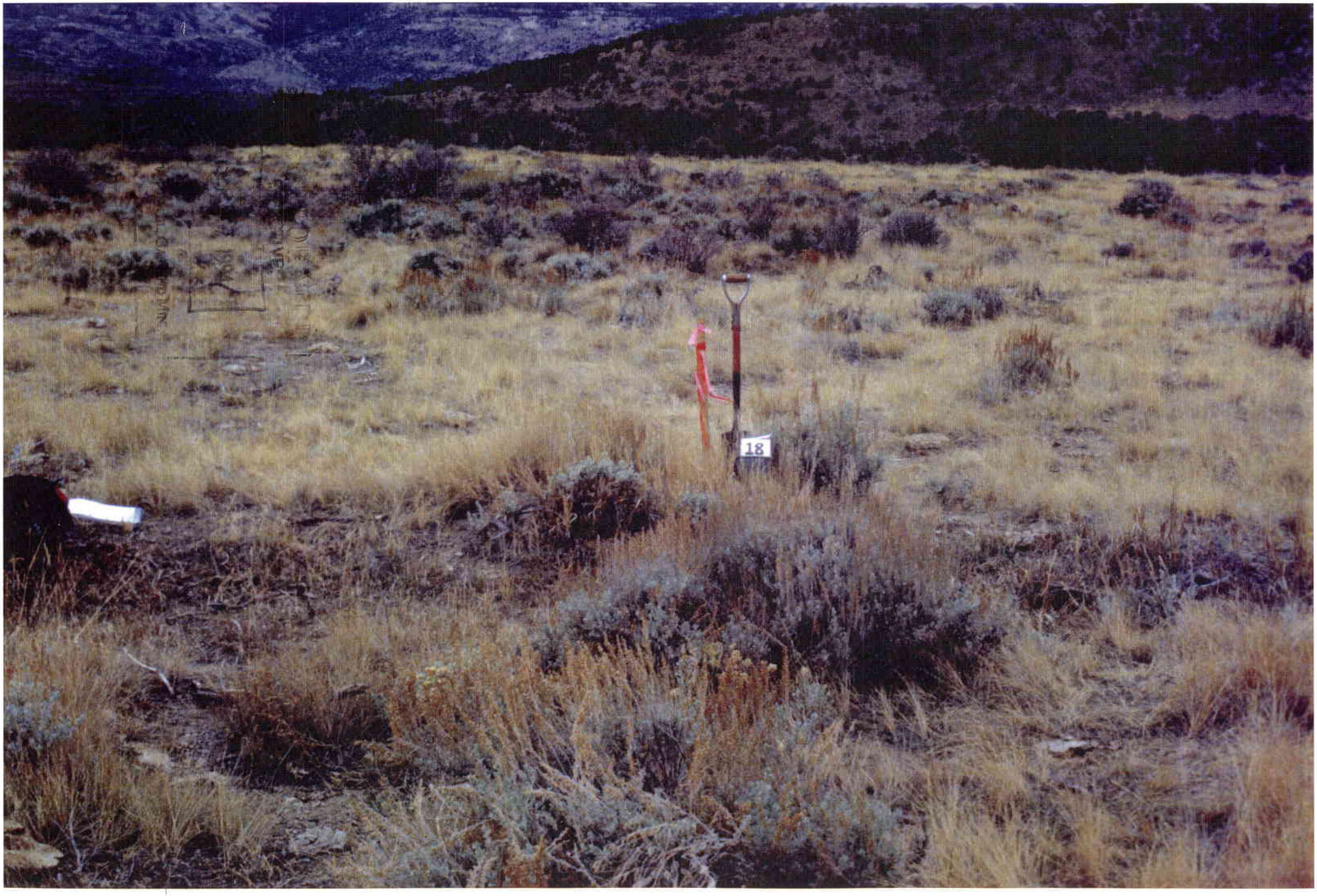
18

APPENDIX C

MANTI LASAL FOREST SERVICE
SOIL MAP UNIT DESCRIPTIONS

SOIL MAP UNIT NO. 20

MAP UNIT NAME: STRYCH - PATHEAD - PODO FAMILIES - RUBBLELAND COMPLEX
30 TO 80 PERCENT SLOPES

MAP UNIT SETTING

Landform: STEEPLY SLOPING ENCARPMENTRS AND CANYON SLOPES
Geology (parent material): COLLUVIUM WITH INTERBEDDED SANDSTONE, SILTSTONE, AND SHALE
Broad vegetative type: PINYON-JUNIPER
Elevation range: 5,000 to 8,000 feet
Climatic factors (mean annual):
Precipitation: 14 to 18 inches
Air temperature: 40 to 48 degrees F.
Freeze-free period: 60 to 100 days

COMPOSITION

30 percent: STRYCH FAMILY SOILS
30 percent: PATHEAD FAMILY SOILS
15 percent: PODO FAMILY SOILS
15 percent: RUBBLELAND
10 percent contrasting inclusions of rock outcrops and finer textured soils.

STRYCH FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED, MESIC USTOLLIC CALCIORTHIDS
Parent materials: SANDSTONE, SILTSTONE, SHALE, COLLUVIUM
Landscape position: CANYON AND ESCARPMENTS SIDESLOPES, GENERALLY ON TOESLOPES AND SOUTH ASPECTS
Slope range: 30 to 80 percent
Vegetative community type: PINYON-JUNIPER

Reference soil profile characteristics: REF. CCSS

0 to 5 inches: PINKISH GRAY VERY STONY LOAM
5 to 17 inches: LIGHT GRAY VERY STONY LOAM
17 to 47 inches: VERY PALE BROWN VERY STONY LOAM
to inches:

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATELY RAPID
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 40 TO 60 inches
Surface rock fragments: 25 TO 45 PERCENT
Runoff: RAPID
Soil erodibility: MODERATELY LOW
Erosion hazard (exposed soil): MODERATE

SOIL MAP UNIT NO. 20

PATHEAD FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED (CALCAREOUS) FRIGID TYPIC USTORTHENTS
Parent materials: COLLUVIUM FROM SANDSTONE AND SHALE
Landscape position: CANYON SLOPES
Slope range: 30 to 80 percent
Vegetative community type: PINYON-JUNIPER, MOUNTAIN MAHOGANY

Reference soil profile characteristics:

0	to 4	inches:	BROWN VERY GRAVELLY LOAM
4	to 15	inches:	YELLOWISH BROWN VERY COBBLY LOAM
15	to 60	inches:	BROWN VERY COBBLY LOAM
	to	inches:	
	to	inches:	

Depth class: DEEP AND MODERATELY DEEP
Drainage class: WELL DRAINER
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B AND C
Potential rooting depth: 30 TO 60 inches
Surface rock fragments: 20 TO 40 PERCENT
Runoff: RAPID
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE

PODO FAMILY SOIL

Taxonomic classification: LOAMY, MIXED (CALCAREOUS), FRIGID LITHIC USTORTHENTS
Parent materials: SANDSTONE AND SHALE
Landscape position: CANYON SLOPES
Slope range: 30 to 80 percent
Vegetative community type: PINYON-JUNIPER

Reference soil profile characteristics: (CCSS)

0	to 2	inches:	BROWN GRAVELLY SANDY LOAM
2	to 8	inches:	BROWN LOAM
8	to 11	inches:	BROWN GRAVELLY SANDY LOAM
11	to +	inches:	SANDSTONE
	to	inches:	

Depth class: SHALLOW
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATELY RAPID
Available water capacity: LOW
Hydrologic group: D
Potential rooting depth: 20 inches OR LESS
Surface rock fragments: 15 TO 30 PERCENT
Runoff: RAPID
Soil erodibility: LOW
Erosion hazard (exposed soil): MODERATE TO HIGH

SOIL MAP UNIT NO. 23

MAP UNIT NAME: RIDGE - GUBEN - PODO FAMILIES COMPLEX, 20 TO 60 PERCENT SLOPES

MAP UNIT SETTING

Landform: VERY STEEP RIDGES AND MOUNTAIN SIDES
Geology (parent material): LIMESTONE AND SHALE OF NORTH HORN FORMATION
Broad vegetative type: PINYON-JUNIPER - MOUNTAIN BRUSH - WHEATGRASS
Elevation range: 7,200 to 8,400 feet
Climatic factors (mean annual):
Precipitation: 15 to 18 inches
Air temperature: 45 to 50 degrees F.
Freeze-free period: 60 to 100 days

COMPOSITION

Lower % based on data

40 percent: RIDGE FAMILY SOILS
30 percent: GUBEN FAMILY SOILS
20 percent: PODO FAMILY SOILS
10 percent contrasting inclusions of rock outcrops and finer textured soils.

RIDGE FAMILY SOIL

Taxonomic classification: LOAMY, MIXED, FRIGID, SHALLOW TYPIC USTOCHREPTS
Parent materials: LIMESTONE AND SHALE OF NORTH HORN FORMATION
Landscape position: CONVEX
Slope range: 20 to 60 percent
Vegetative community type: PINYON, JUNIPER, SAGE, WHEATGRASS

Reference soil profile characteristics:

0	to 4	inches:	LIGHT YELLOWISH BROWN GRAVELLY LOAM
4	to 11	inches:	BROWN CLAY LOAM
11	to +	inches:	RED AND GREEN WEATHERED SHALE
	to	inches:	
	to	inches:	

Depth class: SHALLOW (10 TO 20 INCHES)
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: LOW
Hydrologic group: D
Potential rooting depth: 20 inches
Surface rock fragments: 45% PEBBLES, 10% COBBLES
Runoff: RAPID
Soil erodibility: LOW TO MODERATE
Erosion hazard (exposed soil): HIGH

GUBEN FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED TYPIC CALCIBOROLLS
Parent materials: LIMESTONE, SHALE, AND SANDSTONE
Landscape position: CONVEX
Slope range: 20 to 45 percent
Vegetative community type: SERVICE BERRY - BIRCHLEAF MOUNTAIN MAHOGANY
PINYON-JUNIPER
Reference soil profile characteristics:

0	to 9	inches:	BROWN GRAVELLY FINE SANDY LOAM
9	to 17	inches:	PALE BROWN GRAVELLY SANDY CLAY LOAM
17	to 26	inches:	YELLOWISH BROWN VERY GRAVELLY SANDY CLAY LOAM
26	to 42	inches:	YELLOWISH BROWN VERY GRAVELLY SANDY CLAY LOAM
	to	inches:	
	to	inches:	

Depth class: DEEP AND MODERATELY DEEP (30 TO 60 INCHES)
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 30% PEBBLES, 20% COBBLES, 5% STONES
Runoff: MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): HIGH

PODO FAMILY SOIL

Taxonomic classification: LOAMY, MIXED (CALCAREOUS), FRIGID LITHIC
USTORTHENTS
Parent materials: LIMESTONE AND SHALE
Landscape position: CONVEX
Slope range: 20 to 60 percent
Vegetative community type: PINYON-JUNIPER

Reference soil profile characteristics:

0	to 1	inches:	WHITE LOAM
1	to 8	inches:	LIGHT GRAY LOAM
8	to +	inches:	WEATHERED AND FRACTURED LIMESTONE BEDROCK
	to	inches:	
	to	inches:	
	to	inches:	

Depth class: VERY SHALLOW AND SHALLOW (LESS THAN 20 INCHES)
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: LOW
Hydrologic group: D
Potential rooting depth: 10 inches
Surface rock fragments: 10 TO 30 PERCENT
Runoff: VERY RAPID
Soil erodibility: MODERATELY HIGH
Erosion hazard (exposed soil): HIGH

SOIL MAP UNIT NO. 24

MAP UNIT NAME: RABBITEX - REPP, REVA FAMILIES COMPLEX
5 TO 30 PERCENT SLOPES

MAP UNIT SETTING

Landform: COMPLEX RIDGES AND BENCHES
Geology (parent material): LIMESTONE AND SHALE
Broad vegetative type: MOUNTAIN BRUSH, SAGEBRUSH, LIMBER PINE
Elevation range: 8,200 to 8,800 feet
Climatic factors (mean annual):
Precipitation: 15 to 20 inches
Air temperature: 40 to 45 degrees F.
Freeze-free period: 60 to 100 days

COMPOSITION

40 percent: RABBITEX FAMILY SOILS
30 percent: REPP FAMILY SOILS
15 percent: REVA FAMILY SOILS
15 percent contrasting inclusions of Cumulic Haploborolls, rock outcrop, and colder (Cryic) soils.

RABBITEX FAMILY SOIL

Taxonomic classification: FINE-LOAMY, MIXED TYPIC CALCIBOROLLS
Parent materials: LIMESTONE AND SHALE
Landscape position: CONVEX TO RELATIVELY FLAT
SLOPES range: 5 to 30 percent
Vegetative community type: SAGEBRUSH AND WHEATGRASS

Reference soil profile characteristics:

0 to 11 inches: BROWN GRAVELLY LOAM
11 to 24 inches: LIGHT GRAY SILT LOAM
24 to 42 inches: LIGHT GRAYISH BROWN SILTY CLAY LOAM
to inches:
to inches:

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 0 TO 10 PERCENT
Runoff: HIGH
Soil erodibility: MODERATE
Erosion hazard (exposed soil): HIGH

REPP FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED, FRIGID TYPIC USTOCHREPTS
Parent materials: LIMESTONE AND SHALE
Landscape position: CONVEX SLOPES
SLOPES range: 10 to 30 percent
Vegetative community type: MOUNTAIN BRUSH - GRASS

Reference soil profile characteristics:

0 to 5 inches: PALE BROWN SANDY CLAY LOAM
5 to 16 inches: PALE BROWN VERY GRAVELLY CLAY LOAM
16 to 44 inches: BROWN VERY GRAVELLY SANDY CLAY LOAM
____ to ____ inches:
____ to ____ inches:
____ to ____ inches:

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATELY SLOW
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 40 TO 60 inches
Surface rock fragments: 20 TO 60 PERCENT
Runoff: MODERATE
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE TO HIGH

REVA FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED (CALCAREOUS), FRIGID LITHIC USTORTENTS
Parent materials: LIMESTONE, SANDSTONE, SHALE
Landscape position: CONVEX SLOPES
SLOPES range: 10 to 30 percent
Vegetative community type: PINION-JUNIPER, MOUNTAIN BRUSH

Reference soil profile characteristics:

0 to 4 inches: GRAYISH BROWN COBBLY LOAM
4 to 18 inches: PALE BROWN VERY COBBLY CLAY LOAM
18 to ____ inches: WEATHERED BEDROCK
____ to ____ inches:
____ to ____ inches:
____ to ____ inches:

Depth class: SHALLOW
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): SLOW
Available water capacity: LOW
Hydrologic group: D
Potential rooting depth: <20 inches
Surface rock fragments: 15 TO 40 PERCENT
Runoff: MODERATELY RAPID
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE

SOIL MAP UNIT NO. 25

MAP UNIT NAME: FRANDSEN - ALLENS PARK - REPP FAMILIES COMPLEX,

5 TO 30 PERCENT SLOPES

MAP UNIT SETTING

Landform: MOUNTAIN SIDES, FOOTHILLS, AND BENCHES
Geology (parent material): SANDSTONE AND SHALE
Broad vegetative type: PINYON-JUNIPER
Elevation range: 6,000 to 7,500 feet
Climatic factors (mean annual):
Precipitation: 12 to 16 inches
Air temperature: 43 to 47 degrees F.
Freeze-free period: 60 to 100 days

COMPOSITION

30 percent: FRANDSEN FAMILY SOILS
25 percent: ALLENS PARK FAMILY SOILS
25 percent: REPP FAMILY SOILS
20 percent contrasting inclusions of sandier soils and rock outcrop

FRANDSEN FAMILY SOIL

Taxonomic classification: FINE-LOAMY, MIXED (CALCAREOUS), FRIGID TYPIC USTORTHENTS
Parent materials: SANDSTONE AND SHALE
Landscape position: COMPLEX SLOPES
SLOPES range: 5 to 30 percent
Vegetative community type: PINYON-JUNIPER

Reference soil profile characteristics:

0	to 4	inches:	LIGHT GRAY SILTY CLAY LOAM
4	to 22	inches:	LIGHT OLIVE GRAY SILTY CLAY LOAM
22	to +	inches:	WEATHERED SHALE
	to	inches:	
	to	inches:	

Depth class: MODERATELY DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): SLOW
Available water capacity: LOW
Hydrologic group: C
Potential rooting depth: 20 TO 40 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: RAPID
Soil erodibility: HIGH
Erosion hazard (exposed soil): HIGH

ALLENS PARK FAMILY SOIL

Taxonomic classification: FINE - LOAMY, MIXED TYPIC EUTROBORALFS
Parent materials: SHALE AND SANDSTONE
Landscape position: COMPLEX UPLANDS AND BENCHES, TYPICALLY NORTH ASPECT
SLOPES range: 5 to 30 percent
Vegetative community type: PINYON-JUNIPER - MIXED MOUNTAIN BRUSH

Reference soil profile characteristics:

0	to	3	inches:	BROWN SANDY CLAY LOAM
3	to	10	inches:	LIGHT YELLOWISH BROWN CLAY LOAM
10	to	24	inches:	LIGHT BROWNISH GRAY CLAY LOAM
24	to	36	inches:	PALE YELLOW COBBLY SANDY CLAY LOAM
36	to	+	inches:	WEATHERED SANDSTONE
	to		inches:	

Depth class: MODERATELY DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATELY SLOW
Available water capacity: MODERATE TO LOW
Hydrologic group: C
Potential rooting depth: 20 TO 40 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: MODERATE
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE

REPP FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED, FRIGID TYPIC USTOCHREPTS
Parent materials: SANDSTONE AND SHALE
Landscape position: COMPLEX SLOPES
SLOPES range: 5 to 30 percent
Vegetative community type: PINYON-JUNIPER

Reference soil profile characteristics:

0	to	5	inches:	PALE BROWN SANDY CLAY LOAM
5	to	16	inches:	PALE BROWN VERY GRAVELLY CLAY LOAM
16	to	44	inches:	BROWN VERY GRAVELLY SANDY CLAY LOAM
	to		inches:	
	to		inches:	
	to		inches:	

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 40 TO 60 inches
Surface rock fragments: 20 TO 60 PERCENT
Runoff: MODERATE
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE TO HIGH

SOIL MAP UNIT NO. 107

MAP UNIT NAME: CURECANTI - ELWOOD - DUCHESNE FAMILIES COMPLEX,
20 TO 70 PERCENT SLOPES

MAP UNIT SETTING

Landform: STEEPLY SLOPING, DISSECTED CANYON AND MOUNTAIN SLOPES
Geology (parent material): SANDSTONE AND SHALE
Broad vegetative type: MOUNTAIN BRUSH, DOUGLAS FIR
Elevation range: 7,000 to 9,000 feet
Climatic factors (mean annual):
Precipitation: 16 to 25 inches
Air temperature: 38 to 45 degrees F.
Freeze-free period: 80 to 100 days

COMPOSITION

30 percent: CURECANTI FAMILY SOILS
25 percent: ELWOOD FAMILY SOILS
25 percent: DUCHESNE FAMILY SOILS
20 percent contrasting inclusions of rock outcrops

CURECANTI FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED TYPIC ARGIBOROLLS
Parent materials: SANDSTONE, COLLUVIUM
Landscape position: MOUNTAIN SIDESLOPE
Slope range: 20 to 70 percent
Vegetative community type: SAGEBRUSH - MOUNTAIN BRUSH

Reference soil profile characteristics:

0	to 7	inches:	DARK GRAYISH BROWN LOAM
7	to 15	inches:	BROWN VERY STONY LOAM
15	to 20	inches:	VERY PALE BROWN VERY STONY LOAM
20	to 60	inches:	PALE BROWN VERY STONY LOAM
	to	inches:	

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: RAPID
Soil erodibility: MODERATE
Erosion hazard (exposed soil): HIGH

SOIL MAP UNIT NO. 107

ELWOOD FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED ARGIC CRYOBOROLLS
Parent materials: SANDSTONE AND SHALE, COLLUVIUM
Landscape position: MOUNTAIN SIDESLOPE
Slope range: 20 to 60 percent
Vegetative community type: MOUNTAIN BRUSH

Reference soil profile characteristics:

0	to	7	inches: GRAYISH BROWN LOAM
7	to	15	inches: GRAYISH BROWN VERY COBBLY CLAY LOAM
15	to	39	inches: PALE BROWN VERY COBBLY LOAM
39	to	50	inches: LIGHT GRAY COBBLY CLAY LAOM
50	to	60	inches: PALE BROWN VERY COBBLY FINE SANDY LOAM
	to		inches:

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): HIGH

DUCHESNE FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED TYPIC CRYOBORALFS
Parent materials: SANDSTONE, COLLUVIUM
Landscape position: MOUNTAIN SIDESLOPE, GENERALLY NORTH ASPECT OR IN DRAWS
Slope range: 20 to 80 percent
Vegetative community type: DOUGLAS FIR - WHITE FIR

Reference soil profile characteristics:

0	to	9	inches: BROWN LOAM
9	to	35	inches: PINKISH GRAY COBBLY CLAY LAOM
35	to	60	inches: LIGHT BROWN VERY COBBLY CLAY LOAM
	to		inches:
	to		inches:
	to		inches:

Depth class: DEEP
Drainage class: WELL
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): HIGH

SOIL MAP UNIT NO. 411

lower precip. phase

MAP UNIT NAME: CLAYBURN - FAIM FAMILIES COMPLEX

5 TO 30 PERCENT

MAP UNIT SETTING

20-25" in trail gulch

Landform: OCCUPIES LOW ROLLING HILLS ~~IN~~ AND VALLEY AREAS
Geology (parent material): SANDSTONE ~~AND~~, SHALE, AND LIMESTONE
Broad vegetative type: MOUNTAIN BIG SAGEBRUSH
Elevation range: 8,400 to 9,800 feet
Climatic factors (mean annual):
Precipitation: 25 to 30 inches
Air temperature: 32 to 38 degrees F.
Freeze-free period: 20 to 40 days

COMPOSITION

55 percent: CLAYBURN FAMILY
30 percent: FAIM FAMILY
percent:
15 percent contrasting inclusions.

CLAYBRUN FAMILY SOIL

Taxonomic classification: FINE-LOAMY, ARGIC PACHIC CRYOBOROLLS
Parent materials: ALLUVIUM AND COLLUVIUM
Landscape position: GENTLY SLOPING TO STEEP SIDE SLOPES
Slope range: 5 to 30 percent
Vegetative community type: MOUNTAIN BIG SAGEBRUSH-GRASSES

Reference soil profile characteristics:

0 to 17 inches: DARK GRAYISH-BROWN LOAM
17 to 60 inches: LIGHT GRAYISH-BROWN CLAY
to inches:
to inches:
to inches:

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MEDIUM
Available water capacity: HIGH
Hydrologic group: D
Potential rooting depth: 60 inches
Surface rock fragments: 2 TO 10 PERCENT
Runoff: LOW
Soil erodibility: MODERATE
Erosion hazard (exposed soil): LOW

SOIL MAP UNIT NO. 411

FAIM FAMILY SOIL

Taxonomic classification: FINE, MONTMORILLONITIC ARGIC PACHIC CRYOBOROLLS
Parent materials: SHALE AND LIMESTONE
Landscape position: MOUNTAIN SLOPES AND CONCAVE POSITIONS
Slope range: 5 to 30 percent
Vegetative community type: SAGEBRUSH-GRASS, TALL FORB

Reference soil profile characteristics:

0	to	21	inches:	VERY DARK GRAYISH BROWN CLAY LOAM
21	to	31	inches:	BROWN CLAY
31	to	44	inches:	GRAY CLAY
44	to	60	inches:	LIGHT BROWNISH GRAY CLAY LOAM
	to		inches:	
	to		inches:	

Depth class: DEEP
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): SLOW TO VERY SLOW
Available water capacity: MODERATELY HIGH
Hydrologic group: D
Potential rooting depth: 60 inches
Surface rock fragments: 0 TO 10 PERCENT
Runoff: LOW TO MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): MODERATE

SOIL MAP UNIT NO. 561

Lower Precip. phase

MAP UNIT NAME: CLAYBURN-FAIM-BEHANIN FAMILIES COMPLEX

5 TO 40 PERCENT SLOPES

MAP UNIT SETTING

Landform: RIDGES AND MOUNTAINSIDES
Geology (parent material): SANDSTONE, SHALE, LIMESTONE, COLLUVIUM
Broad vegetative type: ASPEN
Elevation range: 8,400 to 10,300 feet
Climatic factors (mean annual):
Precipitation: 25 to 30 inches
Air temperature: 34 to 38 degrees F.
Freeze-free period: 40 to 80 days

COMPOSITION

55 percent: CLAYBURN FAMILY SOILS
20 percent: FAIM FAMILY SOILS
15 percent: BEHANIN FAMILY SOILS
10 percent contrasting inclusions of

CLAYBURN FAMILY SOIL

Taxonomic classification: FINE-LOAMY, MIXED ARGIC PACHIC CRYOBOROLLS
Parent materials: SANDSTONE, SHALE, LIMESTONE, COLLUVIUM.
Landscape position: CONVEX
Slope range: 5 to 40 percent
Vegetative community type: ASPEN-TALL FORB AND ASPEN-SNOWBERRY

Reference soil profile characteristics:

0 to 9 inches: DARK BROWN LOAM
9 to 28 inches: DARK BROWN CLAY LOAM
28 to 60 inches: VERY PALE BROWN VERY COBBLY LOAM
to inches:
to inches:

Depth class: DEEP
Drainage class: WELL-DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: HIGH
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 5 TO 15 PERCENT
Runoff: MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): LOW TO MODERATE

SOIL MAP UNIT NO. 561

FAIM FAMILY SOIL

Taxonomic classification: FINE, MONTMOAILLONITIC ARGIC PACHIC CRYOBOROLLS.
Parent materials: SHALE, SANDSTONE, LIMESTONE, COLLUVIUM
Landscape position: CONCAVE
Slope range: 5 to 20 percent
Vegetative community type: ASPEN-TALL FORB

Reference soil profile characteristics:

0 to 8 inches: DARK GRAYISH BROWN CLAY LOAM
8 to 30 inches: BROWN CLAY
30 to 42 inches: BROWN CLAY LOAM
42 to 60 inches: PALE BROWN LOAM
____ to ____ inches:
____ to ____ inches:

Depth class: DEEP (40 TO 60 INCHES)
Drainage class: MODERATELY WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATELY LOW
Available water capacity: 7 TO 9 INCHES
Hydrologic group: C
Potential rooting depth: 60 inches
Surface rock fragments: 0 TO 10 PERCENT
Runoff: MEDIUM
Soil erodibility: MODERATE
Erosion hazard (exposed soil): LOW TO MODERATE

BEHANIN FAMILY SOIL

Taxonomic classification: LOAMY-SKELETAL, MIXED PACHIC CRYOBOROLLS
Parent materials: SANDSTONE, SHALE
Landscape position: CONVEX
Slope range: 10 to 30 percent
Vegetative community type: ASPEN-SNOWBERRY, ASPEN-TALL FORB

Reference soil profile characteristics:

0 to 13 inches: DARK BROWN LOAM
13 to 25 inches: DARK BROWN VERY STONY LOAM
25 to 31 inches: LIGHT GRAY EXTREMELY STONY LOAM
31 to 45 inches: VERY PALE BROWN EXTREMELY STONY CLAY LOAM
45 to + inches: FRACTURED AND WEATHERED SANDSTONE AND SHALE
____ to ____ inches:

Depth class: DEEP (40 TO 60 INCHES)
Drainage class: WELL DRAINED
Saturated hydraulic conductivity (permeability): MODERATE
Available water capacity: LOW TO MODERATE
Hydrologic group: B
Potential rooting depth: 60 inches
Surface rock fragments: 5 TO 20 PERCENT
Runoff: SLOW
Soil erodibility: MODERATE
Erosion hazard (exposed soil): LOW TO MODERATE

APPENDIX D

USDA MANTI LASAL FOREST SERVICE/ USDA SOIL CONSERVATION SERVICE

Official Soil Series Descriptions

Soil Series Family Name	Drill Pad Number	Soil Profile Description	
		SCS	FS
Clayburn	TMTN 16, 17	3/77	FS 7/93
Frandsen	TMTN 19, 23, 27	SCS 1/83	(not completed by FS)
Rabbitex	TMTN 18, 24, 25, 26		FS 7/93
Reva	TMTN 20, 21, 28	SCS 1/80	(not completed by FS)
Trag	TMTN 22		FS 7/93

Established Series
Rev. EJ/LW/MEO/AJE
3/77

CLAYBURN SERIES

The Clayburn series consists of deep, well drained soils that formed in glacial drift derived mainly from andesite. Clayburn soils are on plateaus and have slopes of 2 to 50 percent. The mean annual precipitation is about 30 inches and the mean annual air temperature is about 40°F.

Taxonomic Class: Fine-loamy, mixed Argic Pachic Cryoborolls.

Typical Pedon: Clayburn loam - rangeland. (Colors are for air dry soil unless otherwise noted.)

A11--0 to 2 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; slightly acid (pH 6.2); abrupt wavy boundary. (1 to 4 inches thick)

A12--2 to 12 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium granular structure; slightly hard, friable, nonsticky and nonplastic; many fine and few medium roots; many fine pores; slightly acid (pH 6.4); clear wavy boundary. (8 to 12 inches thick)

A13--12 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure that parts to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many fine pores; slightly acid; (pH 6.4); abrupt irregular boundary. (6 to 12 inches thick)

B1--18 to 24 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure that parts to fine subangular blocky; hard, friable, sticky and plastic; many fine and few medium roots; common fine pores; slightly acid (pH 6.3); clear wavy boundary. (3 to 6 inches thick)

B21t--24 to 36 inches; brown (10YR 5/3) sandy clay loam marginal to clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure that parts to moderate fine blocky; hard, firm, very sticky and very plastic; many roots; few fine pores; moderately thick continuous clay films; slightly acid (pH 6.2); clear wavy boundary. (12 to 22 inches thick)

B22t--36 to 41 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure that parts to moderate fine blocky; hard, firm, sticky and plastic; many fine roots; few fine pores; thin patchy clay films; slightly acid (pH 6.2); clear wavy boundary. (5 to 8 inches thick)

C1--41 to 48 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; single grained or massive; loose, very friable, nonsticky and nonplastic; few fine roots; slightly acid (pH 6.4); clear wavy boundary. (0 to 7 inches thick)

C2--48 to 57 inches; same as above horizon except very gravelly and weakly consolidated.

Type Location: Wasatch County, Utah; about 12 miles east of Heber; on the plateau between Lake Creek and the Provo River; 1.75 air line miles north of Witts Lake; 1,780 feet east and 210 feet south of NW corner of sec. 10, T.4S., R.6E.

Range in Characteristics: The mollic epipedon is more than 16 inches thick and organic matter decreases regularly with increasing depth. The upper boundary of the argillic horizon is within 24 inches of the surface. The mean annual soil temperature is about 40°F. and the mean summer temperature is about 58°F. The soils are usually moist and are dry less than 90 cumulative days in some subhorizon.

The A horizon has value of 3 or 4 dry, 1.5 or 2 moist, and chroma of 2 or 3. It has weak or moderate fine or medium granular to weak subangular blocky structure.

The B2t horizon has hue of 7.5YR or 10YR, value of 4 through 6 dry, 3 through 5 moist and chroma of 2 through 4. It is sandy clay loam or light clay loam, has less than 35 percent clay and contains few to about 20 percent coarse fragments of gravel and cobble size. This horizon extends to depths of 36 to 50 inches below the surface. It is slightly acid or neutral.

The C horizon has chroma of 2 through 4. It is gravelly or very gravelly sandy loam or loam.

Competing Series: These are the Bachus, Bear Basin, Benteen, Broadhead, Cambern, Decross, Demast, Dranyon, Gordo, Harmehl, Hourglass, Mult, Packsaddle, Sessions and Stubbs series. Bachus, Benteen and Cambern soils have bedrock at depths of 20 to 40 inches. Bear Basin, Hourglass, Mult and Sessions have mollic epipedons less than 16 inches thick. Also, Bear Basin soils have albic horizons and Sessions soils have more than 35 percent clay in the B2t horizon. Broadhead soils have mean summer temperature of more than 59°F. and are dry for more than 60 consecutive days in the 3- to 20-inch depth. Decross soils have a zone of CaCO3 accumulation at depths of 15 to 40 inches. Demast, Dranyon, and Harmehl soils have 20 to 35 percent coarse fragments in the argillic horizon. Harmehl soils are very cobbly at about 35 inch depth. Gordo soils have hue of 5YR or 2.5YR in the B2t horizon. Packsaddle soils have horizons of carbonate accumulation at depths of 15 to 25 inches and have contrasting texture changes to sand and gravel at about 40 inches. Stubbs soils have a paralithic contact at depths of 20 to 40 inches.

Geographic Setting: Clayburn soils are on plateaus at elevations of 6,800 to 9,000 feet. They formed in glacial drift derived mainly from andesite. Slopes range from 2 to 50 percent. The climate is humid, with about 25 to 35 inches of precipitation falling mostly as snow. Mean annual temperature is about 40°F. The mean summer temperature is about 58°F. Frost-free period is about 50 to 80 days.

Geographically Associated Soils: These are the Baird Hollow and Flygare soils and the competing Sessions soils. Baird Hollow and Flygare soils have albic horizons with upper boundary below 24 inches.

Drainage and Permeability: Well drained; medium runoff; moderate permeability.

Use and Vegetation: These soils are used for watershed and rangeland from late spring through fall for livestock and wildlife grazing. Important plants are mountain bromegrass, oniongrass, slender wheatgrass, bearded wheatgrass, geranium, horsemint, peavine, Jacob's ladder, snowberry, shrubby cinquefoil, big sagebrush, western wheatgrass, and bluegrass.

Distribution and Extent: Mountain areas of Colorado and Utah. This series is moderately extensive.

Series Established: Wasatch County (Wasatch Area), Utah, 1971.

National Cooperative Soil Survey
U. S. A.

Clayburn Family

The Clayburn family consists of deep and very deep, well drained, moderately permeable soils on broad ridge tops and mountain slopes. They have formed from residual materials and colluvium from sandstone and shale. Slopes are 5 to 40 percent. Elevation is about 8000 to 9200 feet. Average annual precipitation is 25 to 35 inches and mean annual air temperature is 32 to 40 degrees F.

These soils are classified as fine-loamy, mixed Argic Pachic Cryoborolls.

A reference pedon of the Clayburn family is in Map Unit 561; SW¼, Sec. 12, T. 13 S., R. 6 E.

A — 0 to 9 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few medium and coarse roots; neutral (pH 7.2); clear smooth boundary.

Bt — 9 to 28 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine and few coarse roots; 2 percent gravel and 5 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

C ___ 28 to 60 inches; very pale brown (10YR 8/3) very cobbly loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and coarse roots; 5 percent gravel, 25 percent cobbles, and 10 percent stones; moderately alkaline (pH 8.0).

Bedrock is at 40 to 60 inches or more; the particle size control section has 27 to 35 percent clay and 0 to 15 percent rock fragments.

The A horizon has hue of 7.5 YR or 10 YR, value of 4 or 5 dry and 2 or 3 moist, and chroma of 2 or 3 dry or moist. It is loam, silt loam, or sandy loam. It is slightly acid to neutral.

The B horizon has hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 dry and 3 to 5 moist; and chroma of 2 to 6 moist or dry. It is loam, clay loam, silty clay loam, or sandy clay loam. It is slightly acid to neutral.

The C horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y; value of 6 to 8 dry and 4 to 6 moist; and chroma of 2 to 4 dry and 2 to 6 moist. It is very cobbly loam, clay loam, or loam. It is slightly acid to moderately alkaline

Established Series
Rev. MM/LHS/RLM
1/83

FRANDSEN SERIES

The Frandsen series consists of very deep, well drained, moderately slowly permeable soils that formed from alluvium and colluvium derived from sandstone, limestone and shale. Frandsen soils are on dissected alluvial fans and mountain footslopes and have slopes of 1 to 50 percent. The average annual precipitation is about 14 inches and mean annual temperature is 42 degrees F.

TAXONOMIC CLASS: Fine-loamy, mixed (calcareous), frigid Typic Ustorthents. Calcic Ustochrept

TYPICAL PEDON: Frandsen loam - rangeland. (Colors are for air-dry soil unless otherwise stated.)

A--0 to 3 inches; light brownish gray (10YR 6/2) loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few fine medium and coarse roots; common fine pores; 10 percent pebbles; strongly calcareous; moderately alkaline (pH 8.0); abrupt smooth boundary. (2 to 8 inches thick)

Bw--3 to 21 inches; light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, friable, slightly plastic; few fine medium and coarse roots; few coarse and very fine pores; 5 percent pebbles; strongly calcareous; strongly alkaline (pH 8.6); gradual smooth boundary. (15 to 22 inches thick)

Bk1--21 to 37 inches; pinkish gray (7.5YR 6/2) loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine pores; 10 percent pebbles; few fine carbonate flakes; strongly calcareous; strongly alkaline (pH 8.8); clear wavy boundary. (12 to 18 inches thick)

Bk2--37 to 43 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; 10 percent pebbles; few fine carbonate flakes; strongly calcareous; strongly alkaline (pH 8.6); clear wavy boundary. (4 to 10 inches thick)

C--43 to 60 inches; pale brown (10YR 6/3) loam; brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; 10 percent pebbles; strongly calcareous; strongly alkaline (pH 8.8).

TYPE LOCATION: Garfield County, Utah; 3 miles northwest of the Pink Cliffs Motel; 1,600 feet south and 2,600 feet east of the northwest corner of sec. 3, T. 36 S., R. 3 W.

RANGE IN CHARACTERISTICS: Mean annual soil temperature is 40 to 45 degrees F. The mean summer soil temperature is 60 to 62 degrees F. The soils are dry in some or all parts of the moisture control section for 90 to 110 consecutive days in most years, but are moist in some parts 50 to 60 percent of the time the soil temperature exceeds 41 degrees F., at a depth of 20 inches.

The A horizon has hue of 10YR to 5YR, value of 4 to 6 dry, 3 or 4 moist and chroma of 2 to 4 dry and moist.

The Bw and Bk horizons have hue of 10YR to 5YR, value of 5 or 6 dry, 3 to 5 moist and chroma of 2 to 4 dry, 2 to 5 moist. They are loam or clay loam. Clay content averages from 20 to 35 percent. Rock fragments range from 0 to 10 percent. Reaction is moderately or strongly alkaline.

The C horizon has hue of 10YR to 5YR, value of 5 or 6 dry, 3 to 5 moist and chroma of 2 to 4 dry, 2 to 5 moist. It is typically loam, but includes fine sandy loam below 40 inches. Rock fragments range from 0 to 10 percent. This horizon is moderately alkaline or strongly alkaline.

COMPETING SERIES: These are the Sheepcan and Zahill series. Sheepcan soils have 20 to 35 percent rock fragments in the particle-size control section. Zahill soils have accumulations of secondary carbonates at depths of 6 to 30 inches and have hue of 2.5Y or 5Y.

GEOGRAPHIC SETTING: Frandsen soils are at elevations of 6,800 to 8,000 feet. Slopes are 1 to 50 percent. These soils occur on fan terraces, dissected alluvial fans and mountain footslopes and formed in colluvium and alluvium weathered from sandstone, limestone, and shale. The climate is dry subhumid, average annual precipitation is 12 to 20 inches. The mean annual temperature is 38 to 45 degrees F., and the freeze-free period is 60 to 100 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Cooney, Guben, Luhon, and Panguitch soils. Cooney soils have carbonatic mineralogy and have a fine-silty particle-size control section. Guben soils have a mollic epipedon and have a calcic horizon. Luhon soils have a calcic horizon. Panguitch soils have a mollic epipedon, a cambic horizon and a calcic horizon.

DRAINAGE AND PERMEABILITY: Well-drained; medium runoff; moderately slow permeability.

USE AND VEGETATION: These soils are used for rangeland, woodland and wildlife habitat. The potential vegetation is mountain big sagebrush, Indian ricegrass, bluebunch wheatgrass, and yellowbrush.

DISTRIBUTION AND EXTENT: South-central and central Utah. The series is inextensive.

SERIES ESTABLISHED: Carbon County, Utah, 1982.

National Cooperative Soil Survey

U.S.A.

Rabbitex Family

The Rabbitex family consists of deep and very deep, well drained, moderately permeable soils on alluvial fans and mountain slopes. They have formed from alluvial and colluvial materials from sandstone and shale. Slopes are 5 to 40 percent. Elevation is about 7200 to 9000 feet. Average annual precipitation is 15 to 20 inches and mean annual air temperature is 38 to 45 degrees F.

These soils are classified as fine-loamy, mixed Typic Calciborolls.

A reference pedon of the Rabbitex family is located in Map Unit 26; NE 1/4, NE 1/4, SE 1/4, Sec. 18 T. 17S, R. 6E.

A1 — 0 to 8 inches, brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; 5 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

B2t — 8 to 11 inches; brown (10YR 5/3) clay loam dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic;

2
Addition

common-very fine and fine and few medium roots; 5 percent gravel; violently effervescent (pH 8.3); clear smooth boundary.

Bk1 — 11 to 21 inches; very pale brown (10YR 7/3) clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; 10 percent gravel; violently effervescent; moderately alkaline (pH 8.3); gradual wavy boundary.

Bk2 — 21 to 36 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, sticky and plastic; few very fine and fine roots; 12 percent gravel; violently effervescent; moderately alkaline (pH 8.3); gradual wavy boundary.

C — 36 to 48; very pale brown (10YR 7/3) gravelly clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, sticky and plastic; 25 percent gravel; strongly effervescent (pH 8.2).

Depth to bedrock is 40 to 60 inches or more. The particle size control section has 5 to 30 percent rock fragments and 20 to 35 percent clay. Secondary calcium carbonate is at a depth of 10 to 18 inches.

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Appendix

The A horizon has value of 4 or 5 dry and 3 moist, and chroma of 2 or 3 dry or moist. It is loam, silt loam, clay loam, or sandy clay loam and may be gravelly or cobbly. It is mildly alkaline to moderately alkaline.

The Bk horizon has value of 6 to 8 dry and 4 to 6 moist and chroma of 1 to 4 dry and 2 to 4 moist. It is clay loam, silty clay loam, sandy clay loam or loam and may be gravelly or cobbly. It is moderately alkaline to strongly alkaline.

APPROVED BY HEAD, SOILS STAFF
MIDWEST TECHNICAL SERVICE CENTER; 1/14/80

Tentative Series
Rev. WFJ-LDZ
1/14/80

Maurice Huff

REVA SERIES

The Reva series consists of shallow, well drained soils formed in residuum weathered from sandstone or siltstone. Reva soils are on uplands. Permeability is moderate or moderately rapid. Slopes range from 6 to 100 percent. Mean annual precipitation is about 15 inches, and the mean annual air temperature is about 45° F.

Taxonomic Class: Loamy-skeletal, mixed (calcareous), frigid Lithic Ustorthents.

Typical Pedon: Reva gravelly fine sandy loam, on a convex ridge of 17 percent slope under native vegetation. When described the soil was moist to the bedrock. (Colors are for dry soil unless otherwise stated.)

A1--0 to 3 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; soft, very friable; many fine and medium roots; many fine and medium pebbles of hard sandstone; slight effervescence; mildly alkaline; abrupt wavy boundary. (1 to 4 inches thick)

C1--3 to 8 inches; light brownish gray (2.5Y 6/2) gravelly sandy loam; olive brown (2.5Y 4/3) moist; massive; soft, very friable; many fine and medium roots; 35 percent by volume of pebbles of sandstone; strong effervescence; mildly alkaline; clear wavy boundary.

C2--8 to 16 inches; white (2.5Y 8/2) gravelly sandy loam, olive (5Y 5/4) moist; massive; soft, very friable; common fine and medium roots between the rock fragments; 50 percent by volume of coarse fragments and cobblestone of sandstone; rock fragments coated with carbonate, interiors lack carbonates; strong effervescence in matrix; mildly alkaline; diffuse irregular boundary. (Combined thickness of the C horizon is 9 to 16 inches.)

R--16 to 24 inches; white (2.5Y 8/2) sandstone, pale olive (5Y 6/4) moist; hard to chip with a spade; few fine and medium roots following cracks; bedding planes separated 3 inches to over 10 inches; sandstone fragments coated with carbonates along bedding planes, interiors lack carbonates.

Type Location: Harding County, South Dakota; about 5½ miles west of Reva; 2,600 feet south and 1,040 feet east of the NW corner, sec. 17, T. 18 N., R. 8 E.

Range in Characteristics: Depth to hard sandstone ranges from about 10 to 20 inches. Rock fragments of sandstone range in size from pebbles to flagstones and are on the surface and mixed throughout the C horizon. Rock fragments make up 35 to 60 percent by volume of the soil. The soil averages between 15 and 25 percent clay. The soil typically is calcareous to the surface, but some pedons are free of carbonates in the upper 5 inches. Some pedons have 1 to 2 inches of mixed forest and grass litter on the surface.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 and 2 to 4 moist, and chroma of 1 or 2. It typically is gravelly fine sandy loam but is gravelly loam or gravelly sandy loam in some pedons. It contains 15 to 25 percent pebbles by volume. It ranges from slightly acid to mildly alkaline.

In some pedons there is a thin AC horizon 1 to 3 inches thick, but it is not continuous. It has color intermediate between the A and C horizons.

The C horizon has 10YR, 2.5Y, or 5Y hue, value of 5 to 8 and 4 to 6 moist, and chroma of 1 to 4. It typically is gravelly or very gravelly sandy loam but is gravelly, cobbly, or channery loam, fine sandy loam, or sandy loam, and contains 35 to 60 percent rock fragments by volume. It is mildly or moderately alkaline.

The R horizon is hard sandstone or siltstone that has numerous cracks in the upper part. It typically lacks free carbonates, but individual fragments are coated or impregnated with carbonates depending on the layer encountered.

Competing Series: There are no other series in the same family.

Geographic Setting: Reva soils are gently rolling to very steep crests of uplands and ridges. Slopes are dominantly convex and short to medium in length. Slopes range from 6 to 100 percent. The soil formed in residuum weathered from sandstone or siltstone. Mean annual air temperature ranges from 43 to 45° F, and the mean annual precipitation ranges from 13 to 17 inches.

Geographically Associated Soils: These are the Amor, Blackhall, Cabba, Cabbart, Cohagen, Lakoa, Reeder, Slimbutte, Vanocker, Watrous, and Werner soils. Amor, Reeder, and Werner soils have mollic epipedons and are on less sloping landscapes. In addition, the Amor and Reeder soils are fine-loamy and are moderately deep to soft sandstone. Blackhall, Cabba, Cabbart, and Cohagen are on lower nearby landscapes and have soft sandstone and siltstone bedrock at shallow depths. Lakoa soils have A2 horizons and argillic horizons and are on side slopes of lower landscapes. Slimbutte soils have mollic epipedons and are on lower landscapes. Vanocker soils are intermingled with Reva soils on plane slopes and have a cambic horizon and lack bedrock above 40 inches. Watrous soils are on nearby flats and gently sloping landscapes and have a mollic epipedon, an argillic horizon, and are moderately deep to hard sandstone.

Drainage and Permeability: Well drained; runoff is medium on gentle slopes and rapid on the steeper slopes. Permeability is moderate or moderately rapid.

Use and Vegetation: Rangeland. Native vegetation is mainly little bluestem, sideoats grama, threadleaf sedge, and some Ponderosa pine.

Distribution and Extent: On high pine covered buttes in northwestern South Dakota and possible east-central Montana. The series is of moderate extent.

Series Proposed: Harding County, South Dakota, 11/78. The name is from an old town site in Harding County.

Remarks: The series is proposed for shallow soils formed in White River and Arikaree materials of Tertiary Age on the West and East Short Pines and Slim Butte area that are distinctly different from the lower lying materials.

National Cooperative Soil Survey
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Trag Family

The Trag family consists of very deep, well drained, moderately permeable soils on mountain slopes. They have formed from colluvium and alluvium from sandstone and shale. Slopes are 5 to 50 percent. Average annual precipitation is 16 to 20 inches and mean annual air temperature is 38 to 45 degrees F.

These soils classify as fine-loamy, mixed Typic Argiborolls

A reference pedon of the Trag family is in Map Unit 101; NE 1/4, Sec. 12, T. 14S, R. 7E.

A1 — 0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and few medium roots; slightly acid (pH 6.2); clear smooth boundary.

A2 — 8 to 14 inches; ~~dark~~ brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium sub-angular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; neutral (pH 6.6); clear smooth boundary.

Bt1 — 14 to 18 inches; grayish brown (10YR 5/2) loam

dark grayish brown (10YR 4/2) moist; weak, fine, subangular blocky structure; slightly hard, friable slightly sticky and plastic; many fine and medium and few coarse roots; few thin continuous clay films on peds and in pores; neutral (pH 6.6) gradual wavy boundary.

BT2 — 28 to 42 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; hard, firm, sticky and very plastic; many medium and few fine and coarse roots; common moderately thick clay films on peds and in pores; medium acid (pH 6.0); gradual wavy boundary.

C — 42 to 60 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky and plastic; few fine roots; moderately alkaline (pH 8.4).

Depth to bedrock is 60 inches or more. The particle size control section has 27 to 35 percent clay and 0 to 15 percent rock fragments.

The A horizon has value of 4 to 6 dry and 3 or 4 moist and chroma of 2 or 3 moist or dry. It is loam or clay loam and slightly acid to slightly alkaline.

W31

The B horizon has value of 5 or 6 dry and 4 or 5 moist and chroma of 2 to 4 dry or moist. It is loam, clay loam, or silty clay loam. It is slightly acid to moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 dry and 5 or 6 moist, and chroma of 2 or 3 dry or moist.

1994 EXPLORATION DRILLING

TRAIL MOUNTAIN

SOIL STRIPPING AND STOCKPILING PLAN

The 1994 Trail Mountain Drilling project will occur within an area of Trail Mountain which has already been altered as a result of the Battlegrounds Watershed Improvement Project. This watershed project was initiated by the Ferron Ranger District in 1985. Soil removal, associated with construction of access roads and drilling pads will be necessary to facilitate drilling.

ACCESS ROADS

Soil removal associated with access road establishment, will be discussed herein and in the Soil Survey Report prepared by James H. Nyenhuis.

In areas of the access roads where topsoil stripping is necessary, the topsoil materials will be pushed into a berm along the outside edge of the access road. Previously developed access roads which are to be reopened will require removal of disturbed soil materials in some areas. The soil horizons have been disrupted in the previously disturbed areas (reclaimed roads and contour furrows); therefore, separation of topsoil is not feasible. These soil materials will also be placed along the outside edge of the access roads. This will be accomplished using a track dozer and motor grader. The access roads will be reclaimed within one month following construction; therefore, no soil stabilizing measures will be implemented. However, the topsoil berm will be protected from water erosion by measures as determined necessary and agreed upon by the US Forest Service, the Division and PacifiCorp. These measures may include; sloping the road bed away from the soil berm,

silt fence installed at areas of potential erosion, water bars, ditches or a combination of measures.

Additionally, if any access road or portion thereof, is to remain for longer than one month the soil materials will be protected through application of a straw mulch (certified weed free) and a sterile annual ryegrass. The mulch will be applied by hand at a minimum rate of 1,000 lbs per acre. The ryegrass will be applied at the rate of 20 PLS lbs/acre.

Sediment control for the soil berms will be provided by two (2) feet wide band of undisturbed vegetation along the toe of the berm outslope. Observation of previous drilling roads, on Trail Mountain and East Mountain, has indicated minimal movement of the soil from unprotected berms into the adjacent undisturbed vegetation. Therefore, a vegetative filter two (2) feet in width is expected to provide adequate sediment control. The vegetative filter is included in the disturbed area.

DRILL PADS

As discussed elsewhere in the application, the topsoil stripped from the drill pads will be placed in a pile up-slope from the pad and silt fence will be provided as necessary to protect the pile. If any topsoil pile is to remain longer than one month, it will be stabilized with mulch and seeding as described under Access Roads.

TMTN-16:

Access includes re-opening a reclaimed access road and development of a new road. The stripping depth will vary from 0 to 17 inches on the access road and will average 17 inches on the drill pad.

TMTN-17

Access includes re-opening a reclaimed access road and development of a new road. The stripping depth will vary from 0 to 17 inches on the access road and will average 17 inches on the drill pad.

TMTN-18

Access requires the development of a new road off an existing road. The stripping depth will vary from 0 to 16 inches on the access road and will average 16 inches on the drill pad.

TMTN-19

Access requires the development of a new road off an existing road. The stripping depth will vary from 0 to 12 inches on the access road and will average 12 inches on the drill pad.

TMTN-20

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 12 inches on the access road and will average 10 inches on the drill pad.

TMTN-21

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 8 inches on the access road and will average 8 inches on the drill pad.

TMTN-22

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 15 inches on the access road and will average 15 inches on the drill pad.

TMTN-23

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 14 inches on the access road and will average 14 inches on the drill pad.

TMTN-24

Access requires the development of a new road off an existing road. The stripping depth will vary from 0 to 13 inches on the access road and will average 13 inches on the drill pad.

TMTN-25

Access requires the development of a new road off an existing road. The stripping depth will vary from 0 to 18 inches on the access road and will average 18 inches on the drill pad.

TMTN-26

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 18 inches on the access road and will average 18 inches on the drill pad.

TMTN-27

Access utilizes the 1993 drill road that was left open from last years drilling project and the development of a new road. The stripping depth will vary from 0 to 12 inches on the access road and will average 12 inches on the drill pad.

TMTN-28

Access requires the development of a new road off an existing road. The stripping depth will vary from 0 to 8 inches on the access road and will average 8 inches on the drill pad.

1994 TRAIL MOUNTAIN DRILLING PLAN

	MAXIMUM STRIPPING DEPTH (IN.)		MAXIMUM SOIL STRIPPED (CU. YDS)		EROSION POTENTIAL (CU. YDS)		
DRILL HOLE #	ACCESS	PAD	STRIPPED SOIL ACCESS ROAD	STRIPPED SOIL DRILLING PAD	ACCESS	PAD	% OF STOCKPILE LOST
TMTN-16	17	17	2990	2554	.477	.140	1.11%
TMTN-17	17	17	3060	2554	.488	.140	1.12%
TMTN-18	16	16	39	2420	.006	.140	0.59%
TMTN-19	12	12	922	1613	.233	.140	1.47%
TMTN-20	12	10	422	1344	.106	.140	1.39%
TMTN-21	8	8	377	1074	.143	.140	1.95%
TMTN-22	15	15	1204	2284	.215	.140	1.02%
TMTN-23	14	14	37	2151	.007	.140	0.67%
TMTN-24	13	13	503	2015	.102	.140	0.96%
TMTN-25	18	18	1277	2688	.194	.140	0.84%
TMTN-26	18	18	509	2688	.077	.140	0.68%
TMTN-27	12	12	1144	1613	.289	.140	1.56%
TMTN-28	8	8	211	1074	.080	.140	1.71%
TOTAL =					**2.417**	**1.82**	**15.08%**

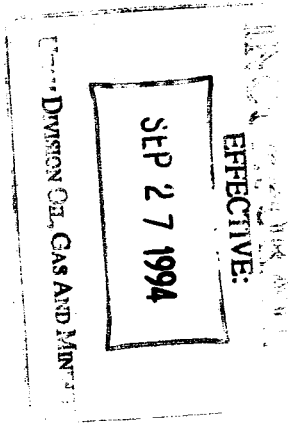
1994 TRAIL MOUNTAIN DRILLING PLAN

ASSUMPTIONS:

Access road - width = 15' (12' Road + 3' Berm)
length Varies (see Pages 7 - 11 of Plan)
Drill Pad - Disturbed Area = .34 Acre (includes topsoil storage pile)
Soil Erosion Rates - Taken from Battleground Watershed Improvement Plan, Page 12 (enclosed)
Average Before Treatment Rate of 5.7 tons/acre/yr Converted to cu. yds/acre/yr = 5.7 tons x 0.9 cu. yds/ton = 5.1 Cu. Yds.
Length of time Disturbance Will Be Unprotected = One Month (.08 yr)

Formulas:

Maximum Soil Stripped = Area x Stripping Depth
Erosion Potential = Area (sq. ft.) ÷ 43,560 sq. ft./ac. x 5.1 cu. yds./ac./yr x .08 yr
% of Stockpile Lost = Total Erosion Potential (Access & Pad) ÷ Total Maximum Soil Stripped (Access & Pad) x 100



BATTLEGROUNDS WATERSHED IMPROVEMENT PLAN

FERRON RANGER DISTRICT
MANTI-LASAL NATIONAL FOREST

Prepared by: John Niebergall, District Ranger
Bill Dye, Forester
Dan Larsen, Soil Scientist
Dennis Kelly, Hydrologist

Recommended by: John Niebergall — District Ranger — 6-26-85 — Date

Watershed Staff — 8/16/85 — Date

Approved by: Lee Clarkson — Forest Supervisor — 8/19/85 — Date

ATTACHMENT 9

Estimated Effects of Treatment on Soil Erosion Rates

Soil Map Unit No.	Acres Treated	Erosion Rate Before Treatment (Tons/Acre/Yr.)*	Erosion Rate After Treatment (Tons/Acre/Yr.)	Reduction in Erosion Rate (Tons/Acre/Yr.)
1	131	2.7	0.9	1.8
3	20	11.4	4.6	6.8
4	165	4.1	2.0	2.1
5	40	5.1	2.3	2.8
6	125	8.6	3.6	5.0
7	30	6.6	3.5	3.1
8	10	2.9	0.9	2.0
9	50	3.4	1.2	2.2
Average		(5.7)	(2.4)	(3.2)

*One ton of sediment at a bulk density of 1.3 is about 0.9 cubic yards. Values for cubic yard measurements would be slightly less than four tons. These erosion rates are for sheet and rill erosion and represent estimated long term averages.

Total reduction of onsite erosion is estimated at 1,680 to 2,000 tons per year over the treated area. Control of sediment delivery to Straight Canyon is estimated at 3,000 to 4,000 tons per year.

Reducing sediment load in Straight Canyon by this amount will have a large dollar benefit for the various organizations which utilizes this water for culinary, industrial, irrigation and fishery purposes.

Implementing this project will reduce the amount of maintenance and cleanup which the State will need to do on State Highway 29. It is anticipated it will save the State at least two trips per summer to remove mud and debris from the road and would also reduce the cost of ditch maintenance. The State's maintenance costs could be reduced an estimated $6,000 per year.

Increased vegetation can be obtained by allowing the water to enter the soil rather than running off the area and by reseeding the disturbed areas.

After revegetation is accomplished, it is estimated we could obtain an additional 50 AUM's valued at $12.78 or $639 per year. It is estimated the project would provide an additional 790 wildlife user days, valued at $25.20 WFUD or $19,908.

The above estimates are based on the results which have been obtained on the South Trail Watershed Project which is located adjacent to the proposed project.

ATTACHMENT 9