United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the United States Department of Agriculture, Forest Service; United States Department of the Interior, Bureau of Land Management; and Montana Agricultural Experiment Station

Soil Survey of Carter County, Montana

Part I

The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the detailed soil map units and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

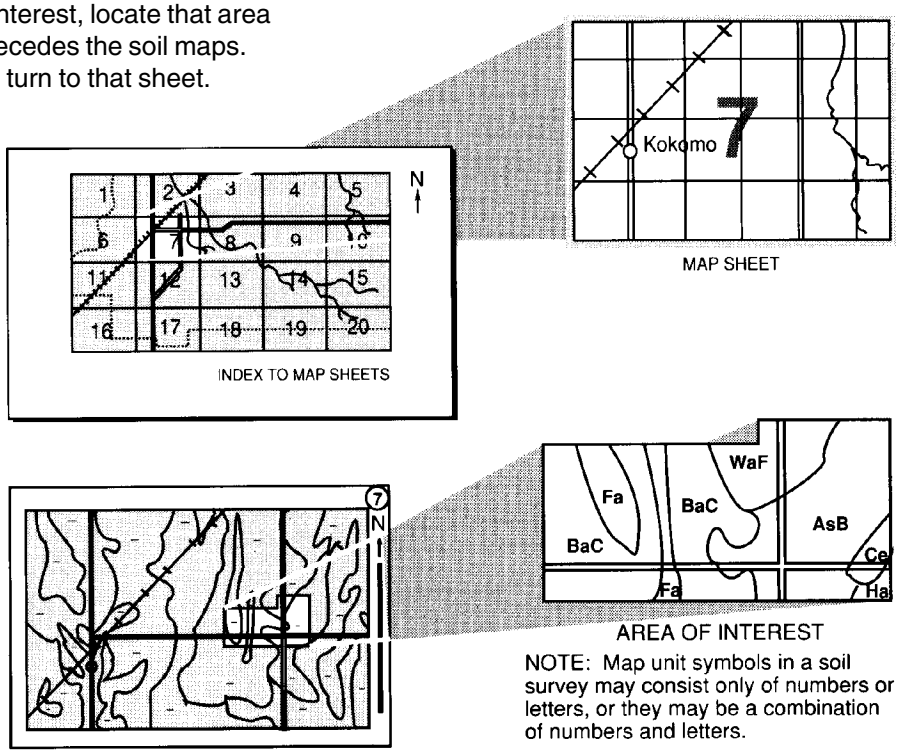
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets,** which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** in Part II for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

A **State Soil Geographic Database** (STATSGO) is available for this survey area. This database consists of a soils map at a scale of 1:250,000 along with groups of associated soils. It replaces the general soils map published in earlier surveys. The map and the database can be useful for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Database for this survey area, or for any part of Montana, is available at the local office of the Natural Resources Conservation Service.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies, including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service and Forest Service; United States Department of the Interior, Bureau of Land Management; and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Carter County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at http://soildatamart.nrcs.usda.gov. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The United States Department of Agriculture (USDA) prohibits discrimination in all of its programs on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the USDA's TARGET Center at 202-720-2600 (voice or TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue SW, Washington, DC 20250-9410, or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Cover: Archin soils are in the foreground with the Long Pines in the background.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Part I

How To Use This Soil Survey i
Index to Taxonomic Units x
Index to Map Units xi
Summary of Tables xvi
Foreword xix
General Nature of the Survey Area 1
History 1
Industry and Recreation 2
Physiography and Drainage 2
Geology 2
Mineral Resources 4
Ground-water Resources 5
Climate 6
How This Survey Was Made 6
Formation and Classification of the Soils 13
Formation of the Soils 13
Climate 13
Living Organisms 13
Topography 13
Parent Material 14
Time 14
Classification of the Soils 14
Soil Series and Detailed Soil Map Units 23
Abor Series 24
51C—Abor silty clay loam, 2 to 8 percent slopes 25
251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes 25
Absher Series 26
168B—Absher-Gerdrum complex, 0 to 4 percent slopes 27
Alona Series 27
20C—Alona silt loam, 2 to 8 percent slopes 28
621C—Alona silt loam, warm, 2 to 8 percent slopes 29
Alzada Series 29
92C—Alzada clay loam, 2 to 8 percent slopes 30
Archin Series 30
75A—Archin-Absher complex, 0 to 2 percent slopes 31
75C—Archin-Absher complex, 2 to 8 percent slopes 32
175A—Archin loam, 0 to 2 percent slopes 33
175C—Archin loam, 2 to 8 percent slopes 33
275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes 33
375C—Archin-Ynot complex, 2 to 8 percent slopes 34
Arsite Series 34
79C—Arsite clay, 0 to 8 percent slopes 35
179E—Arsite-Rock outcrop complex, 8 to 25 percent slopes 35
Assinniboine Series 36
74A—Assinniboine sandy clay loam, 0 to 2 percent slopes 37
74C—Assinniboine sandy clay loam, 2 to 8 percent slopes 37
174C—Assinniboine-Ynot complex, 2 to 8 percent slopes 38
13F—Badland 38
Bascovy Series 38
90C—Bascovy clay, 2 to 8 percent slopes 39
90D—Bascovy clay, 8 to 15 percent slopes 40
490C—Bascovy-Ethridge complex, 2 to 8 percent slopes 40
590C—Bascovy-Marvan complex, 2 to 8 percent slopes 40
623D—Bascovy clay, warm, 0 to 9 percent slopes 41
633D—Bascovy-Neldore clays, warm, 6 to 21 percent slopes 41
Beaverflat Series 42
30A—Beaverflat loam, 0 to 4 percent slopes 43
130A—Beaverflat sandy loam, 0 to 4 percent slopes 43
Beenom Series 43
49A—Beenom-Reeder loams, 1 to 4 percent slopes 44

116C—Beenom-Parchin complex, 2 to 8 percent slopes 45
Belltower Series 45
144D—Belltower-Reeder-Vebar complex, 4 to 15 percent slopes 46
144E—Belltower-Dast-Reeder complex, 15 to 35 percent slopes 47
144F—Belltower-Dast complex, 35 to 60 percent slopes 48
Bickerdyke Series 48
87A—Bickerdyke clay, 0 to 2 percent slopes 49
87C—Bickerdyke clay, 2 to 8 percent slopes 49
Blacksheep Series 50
55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes 50
55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes 51
155E—Blacksheep-Rock outcrop complex, 25 to 50 percent slopes 51
Bonfri Series 52
91C—Bonfri loam, 2 to 8 percent slopes 53
91D—Bonfri loam, 8 to 15 percent slopes 53
191C—Bonfri-Cambeth complex, 2 to 8 percent slopes 53
291D—Bonfri-Cabbart loams, 8 to 15 percent slopes 54
391C—Bonfri-Parchin complex, 2 to 8 percent slopes 55
Broadus Series 55
126D—Broadus-Ridge-Reeder complex, 8 to 25 percent slopes 56
126F—Broadus-Ridge-Rock outcrop complex, 25 to 65 percent slopes 57
Bullock Series 57
Busby Series 58
70C—Busby fine sandy loam, 2 to 8 percent slopes 59
70D—Busby fine sandy loam, 8 to 15 percent slopes 59
170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes 60
170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes 60
270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes 61
Cabba Series 62
112D—Cabba silt loam, 8 to 15 percent slopes 62
212E—Cabba-Rock outcrop complex, 15 to 45 percent slopes 63
312D—Cabba-Dast complex, 8 to 15 percent slopes 63
Cabbart Series 64
60D—Cabbart silt loam, 4 to 15 percent slopes 64
160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes 65
160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes 65
260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes 66
360D—Cabbart-Bascovy complex, 4 to 15 percent slopes 66
Cambeth Series 67
160D—Cambeth-Yamacall complex, 8 to 15 percent slopes 68
260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes 68
260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes 69
Carfall Series 69
14C—Carfall loam, 2 to 8 percent slopes 70
114C—Carfall-Assinniboine complex, 2 to 8 percent slopes 70
114D—Carfall-Assinniboine complex, 8 to 15 percent slopes 71
214C—Carfall fine sandy loam, 2 to 8 percent slopes 71

214D—Carfall fine sandy loam, 8 to 15 percent slopes 72
Chinook Series 72
83A—Chinook sandy loam, 0 to 2 percent slopes 73
83C—Chinook sandy loam, 2 to 8 percent slopes 73
83D—Chinook sandy loam, 8 to 15 percent slopes 74
183C—Chinook-Assinniboine complex, 2 to 8 percent slopes 74
283C—Chinook-Archin complex, 2 to 8 percent slopes 75
Cohagen Series 75
Creed Series 76
54A—Creed loam, 0 to 2 percent slopes 77
54C—Creed loam, 2 to 8 percent slopes 77
154C—Creed-Absher complex, 2 to 8 percent slopes 78
254C—Creed-Gerdrum complex, 2 to 8 percent slopes 78
602C—Creed-Gerdrum complex, warm, 2 to 6 percent slopes 79
Daglum Series 79
45B—Daglum loam, 0 to 4 percent slopes 80
Dast Series 80
125F—Dast-Ridge-Rock outcrop complex, 35 to 60 percent slopes 81
225E—Dast-Vebar complex, 15 to 35 percent slopes 82
225F—Dast-Vebar complex, 35 to 60 percent slopes 82
325E—Dast-Cabba-Mowbray complex, 15 to 35 percent slopes 83
Delpoint Series 84
71C—Delpoint loam, 2 to 8 percent slopes 84
171C—Delpoint-Cabbart complex, 2 to 8 percent slopes 85
171D—Delpoint-Cabbart complex, 8 to 15 percent slopes 85
271D—Delpoint-Yamacall loams, 8 to 15 percent slopes 86
DA—Denied access 86
Eapa Series 86
84A—Eapa loam, 0 to 2 percent slopes 87
84C—Eapa loam, 2 to 8 percent slopes 88
84D—Eapa loam, 8 to 15 percent slopes 88
167C—Eapa-Yamacall loams, 2 to 8 percent slopes 88
184C—Eapa-Archin loams, 2 to 8 percent slopes 89
603C—Eapa loam, warm, 1 to 6 percent slopes 89
Ethridge Series 90
66C—Ethridge silty clay loam, 2 to 8 percent slopes 91
85A—Ethridge loam, 0 to 2 percent slopes 91
85C—Ethridge loam, 2 to 8 percent slopes 91
185A—Ethridge-Daglum complex, 0 to 4 percent slopes 92
626C—Ethridge silty clay loam, warm, 2 to 8 percent slopes 92
Gerdrum Series 93
65A—Gerdrum clay loam, 0 to 2 percent slopes 94
65C—Gerdrum clay loam, 2 to 8 percent slopes 94
165A—Gerdrum-Absher complex, 0 to 2 percent slopes 95
165C—Gerdrum-Absher complex, 2 to 8 percent slopes 95
611B—Gerdrum-Absher complex, warm, 0 to 3 percent slopes 96
611D—Gerdrum-Absher complex, warm, 3 to 9 percent slopes 96
Glendive Series 97
61A—Glendive sandy loam, 0 to 2 percent slopes 98
161B—Glendive sandy loam, saline, 0 to 4 percent slopes 98

Hanly Series 98
7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes 99
Haploborolls 99
Harlake Series 100
57A—Harlake silty clay, saline, 0 to 2 percent slopes 101
157A—Harlake silty clay loam, 0 to 2 percent slopes 101
606B—Harlake silty clay loam, warm, saline, 0 to 3 percent slopes 102
608B—Harlake clay, warm, 0 to 3 percent slopes 102
Havre Series 103
56A—Havre loam, 0 to 2 percent slopes 103
156A—Havre loam, saline, 0 to 2 percent slopes 104
256A—Havre-Harlake complex, 0 to 2 percent slopes 104
Julin Series 105
Kirby Series 105
176D—Kirby-Cabbart complex, 8 to 25 percent slopes 106
276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes 107
Kobase Series 107
78A—Kobase silty clay loam, 0 to 2 percent slopes 108
78C—Kobase silty clay loam, 2 to 8 percent slopes 109
Kremlin Series 109
72A—Kremlin loam, 0 to 2 percent slopes 110
72C—Kremlin loam, 2 to 8 percent slopes 110
172C—Kremlin-Cabbart complex, 2 to 8 percent slopes 111
Marias Series 111
94A—Marias silty clay loam, 0 to 2 percent slopes 112
94C—Marias silty clay loam, 2 to 8 percent slopes 113
Marmarth Series 113
81C—Marmarth loam, 2 to 8 percent slopes 114
629C—Marmarth loam, warm, 2 to 8 percent slopes 114
Marvan Series 114
89A—Marvan silty clay, 0 to 2 percent slopes 116
89C—Marvan silty clay, 2 to 8 percent slopes 116
613B—Marvan-Vanda clays, warm, 0 to 3 percent slopes 116
614C—Marvan clay, warm, 0 to 6 percent slopes 117
635C—Marvan-Bascovy clays, warm, 0 to 6 percent slopes 117
M-W—Miscellaneous water 118
Mowbray Series 118
152F—Mowbray-Cabba-Vebar complex, 35 to 60 percent slopes 119
Moyerson Series 119
77D—Moyerson silty clay loam, 4 to 15 percent slopes 120
277D—Moyerson-Orinoco silty clay loams, 4 to 15 percent slopes 121
477E—Moyerson silty clay loam, 15 to 35 percent slopes 121
605E—Moyerson, warm-Rock outcrop complex, 9 to 45 percent slopes 121
Neldore Series 122
58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes 123
58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes 123
158D—Neldore clay, 4 to 15 percent slopes 123
158E—Neldore clay, 15 to 35 percent slopes 124
258D—Neldore-Volborg clays, 4 to 15 percent slopes 124

358D—Neldore-Bascovy clays, 4 to 15 percent slopes 125
625E—Neldore clay, warm, 3 to 25 percent slopes 125
Noonan Series 126
Orinoco Series 127
53C—Orinoco silty clay loam, 2 to 8 percent slopes 127
153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes 128
253D—Orinoco-Weingart complex, 4 to 15 percent slopes 128
631D—Orinoco-Yawdim silty clay loams, warm, 4 to 15 percent slopes 129
Parchin Series 129
21C—Parchin fine sandy loam, 2 to 8 percent slopes 131
121C—Parchin-Bullock complex, 2 to 8 percent slopes 131
Parshall Series 131
36A—Parshall sandy loam, 0 to 4 percent slopes 132
36D—Parshall fine sandy loam, 4 to 15 percent slopes 133
136D—Parshall-Cohagen fine sandy loams, 4 to 15 percent slopes 133
Prego Series 134
48D—Prego sandy loam, 2 to 15 percent slopes 134
Reeder Series 135
42C—Reeder loam, 2 to 8 percent slopes 136
142D—Reeder-Cabba loams, 4 to 15 percent slopes 136
242D—Reeder-Dast complex, 4 to 15 percent slopes 136
Rentsac Series 137
99F—Rentsac-Twilight-Rock outcrop complex, 15 to 45 percent slopes 138
Ridge Series 138
13E—Rock outcrop 139
177E—Rock outcrop-Moyerson complex, 15 to 50 percent slopes 139
Ryell Series 139
Shambo Series 140
131C—Shambo-Noonan loams, 4 to 15 percent slopes 141
231D—Shambo-Mowbray-Parchin complex, 4 to 25 percent slopes 142
Tanna Series 142
64C—Tanna silty clay loam, 2 to 8 percent slopes 143
164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes 143
164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes 144
Teigen Series 144
95A—Teigen silty clay loam, 0 to 4 percent slopes 145
95D—Teigen clay loam, gullied, 4 to 15 percent slopes 146
Tricart Series 146
23D—Tricart clay loam, 4 to 15 percent slopes 147
23E—Tricart gravelly loam, 15 to 45 percent slopes 147
Twilight Series 148
69C—Twilight fine sandy loam, 2 to 8 percent slopes 148
69D—Twilight fine sandy loam, 8 to 15 percent slopes 149
269C—Twilight-Bonfri complex, 2 to 8 percent slopes 149
269D—Twilight-Bonfri complex, 8 to 15 percent slopes 150
369C—Twilight-Delpoint complex, 2 to 8 percent slopes 150
369D—Twilight-Cabbart complex, 8 to 15 percent slopes 151

Ustochrepts 151
17E—Ustochrepts-Haploborolls complex, slump, 15 to 45 percent slopes 152
Vaeda Series 153
96A—Vaeda silty clay loam, 0 to 2 percent slopes 154
196C—Vaeda-Creed complex, 0 to 4 percent slopes 154
Vanda Series 154
97A—Vanda silty clay loam, 0 to 2 percent slopes 155
197A—Vanda-Marvan complex, 0 to 2 percent slopes 155
197C—Vanda-Marvan complex, 2 to 8 percent slopes 156
Varney Series 156
22A—Varney loam, 0 to 2 percent slopes 158
22C—Varney loam, 2 to 8 percent slopes 158
122C—Varney-Gerdrum complex, 2 to 8 percent slopes 158
Vebar Series 159
Volborg Series 160
98C—Volborg clay, 2 to 8 percent slopes 160
198D—Volborg silty clay, saline, 4 to 15 percent slopes 161
298E—Volborg-Julin-Rock outcrop complex, 8 to 25 percent slopes 161
398E—Volborg-Volborg, saline-Rock outcrop complex, 8 to 45 percent slopes 162
634E—Volborg-Julin complex, warm, 6 to 60 percent slopes 162
W—Water 163
Weingart Series 163
15C—Weingart silty clay, 2 to 8 percent slopes 164
620C—Weingart silty clay loam, warm, 0 to 6 percent slopes 164
Yamacall Series 165
86A—Yamacall loam, 0 to 2 percent slopes 166
86C—Yamacall loam, 2 to 8 percent slopes 166
86D—Yamacall loam, 8 to 15 percent slopes 166
186A—Yamacall-Havre loams, 0 to 2 percent slopes 167
186C—Yamacall-Havre loams, 2 to 8 percent slopes 167
193C—Yamacall-Cambeth complex, 2 to 8 percent slopes 168
286C—Yamacall-Delpoint loams, 2 to 8 percent slopes 168
386E—Yamacall-Cabbart loams, 15 to 35 percent slopes 169
586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes 169
Yawdim Series 170
162D—Yawdim silty clay loam, 4 to 15 percent slopes 170
262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes 171
Yegen Series 171
41C—Yegen loam, 2 to 8 percent slopes 172
41D—Yegen loam, 8 to 15 percent slopes 172
141C—Yegen-Rentsac complex, 2 to 8 percent slopes 173
Ynot Series 173
59C—Ynot sandy loam, 2 to 8 percent slopes 174
59D—Ynot sandy loam, 8 to 15 percent slopes 174
Zatoville Series 175
178C—Zatoville silty clay loam, 2 to 8 percent slopes 176
Zeona Series 176
119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes 177
References 179
Glossary 181

Part II

How To Use This Soil Survey i
Detailed Soil Map Unit Legend iv
Summary of Tables ix
Agronomy 9
Cropland Limitations and Hazards 9
Crop Yield Estimates 10
Pasture and Hayland Management 11
Land Capability Classification 11
Prime Farmland and Other Important Farmland 12
Erosion Factors 13
Windbreaks and Environmental Plantings 14
Range 77
Similarity Index 78
Rangeland Management 78
Understory Management 79
Forestland 135
Woodland Ordination System 135
Forestland Management and Productivity 136
Main Forest Access Road Limitations and Hazards 137
Forestland of Carter County 138
Recreation 147
Wildlife Habitat 171
Elements of Wildlife Habitat 171
Kinds of Wildlife Habitat 171
Wildlife of Carter County 172
Engineering 173
Building Site Development 173
Sanitary Facilities 174
Waste Management 175
Construction Materials 176
Water Management 177
Soil Properties 273
Engineering Index Properties 273
Physical and Chemical Properties 274
Water Features 276
Soil Features 277
References 411
Glossary 413

Issued 2003

Index to Taxonomic Units

Abor Series 24
Absher Series 26
Alona Series 27
Alzada Series 29
Archin Series 30
Arsite Series 34
Assinniboine Series 36
Bascovy Series 38
Beaverflat Series 42
Beenom Series 43
Belltower Series 45
Bickerdyke Series 48
Blacksheep Series 50
Bonfri Series 52
Broadus Series 55
Bullock Series 57
Busby Series 58
Cabba Series 62
Cabbart Series 64
Cambeth Series 67
Carfall Series 69
Chinook Series 72
Cohagen Series 75
Creed Series 76
Daglum Series 79
Dast Series 80
Delpoint Series 84
Eapa Series 86
Ethridge Series 90
Gerdrum Series 93
Glendive Series 97
Hanly Series 98
Haploborolls 99
Harlake Series 100
Havre Series 103
Julin Series 105
Kirby Series 105
Kobase Series 107
Kremlin Series 109
Marias Series 111
Marmarth Series 113
Marvan Series 114
Mowbray Series 118
Moyerson Series 119
Neldore Series 122
Noonan Series 126
Orinoco Series 127
Parchin Series 129
Parshall Series 131
Prego Series 134
Reeder Series 135
Rentsac Series 137
Ridge Series 138
Ryell Series 139
Shambo Series 140
Tanna Series 142
Teigen Series 144
Tricart Series 146
Twilight Series 148
Ustochrepts 151
Vaeda Series 153
Vanda Series 154
Varney Series 156
Vebar Series 159
Volborg Series 160
Weingart Series 163
Yamacall Series 165
Yawdim Series 170
Yegen Series 171
Ynot Series 173
Zatoville Series 175
Zeona Series 176

Index to Map Units

7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes 99
13E—Rock outcrop 139
13F—Badland 38
14C—Carfall loam, 2 to 8 percent slopes 70
15C—Weingart silty clay, 2 to 8 percent slopes 164
17E—Ustochrepts-Haploborolls complex, slump, 15 to 45 percent slopes 152
20C—Alona silt loam, 2 to 8 percent slopes 28
21C—Parchin fine sandy loam, 2 to 8 percent slopes 131
22A—Varney loam, 0 to 2 percent slopes 158
22C—Varney loam, 2 to 8 percent slopes 158
23D—Tricart clay loam, 4 to 15 percent slopes 147
23E—Tricart gravelly loam, 15 to 45 percent slopes 147
30A—Beaverflat loam, 0 to 4 percent slopes 43
36A—Parshall sandy loam, 0 to 4 percent slopes 132
36D—Parshall fine sandy loam, 4 to 15 percent slopes 133
41C—Yegen loam, 2 to 8 percent slopes 172
41D—Yegen loam, 8 to 15 percent slopes 172
42C—Reeder loam, 2 to 8 percent slopes 136
45B—Daglum loam, 0 to 4 percent slopes 80
48D—Prego sandy loam, 2 to 15 percent slopes 134
49A—Beenom-Reeder loams, 1 to 4 percent slopes 44
51C—Abor silty clay loam, 2 to 8 percent slopes 25
53C—Orinoco silty clay loam, 2 to 8 percent slopes 127
54A—Creed loam, 0 to 2 percent slopes 77
54C—Creed loam, 2 to 8 percent slopes 77
55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes 50
55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes 51
56A—Havre loam, 0 to 2 percent slopes 103
57A—Harlake silty clay, saline, 0 to 2 percent slopes 101
58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes 123
58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes 123
59C—Ynot sandy loam, 2 to 8 percent slopes 174
59D—Ynot sandy loam, 8 to 15 percent slopes 174
60D—Cabbart silt loam, 4 to 15 percent slopes 64
61A—Glendive sandy loam, 0 to 2 percent slopes 98
64C—Tanna silty clay loam, 2 to 8 percent slopes 143
65A—Gerdrum clay loam, 0 to 2 percent slopes 94
65C—Gerdrum clay loam, 2 to 8 percent slopes 94
66C—Ethridge silty clay loam, 2 to 8 percent slopes 91
69C—Twilight fine sandy loam, 2 to 8 percent slopes 148
69D—Twilight fine sandy loam, 8 to 15 percent slopes 149
70C—Busby fine sandy loam, 2 to 8 percent slopes 59
70D—Busby fine sandy loam, 8 to 15 percent slopes 59
71C—Delpoint loam, 2 to 8 percent slopes 84
72A—Kremlin loam, 0 to 2 percent slopes 110
72C—Kremlin loam, 2 to 8 percent slopes 110
74A—Assinniboine sandy clay loam, 0 to 2 percent slopes 37
74C—Assinniboine sandy clay loam, 2 to 8 percent slopes 37

75A—Archin-Absher complex, 0 to 2 percent slopes 31
75C—Archin-Absher complex, 2 to 8 percent slopes 32
77D—Moyerson silty clay loam, 4 to 15 percent slopes 120
78A—Kobase silty clay loam, 0 to 2 percent slopes 108
78C—Kobase silty clay loam, 2 to 8 percent slopes 109
79C—Arsite clay, 0 to 8 percent slopes 35
81C—Marmarth loam, 2 to 8 percent slopes 114
83A—Chinook sandy loam, 0 to 2 percent slopes 73
83C—Chinook sandy loam, 2 to 8 percent slopes 73
83D—Chinook sandy loam, 8 to 15 percent slopes 74
84A—Eapa loam, 0 to 2 percent slopes 87
84C—Eapa loam, 2 to 8 percent slopes 88
84D—Eapa loam, 8 to 15 percent slopes 88
85A—Ethridge loam, 0 to 2 percent slopes 91
85C—Ethridge loam, 2 to 8 percent slopes 91
86A—Yamacall loam, 0 to 2 percent slopes ... 166
86C—Yamacall loam, 2 to 8 percent slopes ... 166
86D—Yamacall loam, 8 to 15 percent slopes 166
87A—Bickerdyke clay, 0 to 2 percent slopes 49
87C—Bickerdyke clay, 2 to 8 percent slopes 49
89A—Marvan silty clay, 0 to 2 percent slopes 116
89C—Marvan silty clay, 2 to 8 percent slopes 116
90C—Bascovy clay, 2 to 8 percent slopes 39
90D—Bascovy clay, 8 to 15 percent slopes 40
91C—Bonfri loam, 2 to 8 percent slopes 53
91D—Bonfri loam, 8 to 15 percent slopes 53
92C—Alzada clay loam, 2 to 8 percent slopes 30
94A—Marias silty clay loam, 0 to 2 percent slopes 112
94C—Marias silty clay loam, 2 to 8 percent slopes 113
95A—Teigen silty clay loam, 0 to 4 percent slopes 145
95D—Teigen clay loam, gullied, 4 to 15 percent slopes 146
96A—Vaeda silty clay loam, 0 to 2 percent slopes 154
97A—Vanda silty clay loam, 0 to 2 percent slopes 155
98C—Volborg clay, 2 to 8 percent slopes 160
99F—Rentsac-Twilight-Rock outcrop complex, 15 to 45 percent slopes 138
112D—Cabba silt loam, 8 to 15 percent slopes 62
114C—Carfall-Assinniboine complex, 2 to 8 percent slopes 70
114D—Carfall-Assinniboine complex, 8 to 15 percent slopes 71
116C—Beenom-Parchin complex, 2 to 8 percent slopes 45
119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes 177
121C—Parchin-Bullock complex, 2 to 8 percent slopes 131
122C—Varney-Gerdrum complex, 2 to 8 percent slopes 158
125F—Dast-Ridge-Rock outcrop complex, 35 to 60 percent slopes 81
126D—Broadus-Ridge-Reeder complex, 8 to 25 percent slopes 56
126F—Broadus-Ridge-Rock outcrop complex, 25 to 65 percent slopes 57
130A—Beaverflat sandy loam, 0 to 4 percent slopes 43
131C—Shambo-Noonan loams, 4 to 15 percent slopes 141

136D—Parshall-Cohagen fine sandy loams, 4 to 15 percent slopes 133
141C—Yegen-Rentsac complex, 2 to 8 percent slopes 173
142D—Reeder-Cabba loams, 4 to 15 percent slopes 136
144D—Belltower-Reeder-Vebar complex, 4 to 15 percent slopes 46
144E—Belltower-Dast-Reeder complex, 15 to 35 percent slopes 47
144F—Belltower-Dast complex, 35 to 60 percent slopes 48
152F—Mowbray-Cabba-Vebar complex, 35 to 60 percent slopes 119
153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes 128
154C—Creed-Absher complex, 2 to 8 percent slopes 78
155E—Blacksheep-Rock outcrop complex, 25 to 50 percent slopes 51
156A—Havre loam, saline, 0 to 2 percent slopes 104
157A—Harlake silty clay loam, 0 to 2 percent slopes 101
158D—Neldore clay, 4 to 15 percent slopes ... 123
158E—Neldore clay, 15 to 35 percent slopes 124
160D—Cambeth-Yamacall complex, 8 to 15 percent slopes 68
160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes 65
160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes 65
161B—Glendive sandy loam, saline, 0 to 4 percent slopes 98
162D—Yawdim silty clay loam, 4 to 15 percent slopes 170
164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes 143
164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes 144
165A—Gerdrum-Absher complex, 0 to 2 percent slopes 95
165C—Gerdrum-Absher complex, 2 to 8 percent slopes 95
167C—Eapa-Yamacall loams, 2 to 8 percent slopes 88
168B—Absher-Gerdrum complex, 0 to 4 percent slopes 27
170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes 60
170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes 60
171C—Delpoint-Cabbart complex, 2 to 8 percent slopes 85
171D—Delpoint-Cabbart complex, 8 to 15 percent slopes 85
172C—Kremlin-Cabbart complex, 2 to 8 percent slopes 111
174C—Assinniboine-Ynot complex, 2 to 8 percent slopes 38
175A—Archin loam, 0 to 2 percent slopes 33
175C—Archin loam, 2 to 8 percent slopes 33
176D—Kirby-Cabbart complex, 8 to 25 percent slopes 106
177E—Rock outcrop-Moyerson complex, 15 to 50 percent slopes 139
178C—Zatoville silty clay loam, 2 to 8 percent slopes 176
179E—Arsite-Rock outcrop complex, 8 to 25 percent slopes 35
183C—Chinook-Assinniboine complex, 2 to 8 percent slopes 74
184C—Eapa-Archin loams, 2 to 8 percent slopes 89
185A—Ethridge-Daglum complex, 0 to 4 percent slopes 92
186A—Yamacall-Havre loams, 0 to 2 percent slopes 167
186C—Yamacall-Havre loams, 2 to 8 percent slopes 167

191C—Bonfri-Cambeth complex, 2 to 8 percent slopes 53
193C—Yamacall-Cambeth complex, 2 to 8 percent slopes 168
196C—Vaeda-Creed complex, 0 to 4 percent slopes 154
197A—Vanda-Marvan complex, 0 to 2 percent slopes 155
197C—Vanda-Marvan complex, 2 to 8 percent slopes 156
198D—Volborg silty clay, saline, 4 to 15 percent slopes 161
212E—Cabba-Rock outcrop complex, 15 to 45 percent slopes 63
214C—Carfall fine sandy loam, 2 to 8 percent slopes 71
214D—Carfall fine sandy loam, 8 to 15 percent slopes 72
225E—Dast-Vebar complex, 15 to 35 percent slopes 82
225F—Dast-Vebar complex, 35 to 60 percent slopes 82
231D—Shambo-Mowbray-Parchin complex, 4 to 25 percent slopes 142
242D—Reeder-Dast complex, 4 to 15 percent slopes 136
251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes 25
253D—Orinoco-Weingart complex, 4 to 15 percent slopes 128
254C—Creed-Gerdrum complex, 2 to 8 percent slopes 78
256A—Havre-Harlake complex, 0 to 2 percent slopes 104
258D—Neldore-Volborg clays, 4 to 15 percent slopes 124
260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes 68
260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes 66
260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes 69
262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes 171
269C—Twilight-Bonfri complex, 2 to 8 percent slopes 149
269D—Twilight-Bonfri complex, 8 to 15 percent slopes 150
270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes 61
271D—Delpoint-Yamacall loams, 8 to 15 percent slopes 86
275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes 33
276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes 107
277D—Moyerson-Orinoco silty clay loams, 4 to 15 percent slopes 121
283C—Chinook-Archin complex, 2 to 8 percent slopes 75
286C—Yamacall-Delpoint loams, 2 to 8 percent slopes 168
291D—Bonfri-Cabbart loams, 8 to 15 percent slopes 54
298E—Volborg-Julin-Rock outcrop complex, 8 to 25 percent slopes 161
312D—Cabba-Dast complex, 8 to 15 percent slopes 63
325E—Dast-Cabba-Mowbray complex, 15 to 35 percent slopes 83
358D—Neldore-Bascovy clays, 4 to 15 percent slopes 125
360D—Cabbart-Bascovy complex, 4 to 15 percent slopes 66
369C—Twilight-Delpoint complex, 2 to 8 percent slopes 150
369D—Twilight-Cabbart complex, 8 to 15 percent slopes 151
375C—Archin-Ynot complex, 2 to 8 percent slopes 34

386E—Yamacall-Cabbart loams, 15 to 35 percent slopes 169
391C—Bonfri-Parchin complex, 2 to 8 percent slopes 55
398E—Volborg-Volborg, saline-Rock outcrop complex, 8 to 45 percent slopes 162
477E—Moyerson silty clay loam, 15 to 35 percent slopes 121
490C—Bascovy-Ethridge complex, 2 to 8 percent slopes 40
586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes 169
590C—Bascovy-Marvan complex, 2 to 8 percent slopes 40
602C—Creed-Gerdrum complex, warm, 2 to 6 percent slopes 79
603C—Eapa loam, warm, 1 to 6 percent slopes 89
605E—Moyerson, warm-Rock outcrop complex, 9 to 45 percent slopes 121
606B—Harlake silty clay loam, warm, saline, 0 to 3 percent slopes 102
608B—Harlake clay, warm, 0 to 3 percent slopes 102
611B—Gerdrum-Absher complex, warm, 0 to 3 percent slopes 96
611D—Gerdrum-Absher complex, warm, 3 to 9 percent slopes 96
613B—Marvan-Vanda clays, warm, 0 to 3 percent slopes 116
614C—Marvan clay, warm, 0 to 6 percent slopes 117
620C—Weingart silty clay loam, warm, 0 to 6 percent slopes 164
621C—Alona silt loam, warm, 2 to 8 percent slopes 29
623D—Bascovy clay, warm, 0 to 9 percent slopes 41
625E—Neldore clay, warm, 3 to 25 percent slopes 125
626C—Ethridge silty clay loam, warm, 2 to 8 percent slopes 92
629C—Marmarth loam, warm, 2 to 8 percent slopes 114
631D—Orinoco-Yawdim silty clay loams, warm, 4 to 15 percent slopes 129
633D—Bascovy-Neldore clays, warm, 6 to 21 percent slopes 41
634E—Volborg-Julin complex, warm, 6 to 60 percent slopes 162
635C—Marvan-Bascovy clays, warm, 0 to 6 percent slopes 117
DA—Denied access 86
M-W—Miscellaneous water 118
W—Water 163

Summary of Tables

Part I

Temperature and precipitation 8

Freeze dates in spring and fall 10

Growing season 12

For tables with the most current data, please visit the Web Soil Survey at **http://websoilsurvey.nrcs.usda.gov/app/.**

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Dave White
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Carter County, Montana

Fieldwork by Richard G. Bandy, Gary F. Berger, James F. Dorr, John A. Lindahl, Dan L. McLean, William R. Johnson, and Kenneth T. Scalzone, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the United States Department of Agriculture, Forest Service; United States Department of the Interior, Bureau of Land Management; and the Montana Agricultural Experiment Station

CARTER COUNTY is located in southeastern Montana (fig. 1). It has a land area of 2,139,300 acres, or 3,342 square miles. Nearly a third of the county consists of Federal land.

The major occupations in Carter County are ranching and dryland farming. The county is the largest producer of sheep and lambs in Montana. About 10 percent of the county is used for dryland farming, with the majority used mainly for range.

Elevations range from 2,760 to 4,450 feet. The annual precipitation ranges from 12 to 17 inches, and the frost-free period ranges from 110 to 130 days.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, and the extent of soils within the survey.

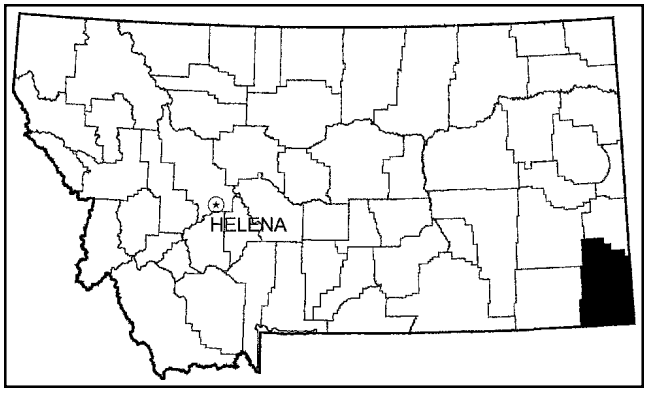


Figure 1.—Location of Carter County, Montana

General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are history, industry and recreation, physiography and drainage, geology, mineral resources, ground-water resources, and climate.

History

The first known inhabitants of Carter County were Native American hunters who followed bison herds into the area.

Carter County was established in 1917 and was named in honor of Thomas Henry Carter, Montana's first representative to Congress. Ekalaka, the county seat, is located in the north-central part of the county and is the largest town. The other town of significant population is Alzada, located in the southern part of the county.

Carter County is located in an area known as the rolling prairie. In 1882, the first herd of cattle was trailed from Texas to Box Elder Creek. In 1897, the first school in the county was built near Ekalaka. In late 1908, the Chicago, Milwaukee, St. Paul, and Pacific Railroad was completed through the town of Baker, located 36 miles north of Ekalaka in Fallon County. Baker became the main freight station and point of departure for hundreds of homesteaders seeking plots of land to make their fortunes.

Schoolhouses became a part of every community, and many post offices were established, generally in ranch or farm homes. In the 1930s, hard times hit and many homesteads were abandoned.

Industry and Recreation

Raising livestock, growing crops, and mining bentonite are the principal industries in Carter County. Livestock operations, primarily cow-calf and sheep, account for nearly 82 percent of the farm income. The main dryland-farming crop is winter wheat. Other crops, such as spring wheat, barley, and grass hay, are also grown. Some alfalfa and grass hay are grown on waterspreading systems, which are located along Beaver and Box Elder Creeks and the Little Missouri River.

Livestock auction yards in Baker and Miles City, Montana, and Belle Fourche, South Dakota, provide ranchers with good livestock marketing facilities. Some of the calves are sold directly from the ranch to feeder buyers. Nearly all of the small grain produced is marketed through elevators in Baker, Miles City, and Belle Fourche.

The Alzada area is an important bentonite mining area. The bentonite produced here is shipped via truck to the Colony, Wyoming, area for refining.

Carter County offers numerous opportunities for outdoor recreation. Mule deer, white-tailed deer, and antelope populations, along with upland game birds, such as Merriam's turkey, sage grouse, sharp-tailed grouse, and Hungarian partridge, create excellent hunting opportunities. Many small ponds provide good fishing.

Medicine Rocks State Park and the abundance of forested lands in the county provide tremendous opportunity for camping, picnicking, hiking, and photography. The Carter County Historical Museum is renown for its paleontological collections and early human artifacts.

Physiography and Drainage

Mary Marshall Garsjo, State Geologist, Natural Resources Conservation Service, prepared the Physiography and Drainage, Geology, Mineral Resources, and Ground-water Resources sections.

The entire county is located within the Missouri Plateau physiographic province. The county is divided into two physiographic subprovinces by a northwest-trending line that runs through the center. This line separates the Montana Plains Province to the north from the Central Rocky Mountain Foreland Province to the south. The Black Hills Uplift begins in the southeast corner of the county and extends into the Black Hills of Wyoming and South Dakota.

The county consists predominantly of gently rolling plains with shallow creek valleys and broad flat divides. The landscape is semiarid with infrequent badland areas. Remnants of younger, relatively resistant sandstone formations form the prominent pinnacles and ridges of the Ekalaka Hills, Long Pine Hills, and Chalk Buttes. Landscapes typical in the northeastern part of the county are flat-topped buttes and summits capped by sandstone or resistant baked shale and clinker (scoria) beds. Topography in the central portion of the county is more subdued, containing large flat areas with little relief.

Relatively resistant reddish baked shale beds can be seen capping summits in the northeastern part of the county; these beds were formed by burning underground coal seams. Burning coal baked the surrounding sediments and made them more resistant to erosion.

In this semiarid climate, landscape is directly controlled by the characteristics of underlying bedrock. Elevations range from a low of 2,760 feet above sea level to a high of 4,450 feet. The lowest point is located where Spring Creek exits the county at the western county line. West Butte, located 6 miles north of the southwestern corner, is the highest point in the county.

The major northeast flowing drainages are Box Elder Creek and the Little Missouri River. Box Elder Creek drains the central portion of the county. It is perennial north of the town of Ridgway. The Little Missouri River is located to the southeast of Box Elder Creek and is perennial throughout Carter County. The northwestern corner of the county is drained by O'Fallon Creek, draining to the northwest. The extreme southeastern corner drains southeast, toward the Belle Fourche River, which is located in Wyoming and South Dakota.

Major streams, with numerous ephemeral tributaries arranged in a relatively linear dendritic pattern, follow meandering courses in wide, nearly level valley bottoms. The pattern is approximately parallel to the strike of the formations.

Geology

The oldest rocks exposed in Carter County belong to sedimentary formations deposited during the Cretaceous Period. At that time, a transcontinental sea covered the area between the Gulf of Mexico and the Arctic Ocean. Thick sequences of sediments were deposited on coastal plains and shallow sea floors during alternating periods of emergence and

submergence. These repeated marine invasions created a thick sequence of marine shales deposited on the sea floor. Brackish shales, freshwater shales, and sandstones were deposited on the coastal plains. These sandstone and shale beds grade both vertically and horizontally into each other.

Marine migrations continued without interruption until the Late Cretaceous Period, when uplift of the Rocky Mountains began in western Montana. Marine deposition ended in Carter County at the end of Pierre Shale time. The overlying Hell Creek Formation was the last unit to be deposited in the Late Cretaceous Period. The extinction of dinosaurs, approximately 65-million years ago, marked the end of the Cretaceous Period. At this time, fossils changed dramatically, but the character of the sediments remained the same.

Volcanism occurring to the west, during the Cretaceous Period, spread thick layers of volcanic ash over the area. Bentonite, which is derived from devitrified volcanic ash, occurs in many of the Cretaceous sediments, particularly the marine shales. Bentonite is found in layers from a few inches thick to mineable beds with thicknesses up to 10 feet.

Deposition of massive amounts of sediment from the Rocky Mountain Uplift continued during the Tertiary Period. Sluggish rivers meandering across the coastal plains deposited these sediments. The coastal plains were swampy and covered with lush vegetation. These marshes were eventually buried by accumulating sediments and converted to coal.

Approximately 50-million years ago, uplift and granitic intrusions occurred in the Black Hills area to the southeast. This igneous activity was accompanied by regional folding and faulting, including the formation of the Cedar Creek anticline and the adjacent Ekalaka syncline, between the Powder River Basin and the Williston Basin, and the Black Hills Uplift to the east of the Power River Basin. The Black Hills Uplift domed the overlying sedimentary formations upward as it rose. These sediments currently surround it in a concentric pattern of decreasing age. In general, rocks of southern Carter County influenced by the Black Hills Uplift occur in an arcuate pattern typical of an anticlinal fold, with age decreasing to the north.

Summarized below and listed in order of decreasing age is the sequence of exposed rocks for the county. Classification of rock units based on their lithology is group, formation, and member, from largest to smallest. For example, formations are subdivided into members. “Systems” refers to the rocks deposited during a particular geologic period.

Cretaceous System (135- to 65-million years before present): The oldest rocks exposed in Carter County belong to the Colorado Group. This group is approximately 2,000-feet thick and is composed of formations that are primarily marine shale. Formations of the Colorado Group are exposed in an arcuate pattern in the south-central portion of the county. In order of decreasing age, these formations include the Thermopolis Formation, with its upper Newcastle Sandstone Member; Mowry Shale; Belle Fourche Shale; Greenhorn Formation; Carlile Shale; and the Niobrara Formation.

Formations in the Colorado Group consist primarily of shale with smaller amounts of interbedded sandstone, siltstone, and marl (a calcareous shale). Most of these formations contain limestone and iron concretions. Bentonite occurs in beds from a few inches to several feet thick. The Gerdrum, Marvan, and Neldore soil series typically are derived from this group.

Directly overlying the Colorado Group is the Pierre Shale. It occupies most of central Carter County, between Cottonwood and Big Ramme Creeks. The Pierre Shale is 1,500- to 2,000-feet thick and consists primarily of dark gray marine shale. Interbedded in the shale are bentonite beds, iron concretions, limestone concretions, veins and crystals of gypsum, and local sandstone lenses. Many saline pan spots are associated with this formation. On the weathered exposures, gypsum crystals glitter in the sun like broken glass. Small lenses of clean, rounded quartz pebbles, weathered from the Pierre Shale, can be found capping small rises. The Gerdrum, Marvan, and Neldore soil series are also typically derived from this formation.

The overlying Fox Hills Sandstone consists of cross-bedded sandstone, siltstone, and shale from marine and brackish water deposits. It is 25- to 100-feet thick and crops out in a relatively narrow band surrounding the Pierre Shale. The upper member of the Fox Hills Sandstone is the Colgate Member. It is a light-colored, permeable sandstone that is distinct from the darker underlying material. The Colgate Member is locally thin or absent. The formation becomes more shaly downward and grades into the underlying Pierre Shale. The Blacksheep and Twilight soil series typically are derived from this formation.

The Hell Creek Formation overlies the Fox Hills Sandstone, ranging from 20- to 30-feet thick in this area. This formation consists of nonmarine and brackish water deposits of sandstone and shale and contains the last of the dinosaur fossils. Together with

the underlying Colgate Member, this formation becomes sandier downward and forms a relatively thick and continuous aquifer. This aquifer supplies much of the domestic and stock water in the region. The Archin, Eapa, and Ynot soil series typically are derived from this formation.

Tertiary System (65- to 2.5-million years before present): The Fort Union Formation overlies the Hell Creek Formation and is exposed in the northeastern part of the county. This formation covers a large portion of eastern Montana but does not occur in significant quantities in Carter County. In this area, the Fort Union Formation has a maximum thickness of 1,800 feet and has been subdivided into the lower Ludlow Member and the upper Tongue River Member. Like the Hell Creek Formation, the Fort Union Formation consists of sandstone, shale, and coal beds. Brick red summits and shoulders of hills formed from baked shale give the outcrops a distinctive appearance. Thin sandy soils mantle the sandstone summits. Deeper soils occur on the intermediate valleys that are eroded into shales. There are 6- to 12-feet thick gravel terraces associated with this formation. The gravels of these terraces are both cleaner and younger than the gravels associated with the Pierre Shale.

In most of the Tongue River Member, shale occurs more frequently than sandstone; however, shale weathers more rapidly into soil-covered slopes and is not as conspicuous as the sandstone. The Tongue River Member is the chief coal-bearing formation in eastern Montana and contains many thick coal beds. The Cabbart, Cambeth, and Eapa soil series typically are derived from this member. The Kirby soil series developed on the baked shale.

The Ludlow Member consists of interbedded sandstone, siltstone, and shale and weathers to badlands-like topography. In other areas of Montana, the Ludlow Member is subdivided into the upper Lebo Shale and lower Tullock Members. Coal in the Ludlow Member occurs as thin lenticular beds. The Archin, Bonfri, and Chinook soil series typically are derived from this member.

Directly overlying the Tongue River Member, the White River Group is exposed only in small areas of higher hills. This group is subdivided into two formations, the older Chadron Formation and the overlying Brule Formation. They crop out in the summits and pinnacles of Long Pine Hills as small exposures overlying the Tongue River. The White River Group is more widely distributed in South Dakota and does not occur in other areas of Montana.

The Chadron Formation consists of interbedded conglomerate and limestone with sandstone and pale green bentonitic shales. The overlying Brule Formation consists of massive orange and pink tuffaceous siltstone with interbeds of shale and sandstone. The White River Group has relatively high permeability but is generally not considered an aquifer because of its limited recharge area.

The Arikaree Formation overlies the White River Group in the Ekalaka Hills and has a wider distribution in South Dakota and Wyoming. This formation is up to 250-feet thick and forms resistant bluffs in the southern margin of the Ekalaka Hills, Long Pine Hills, and Chalk Buttes. The Arikaree Formation consists of light-colored tuffaceous sandstone and shales with interbedded volcanic ash and is locally capped by hard green quartzite. The Belltower, Dast, and Vebar soil series typically are derived from this formation.

Slump areas are located at the base of the Ekalaka Hills, Long Pine Hills, and Chalk Buttes. These areas are composed of both Tertiary- and Cretaceous-aged sedimentary rocks. Most of this movement occurred in the Miocene Epoch (mid-Tertiary Period). The Miocene Epoch was more humid than the contemporary climate. This additional moisture compounded generally unstable conditions in the Brule Formation. The resulting soils have been mapped in the Haploboroll and Ustochrept families.

At the north end of the county, Medicine Rocks State Park consists of unusual and spectacular geology. The park contains knobs and ridges that formed in the soft erodible sandstone of the Tongue River Member. These features are considered remnants of an old dune field that were shaped by wind erosion. Like contemporary dune fields, the sand grains are small and uniform and have a crossbedded structure.

Mineral Resources

Carter County is located within eastern Montana's oil and gas producing region. Oil and gas are produced from different stratigraphic horizons. Oil and gas accumulation is a factor of both geologic structure and porosity variations within individual formations.

Two oil and gas fields have been developed in the county. Hammond Field is located northwest of Alzada, and Repeat Field is located south of the Humbolt Hills near the South Dakota border.

In the Repeat Field, oil and associated gas are produced from the Red River Formation. This

formation is of mid-Ordovician-age and consists of limestone and dolomite. The Red River Formation is one of the most widespread formations in the Williston Basin and is one of its main hydrocarbon reservoirs. The Repeat Field is associated with the Fallon County fields along the crest of the Cedar Creek anticline to the east.

Hammond Field produced natural gas from the Muddy Sandstone Member of the lower Cretaceous Colorado Group. In the past several years, there has not been any production from this field.

Carter County contains significant exposures of formations that are known to contain mineable beds of bentonite. Bentonite beds occur in the Arikaree Formation, the Monument Hill Bentonitic Member of the Pierre Formation, and the Belle Fourche and Mowry Shales.

Potentially economic deposits of lignite are present in Carter County. Lignite is soft and crumbly and contains significant moisture. It has the lowest heat content of coal types. These deposits have undergone little development. They occur in relatively thin, less than 10-feet thick, beds in the Tongue River Member. A few thin beds also occur in the underlying Ludlow Member and Hell Creek Formation.

The Ekalaka Lignite Field produced 2,250 tons of lignite between 1926 and 1934. There has been no further reported development of this field.

Current economic geology maps do not designate “strippable coal reserves” in Carter County. Minor amounts of uranium have been found in lignite beds that crop out along the Ekalaka Hills and Long Pine Hills. Uranium was leached by ground water from windblown tuffs or weathered igneous rocks and deposited in organic-rich lignite. Most uranium in the county has been found in the Fort Union Formation and the overlying Arikaree Formation. Uranium also occurs at depth in lower Cretaceous Formations that do not crop out in the area.

Aggregate, such as sand and gravel, used to make concrete occur in mineable quantities within the county.

Ground-water Resources

Usable ground-water aquifers occur at the surface only in the northern and northeastern portions of Carter County. The remaining shale formations, exposed to the south, are generally impermeable. They contain only small amounts of saline water, which is often too mineralized for any use. Drill depths to underlying artesian aquifers can be quite deep.

Sandstone beds occur In the Pierre Formation and the underlying Newcastle, Muddy, and Lakota Sandstones. Deep wells have been successfully completed in these sandstone beds. Because of structural configuration, wells occur under artesian conditions. Some wells may flow depending on their location.

Ground water in northern Carter County is obtained primarily from the Fox Hills-Lower Hell Creek aquifer wherever the overlying Fort Union Formation is not too thick. Total dissolved solids concentration from this aquifer are generally low, ranging from well under 500 to 2,000 mg/l. The best quality water is found near recharge areas. Average yields are 10 gallons-per-minute (gpm), though yields of as high as 40 gpm are possible.

In the Fort Union Formation, the Tongue River Member typically yields 8 to 15 gpm, and the more shaly Ludlow Member typically yields 3 to 8 gpm. Water is produced from frequently occurring sandstone and baked shale beds. These beds occur as discontinuous lenses with limited areal extent. Their exact locations are impossible to predict at a particular site. After years of use, shallow wells often fail when the limited sandstone lens is completely drained.

Water in the Fort Union Formation contains total dissolved solids concentrations (TDS) ranging from 400 to 2,000 mg/l. In general, the best quality water is obtained from baked shale beds. The Environmental Protection Agency has recommended a maximum TDS concentration of 500 mg/l for human consumption. Water with greater than 7,000 mg/l TDS is generally considered unfit for any use.

Unconsolidated deposits of alluvium occur in the valleys of larger streams. These deposits, consisting of interbedded clay, silt, sand, and gravel, have thicknesses up to 50 feet and are commonly used for ground-water development. They produce average yields of 15 gpm. TDS concentrations range from 450 to 6,000 mg/l.

The Montana Bureau of Mines and Geology’s Open File Report HY77-1, Compilation of Hydrogeological Data for Southeastern Montana, reported a total of 867 wells in Carter County in 1977.

Their average depth was 172 feet, with average static water levels of 72 feet. In 70 percent of the wells, static water level was less than 160 feet.

Well use current to April 1991 is summarized below. Often wells have multiple uses and are listed under both domestic and stockwater supplies, causing the total to appear less than the sum of the uses. This information was provided by the Montana Groundwater Information Center, Butte, Montana.

Stockwater	918
Household and Domestic	239
Unknown	33
Other	3
Industrial	2
Unused	1
TOTAL WELLS	1,089

Climate

Following this section are tables giving data on temperature and precipitation, probable dates of the first freeze in fall and the last freeze in spring, and data on length of the growing season.

Growing-degree days are the equivalent to “heat units.” During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. This information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the survey area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret data from these analyses and tests as well as field-observed characteristics and soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled

from other sources, such as research information, production records, and field experience of specialists. For example, data for crop yields under high levels of management are modeled and validated with farm records and field or plot information on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Temperature and Precipitation

(Recorded in the period 1964-1994 at Albion, Ekalaka, and Ridgway)

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 years in 10 Will Have— Maximum Temperature More Than	2 years in 10 Will Have— Minimum Temperature Less Than	Average Number of Growing Degree Days*	Average	2 years in 10 Will Have— Less Than	2 years in 10 Will Have— More Than	Average Number of Days With 0.10 or More	Average Total Snowfall
ALBION:											
January----	28.5	1.0	14.8	54	-36	1	0.28	0.11	0.46	1	3.0
February---	34.4	6.3	20.3	62	-31	5	0.28	0.07	0.47	0	3.2
March------	44.9	17.6	31.2	72	-14	23	0.51	0.26	0.82	1	3.7
April------	57.0	28.2	42.6	84	6	122	1.56	0.51	2.41	3	6.9
May--------	68.4	38.9	53.7	91	19	371	2.12	1.13	2.99	5	0.6
June-------	76.7	47.9	62.3	99	32	608	3.15	1.95	4.23	7	0.0
July-------	86.1	53.0	69.5	104	37	827	1.82	0.57	2.83	4	0.0
August-----	85.7	50.2	68.0	104	32	737	1.28	0.40	2.00	2	0.0
September--	74.3	39.1	56.7	100	20	435	0.99	0.35	1.58	3	0.6
October----	60.8	28.1	44.5	87	2	171	1.12	0.40	1.80	2	0.7
November---	41.8	15.3	28.5	70	-19	15	0.42	0.16	0.63	1	3.4
December---	32.5	5.1	18.8	61	-31	2	0.41	0.16	0.65	1	4.7
Yearly:											
Average---	57.6	27.6	42.6	----	----	----	----	----	----	----	----
Extreme---	108.0	-48.0	----	106	-38	----	----	----	----	----	----
Total-----	----	----	----	----	----	3,316	13.93	8.88	16.10	30	26.8
EKALAKA:											
January----	29.5	6.9	18.2	56	-30	3	0.53	0.22	0.78	1	0.0
February---	34.9	12.4	23.7	59	-25	7	0.44	0.17	0.69	1	0.5
March------	44.2	20.5	32.4	71	-14	44	0.71	0.29	1.07	2	1.1
April------	57.1	30.8	43.9	82	6	181	1.77	0.76	2.64	4	0.1
May--------	68.3	40.9	54.6	90	20	448	2.57	1.28	3.69	5	0.0
June-------	77.4	49.6	63.5	96	33	698	3.64	2.10	5.01	6	0.0
July-------	85.6	55.4	70.5	101	39	936	1.77	0.68	2.69	3	0.0
August-----	84.0	53.3	68.6	99	34	875	1.24	0.41	2.00	3	0.0
September--	72.0	42.7	57.3	96	22	512	1.57	0.43	2.48	3	0.0
October----	59.3	31.9	45.6	83	6	229	1.32	0.52	2.06	2	0.3
November---	42.1	19.7	30.9	70	-12	34	0.68	0.24	1.04	2	2.7
December---	32.1	10.2	21.2	59	-29	6	0.63	0.22	0.97	2	2.6
Yearly:											
Average---	57.2	31.2	44.2	----	----	----	----	----	----	----	----
Extreme---	105.0	-43.0	----	102	-34	----	----	----	----	----	----
Total-----	----	----	----	----	----	3,973	16.87	12.78	20.16	34	7.4

See footnote at end of table.

Temperature and Precipitation--Continued

Month	Temperature (Degrees F)					Precipitation (Inches)					
	Average Daily Maximum	Average Daily Minimum	Average	2 years in 10 Will Have— Maximum Temperature More Than	2 years in 10 Will Have— Minimum Temperature Less Than	Average Number of Growing Degree Days*	Average	2 years in 10 Will Have— Less Than	2 years in 10 Will Have— More Than	Average Number of Days With 0.10 or More	Average Total Snowfall
RIDGWAY:											
January----	28.7	3.0	15.8	54	-32	1	0.32	0.17	0.62	1	5.1
February---	34.2	8.8	21.5	59	-29	4	0.28	0.09	0.50	1	4.3
March------	43.7	19.1	31.4	72	-16	30	0.68	0.18	1.17	1	6.9
April------	57.0	30.5	43.8	83	8	169	1.51	0.60	2.28	4	4.3
May--------	67.7	40.6	54.2	90	21	430	2.30	0.95	3.45	5	0.4
June-------	76.6	49.6	63.1	97	32	663	2.69	1.74	3.54	6	0.1
July-------	85.0	55.5	70.3	102	39	881	1.69	0.66	2.56	4	0.0
August-----	84.2	52.8	68.5	100	34	832	1.04	0.53	1.61	2	0.0
September--	72.6	41.3	56.9	97	20	490	1.21	0.39	2.03	3	0.8
October----	60.2	29.8	45.0	85	3	201	1.01	0.34	1.69	2	1.7
November---	42.5	16.8	29.7	72	-17	26	0.53	0.19	0.95	1	4.7
December---	32.0	6.3	19.1	59	-34	2	0.48	0.19	0.87	1	5.4
Yearly:											
Average---	57.0	29.5	43.3	---	---	---	---	---	---	---	---
Extreme---	108.0	-51.0	---	103	-39	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,728	13.75	10.39	16.35	31	33.7

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 degrees F).

Freeze Dates in Spring and Fall

(Recorded in the period 1964-1994 at Albion, Ekalaka, and Ridgway)

Probability	Temperature		
	24 Degrees F or Lower	28 Degrees F or Lower	32 Degrees F or Lower
ALBION:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-------	May 16	May 31	June 7
2 years in 10 later than------	May 12	May 25	June 2
5 years in 10 later than------	May 2	May 13	May 24
First freezing temperature in fall: August-December			
1 year in 10 earlier than-----	September 13	September 4	August 27
2 years in 10 earlier than----	September 18	September 8	August 31
5 years in 10 earlier than----	September 28	September 17	September 10
EKALAKA:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-------	May 10	May 20	June 6
2 years in 10 later than------	May 5	May 15	June 1
5 years in 10 later than------	April 25	May 5	May 21
First freezing temperature in fall: August-December			
1 year in 10 earlier than-----	September 16	September 9	September 1
2 years in 10 earlier than----	September 22	September 14	September 6
5 years in 10 earlier than----	October 4	September 25	September 16

Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 Degrees F or Lower	28 Degrees F or Lower	32 Degrees F or Lower
RIDGWAY:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-------	May 16	May 24	June 6
2 years in 10 later than------	May 10	May 18	May 31
5 years in 10 later than------	April 28	May 8	May 20
First freezing temperature in fall: August-December			
1 year in 10 earlier than-----	September 16	September 7	August 26
2 years in 10 earlier than----	September 21	September 12	September 1
5 years in 10 earlier than----	October 3	September 22	September 11

Growing Season

(Recorded in the period 1964-1994 at Albion, Ekalaka, and Ridgway)

Probability	Daily Minimum Temperature		
	Higher Than 24 Degrees F	Higher Than 28 Degrees F	Higher Than 32 Degrees F
	Days	*Days*	*Days*
ALBION:			
9 years in 10----------	126	104	86
8 years in 10----------	133	111	95
5 years in 10----------	148	125	112
2 years in 10----------	163	138	129
1 year in 10----------	170	145	138
EKALAKA:			
9 years in 10----------	138	120	94
8 years in 10----------	146	128	102
5 years in 10----------	161	142	117
2 years in 10----------	177	157	132
1 year in 10----------	184	164	140
RIDGWAY:			
9 years in 10----------	130	112	91
8 years in 10----------	139	121	99
5 years in 10----------	157	136	115
2 years in 10----------	175	152	130
1 year in 10----------	184	160	138

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The tables, "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," at the end of this section show the classification and extent of the soils in this survey area.

Formation of the Soils

Soil is a natural, three-dimensional body on the earth's surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, the physical and chemical composition of the parent material, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the survey area.

Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material. Water and wind are active agents in transporting and separating weathered material.

Precipitation and temperature affect the kind and amount of vegetation that grows on the soil. Vegetation decays to produce organic matter in the soil. Soils that have cool temperatures and high precipitation, such as the Parshall series, generally contain more organic matter and are dark colored. Soils that have warm temperatures and low precipitation, such as the Yamacall series, generally contain less organic matter and are light colored. In Carter County, precipitation ranges from 10 to 19 inches annually.

Living Organisms

Living organisms are active in the formation of soils. Among the earliest inhabitants of rock material, fungi and algae contribute to the decomposition of bedrock. As rocks decompose, grasses, shrubs, and trees are able to grow and support animal life.

Organic matter is the main source of the dark color of the surface layer. The kinds of plants and animals in an area largely determine the kind and amount of organic matter added to the soil and the manner in which this matter is incorporated into mineral parts of the soil. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients, and changes in porosity and structure. Roots, rodents, and insects penetrate the soil and influence its structure. Microorganisms, chemicals in the soil, and insects change leaves, roots, and entire plants that remain in the surface layer to humus.

Animals increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Common burrowing animals are badger, field mice, ground squirrel, prairie dog, and rabbit. Burrowing rodents brought up many of the pebbles and cobbles on the surface of terraces.

Native vegetation in Carter County consists mainly of short and mid grasses, forbs, and shrubs.

Topography

Topography, or relief, is determined by the resistance of bedrock or soil material to water erosion and soil blowing. Topography influences soil development through its effect on drainage and runoff. On eroded uplands in the survey area, runoff water has carved deep intermittent drains with many branches into the original bedrock formations. This

rugged relief contrasts sharply with the smooth low relief of terraces and flood plains.

On uplands, the number and distinctness of soil horizons generally decrease as the slope increases. Soils on steep slopes that have rapid runoff have many characteristics similar to those of soils formed in arid climates. Nearly level to gently rolling soils have many characteristics similar to those of soils formed in semiarid climates. Examples of these patterns, typical in Carter County, are the shallow Blacksheep soil that has strongly sloping to steep slopes and no B horizon and the nearly level to gently rolling Eapa soil that is very deep with a 7- to 24-inch thick B horizon.

Parent Material

Most soils in Carter County formed in place over semiconsolidated sedimentary beds or semiconsolidated shale. Many soils formed in alluvium and were deposited in valleys. Soils, such as the Blacksheep series, that formed in material derived from semiconsolidated, sandy sedimentary beds are generally sandy. Soils, such as the Bascovy series, that formed in shale are clayey, since clay is the basic constituent of shale. Soils, such as the Havre series, that formed in mixed alluvium derived from semiconsolidated, loamy sedimentary beds are loamy.

Many soils in the county, such as the Alona series, have acquired salt and sodium from their parent materials. Salt and sodium make these soils saline or alkaline and limit the kind and amount of plants able to grow on them. The density of the parent rock and its mineral composition can limit the rate of weathering and the depth of a soil.

Time

Change taking place in soils over a long period is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of these horizons are called soil morphology. These layers are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Soils are classified according to their approximate age, from young to mature. Age or maturity of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Havre loam, a soil of the Entisol order, is a young soil that formed in alluvium on a flood plain. This soil contains little organic matter with which to form an A horizon. It has no clay accumulation and limited translocation of carbonates has occurred to form Bk horizons.

Eapa loam formed in parent material similar to, but much older than, that of the Havre soil. Eapa soil formed in alluvium on alluvial fans and stream terraces and is a mature soil of the Mollisol order. It contains enough organic matter to have a dark A horizon. Also, it has a distinct clay accumulation in the B horizon, and nearly all of the carbonates have been leached below a depth of about 24 inches.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1975 and 1990). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, “Classification of the Soils,” shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol, from *mollis*, meaning soft.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Boroll (*Bor*, meaning northern, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil.

An example is Argiboroll (*Argi*, meaning having an argillic or clay accumulation, plus *boroll*, the suborder of the Mollisols that are cool).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiborolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is Fine-loamy, mixed Typic Argiborolls.

SERIES. The series consists of soils within a family that have horizons similar in arrangement in the profile, color, consistence, mineral and chemical composition, reaction, structure, and texture. An example is the Reeder series, which is a Fine-loamy, mixed Typic Argiboroll.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1962). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1975). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all of the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is

divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Glendive sandy loam, saline, 0 to 4 percent slopes, is a phase of the Glendive series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes *complexes.* They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Gerdrum-Absher complex, warm, 3 to 9 percent slopes, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Badland is an example.

The table, "Acreage and Proportionate Extent of the Soils," in Parts I and II of the manuscript gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. Many of the terms used in describing the soils or miscellaneous areas are defined in the "Glossary."

Abor Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Leptic Udic Haplusterts

Typical Pedon

Abor silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,000 feet north and 250 feet west of the southeast corner of sec. 19, T. 6 S., R. 56 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium granular structure; hard, friable, very sticky, very plastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bss—4 to 14 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky, very plastic; few very fine and fine roots; few slickensides; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bssky—14 to 26 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky, very plastic; few very fine roots; few slickensides; few fine nests and seams of gypsum crystals; common fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

By—26 to 32 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, very plastic; few very fine roots; few fine masses and nests of gypsum; slightly effervescent; slightly alkaline; gradual wavy boundary.

Cr—32 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated shale that crushes to silty clay and silty clay loam, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F (60 to 72 degrees F summer temperatures)
Depth to the Bssky horizon: 10 to 16 inches
Depth to the Cr horizon: 20 to 40 inches
Other features: When dry, this soil has 1/4- to 2-inch cracks that extend to a depth of about 20 inches.

A horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 1 to 4 (The 1 chroma is inherent from the parent material.)
- Clay content: 35 to 40 percent
- Content of rock fragments: 0 to 10 percent pebbles
- Electrical conductivity: 0 to 4 mmhos/cm
- Reaction: pH 7.4 to 8.4

Bss horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 1 to 4
- Texture: Silty clay, silty clay loam, or clay
- Clay content: 35 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 9.0

Bssky horizon
Hue: 2.5Y, 5Y, 10YR, or 2.5YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Silty clay, silty clay loam, clay loam, or clay
Clay content: 35 to 60 percent
Slickensides: Few to common
Electrical conductivity: 0 to 4 mmhos/cm
Gypsum content: 1 to 5 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

By horizon
Hue: 2.5Y, 5Y, 10YR, or 2.5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Silty clay, silty clay loam, or clay
Clay content: 35 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm
Gypsum content: 1 to 5 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

51C—Abor silty clay loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Abor and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

251D—Abor-Yawdim silty clay loams, 4 to 15 percent slopes

Setting

Landform:
- Abor—Hills
- Yawdim—Hills

Position on landform:
- Abor—Backslopes
- Yawdim—Shoulders and summits

Slope:
- Abor—4 to 15 percent
- Yawdim—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Abor and similar soils: 60 percent
Yawdim and similar soils: 30 percent

Minor Components
Bascovy and similar soils: 0 to 3 percent
Marias and similar soils: 0 to 3 percent
Volborg and similar soils: 0 to 2 percent
Neldore and similar soils: 0 to 2 percent

Major Component Description

Abor
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.6 inches

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Absher Series

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 9 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Typic Natriboralfs

Typical Pedon

Absher clay, in an area of Absher-Gerdrum complex, 0 to 4 percent slopes, in an area of rangeland, 650 feet north and 1,250 feet east of the southwest corner of sec. 25, T. 9 S., R. 59 E.

E—0 to 1 inch; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate thin platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine tubular pores; slightly alkaline; abrupt smooth boundary.

Btn1—1 to 7 inches; light brownish gray (10YR 6/2) clay, brown (10YR 5/3) moist; moderate medium columnar structure parting to strong fine and medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; few fine and many very fine roots; few very fine and fine pores; common faint clay films on faces of peds and in pores; moderately alkaline; clear smooth boundary.

Btn2—7 to 10 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; common faint clay films on faces of peds and in pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bknyz—10 to 24 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; common very fine and fine nests and seams of gypsum crystals; few fine seams of other salts; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkyz—24 to 60 inches; very pale brown (10YR 7/3) clay, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, moderately sticky, moderately plastic; common very fine and fine nests of gypsum crystals; few very fine and fine seams of other salts; few fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F (60 to 68 degrees F summer temperatures)
Depth to the Bknyz horizon: 6 to 20 inches
Other features: In areas that are cultivated, a clay texture results from mixing the E and Bt horizons.
Taxonomic note: Map units 611B and 611D are taxadjuncts to the Absher series in order to join soils that have an average soil temperature greater than 47 degrees F.

E horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 6 or 7 dry; 3, 4, or 5 moist
Chroma: 1 to 3
Texture: Clay when mixed to 7 inches
Clay content: 15 to 20 percent
Electrical conductivity: 4 to 8 mmhos/cm
Reaction: pH 6.6 to 8.4

Btn1 horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Silty clay, clay, or clay loam
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 18 to 70
Reaction: pH 6.6 to 8.4

Btn2 horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Silty clay, clay, or clay loam
Clay content: 35 to 60 percent

Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 18 to 70
Reaction: pH 6.6 to 8.4

Bknyz and Bkyz horizons
Hue: 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Clay loam, sandy clay loam, silty clay, clay, or silty clay loam
Clay content: 27 to 50 percent
Content of rock fragments: 0 to 15 percent pebbles
Calcium carbonate equivalent: 4 to 15 percent
Electrical conductivity: 16 to 30 mmhos/cm
Sodium adsorption ratio: 18 to 70
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 9.6

168B—Absher-Gerdrum complex, 0 to 4 percent slopes

Setting

Landform:
- Absher—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

Position on landform:
- Absher—Microlows
- Gerdrum—Microhighs

Slope:
- Absher—0 to 4 percent
- Gerdrum—0 to 4 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Absher and similar soils: 60 percent
Gerdrum and similar soils: 30 percent

Minor Components
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Soils that have slopes more than 4 percent: 0 to 2 percent
Very deep nonsaline soils: 0 to 2 percent

Major Component Description

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Alona Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-silty, mixed, frigid Aridic Ustochrepts

Typical Pedon

Alona silt loam, 2 to 8 percent slopes, in an area of rangeland, 800 feet north and 1,000 feet east of the southwest corner of sec. 1, T. 8 S., R. 59 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; ½- to 1-inch vesicular crust over moderate fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—3 to 10 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5 4/2) moist;

moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine roots; many very fine tubular pores; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bk—10 to 22 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; common very fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bkz—22 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; few fine nests and seams of salt crystals; common fine and medium masses of lime; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 6 to 18 inches
Soil phases: Warm
Taxonomic note: Map unit 621C is a taxadjunct to the Alona series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Electrical conductivity: 2 to 4 mmhos/cm
Sodium adsorption ratio: 2 to 10
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 40
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 8.5 to 9.6

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Silt loam or silty clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 40
Reaction: pH 9.1 to 9.6

Bkz horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, silty clay loam, or silt loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 40
Reaction: pH 8.5 to 9.6

20C—Alona silt loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Alona and similar soils: 85 percent

Minor Components
Cambeth and similar soils: 0 to 4 percent
Soils that have darker colored surface layers: 0 to 4 percent
Very deep nonsaline soils: 0 to 4 percent
Soils that have slopes more than 8 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

621C—Alona silt loam, warm, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Alona and similar soils: 85 percent

Minor Components
Moderately deep loamy soils: 0 to 4 percent
Soils that have slopes more than 8 percent: 0 to 4 percent
Very deep, nonsaline soils: 0 to 4 percent
Soils that have darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Alzada Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, mixed, frigid Aridic Ustochrepts

Typical Pedon

Alzada clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 2,500 feet west of the southeast corner of sec. 24, T. 9 S., R. 58 E.

A—0 to 2 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; slightly acid; clear smooth boundary.

Bw—2 to 10 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, very sticky, very plastic; common very fine roots; few very fine and fine pores; common faint clay films on faces of peds and in pores; disseminated lime; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bk—10 to 16 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, friable, moderately sticky, very plastic; common very fine roots; few fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Bkyz—16 to 36 inches; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure; hard, firm, moderately sticky, moderately plastic; many fine and medium nests and seams of gypsum crystals; few fine seams of other salts; few fine seams of lime; strongly effervescent; neutral; gradual wavy boundary.

2C—36 to 60 inches; gray (10YR 5/1) clay, very dark gray (10YR 3/1) moist; massive; hard, firm, moderately sticky, moderately plastic; neutral.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Depth to the Bk horizon: 8 to 16 inches
Depth to the 2Bkyz horizon: 12 to 22 inches

A horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 3, 4, or 5 moist
Chroma: 2 or 3
Texture: Clay loam when mixed to 7 inches

Clay content: 27 to 35 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 5.6 to 7.3

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Silty clay loam or clay
Clay content: 35 to 50 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 0 to 13
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Silty clay loam or clay
Clay content: 35 to 50 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 0 to 13
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

2Bkyz horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Silty clay loam or clay
Clay content: 35 to 50 percent
Electrical conductivity: 4 to 8 mmhos/cm
Gypsum content: 1 to 5 percent
Reaction: pH 6.6 to 8.4

2C horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Clay loam, silty clay loam, or clay
Clay content: 35 to 50 percent
Electrical conductivity: 4 to 8 mmhos/cm
Reaction: pH 6.6 to 8.4

92C—Alzada clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Alzada and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 3 percent
Teigen and similar soils: 0 to 3 percent
Very shallow soils: 0 to 3 percent
Soils that have slopes less than 2 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Archin Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans, stream terraces, and sedimentary plains
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Borollic Natrargids

Typical Pedon

Archin fine sandy loam, in an area of Archin-Absher complex, 2 to 8 percent slopes, in an area of rangeland, 1,700 feet south and 650 feet east of the northwest corner of sec. 14, T. 3 N., R. 56 E.

A—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine pores; neutral; clear smooth boundary.

E—4 to 7 inches; very pale brown (10YR 7/3) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to

weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine roots; few fine and common very fine pores; neutral; abrupt smooth boundary.

Btn—7 to 20 inches; light yellowish brown (2.5Y 6/4) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, very firm, very sticky, moderately plastic; common very fine and fine roots; many very fine pores; many faint clay films on faces of peds and in pores; moderately alkaline; clear smooth boundary.

Bky—20 to 28 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky, moderately plastic; few very fine roots; common fine nests and seams of gypsum crystals; many fine and medium masses of lime; strongly alkaline; clear smooth boundary.

BC—28 to 34 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; strongly alkaline; gradual smooth boundary.

C—34 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky, slightly plastic; strongly alkaline.

Range in Characteristics

Depth to the Bky horizon: 12 to 30 inches
Soil phases: Gullied
Other features: Some pedons have a Bkz horizon.
Taxonomic note: The Archin soil is a taxadjunct to the series. It classifies as Fine-loamy, mixed Typic Natriboralfs. Use and management is similar.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Loam or fine sandy loam
Clay content: 10 to 25 percent
Reaction: pH 6.1 to 7.3

E horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 1 to 3
Texture: Loam or fine sandy loam
Clay content: 10 to 25 percent
Reaction: pH 6.1 to 7.3

Btn horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 25 to 34 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH 6.6 to 8.4

Bky horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 20
Calcium carbonate equivalent: 5 to 15 percent
Gypsum content: 1 to 5 percent
Reaction: pH 7.4 to 9.0

BC horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Loam or clay loam
Clay content: 20 to 35 percent
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH 7.4 to 9.0

C horizon
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Loam or clay loam
Clay content: 20 to 30 percent
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH greater than 8.4

75A—Archin-Absher complex, 0 to 2 percent slopes

Setting

Landform:
- Archin—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Archin—Microhighs
- Absher—Microlows

Slope:
- Archin—0 to 2 percent
- Absher—0 to 2 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 50 percent
Absher and similar soils: 35 percent

Minor Components
Chinook and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Very deep, nonsaline soils: 0 to 3 percent
Soils that have darker colored surface layers: 0 to 2 percent
Busby and similar soils: 0 to 2 percent
Soils that have slopes more than 2 percent: 0 to 2 percent

Major Component Description

Archin
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

Absher
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

75C—Archin-Absher complex, 2 to 8 percent slopes

Setting

Landform:
- Archin—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Archin—Microhighs
- Absher—Microlows

Slope:
- Archin—2 to 8 percent
- Absher—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 50 percent
Absher and similar soils: 35 percent

Minor Components
Chinook and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Very deep, nonsaline soils: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 2 percent
Soils with darker colored surface layers: 0 to 2 percent

Major Component Description

Archin
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

Absher
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

175A—Archin loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Soils that have slopes more than 2 percent: 0 to 3 percent
Very deep, nonsaline soils: 0 to 2 percent
Soils that have darker colored surface layers: 0 to 2 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

175C—Archin loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Parchin and similar soils: 0 to 3 percent
Very deep, nonsaline soils: 0 to 3 percent
Areas of slickspots: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

275D—Archin, gullied-Delpoint complex, 4 to 15 percent slopes

Setting

Landform:
- Archin—Sedimentary plains
- Delpoint—Hills

Position on landform:
- Archin—Footslopes and toeslopes
- Delpoint—Shoulders and summits

Slope:
- Archin—4 to 8 percent
- Delpoint—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 45 percent
Delpoint and similar soils: 40 percent

Minor Components
Very deep nonsaline soils: 0 to 3 percent
Gerdrum and similar soils: 0 to 3 percent
Yawdim and similar soils: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 2 percent
Soils that have slopes less than 4 percent: 0 to 2 percent
Very deep, silt loam soils: 0 to 2 percent

Major Component Description

Archin
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

375C—Archin-Ynot complex, 2 to 8 percent slopes

Setting

Landform:
- Archin—Alluvial fans and stream terraces
- Ynot—Alluvial fans and stream terraces

Slope:
- Archin—2 to 8 percent
- Ynot—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Archin and similar soils: 45 percent
Ynot and similar soils: 40 percent

Minor Components
Absher and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Archin
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 8.2 inches

Ynot
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Arsite Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Alluvium or semiconsolidated shale
Slope range: 0 to 25 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Clayey, montmorillonitic, nonacid, frigid, shallow Aridic Ustorthents

Typical Pedon

Arsite clay, 0 to 8 percent slopes, in an area of rangeland, 2,100 feet south and 550 feet east of the northwest corner of sec. 9, T. 2 S., R. 58 E.

A—0 to 2 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; strong fine subangular blocky structure with 1/2-inch thick vesicular crust on surface;

slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; neutral; clear wavy boundary.

Cyz1—2 to 6 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; strong coarse prismatic structure; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common fine masses and seams of gypsum crystals; few very fine seams of other salts; slightly acid; clear wavy boundary.

Cyz2—6 to 12 inches; light brownish gray (10YR 6/2) clay, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; 30 percent soft shale fragments; common medium masses of gypsum crystals; few fine and medium masses and seams of other salts; few thin horizontal iron stains and few small masses of sulfur; moderately acid; clear wavy boundary.

Cr—12 to 60 inches; grayish brown (10YR 5/2) semiconsolidated shale that crushes to clay, very dark grayish brown (10YR 3/2) moist.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Depth to the Cr horizon: 10 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay when mixed to 7 inches
Clay content: 15 to 30 percent
Electrical conductivity: 8 to 16 mmhos/cm
Reaction: pH 6.1 to 7.8

Cyz1 horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 8 to 16 mmhos/cm
Reaction: pH 5.6 to 7.3

Cyz2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 or 3
Texture: Silty clay or clay
Clay content: 40 to 60 percent
Content of rock fragments: 30 to 50 percent soft shale fragments
Electrical conductivity: 8 to 16 mmhos/cm
Reaction: pH 5.6 to 7.8

79C—Arsite clay, 0 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 0 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Arsite and similar soils: 85 percent

Minor Components
Bascovy and similar soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Vaeda and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

179E—Arsite-Rock outcrop complex, 8 to 25 percent slopes

Setting

Landform:
- Arsite—Hills
- Rock outcrop—Hills

Position on landform:
- Arsite—Backslopes and footslopes
- Rock outcrop—Summits

Slope: 8 to 25 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Arsite and similar soils: 45 percent
Rock outcrop: 40 percent

Minor Components
Bascovy and similar soils: 0 to 5 percent
Neldore and similar soils: 0 to 5 percent
Very shallow clayey soils: 0 to 5 percent

Major Component Description

Arsite
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.0 inches

Rock outcrop
Definition: Consolidated shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Assinniboine Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans, stream terraces, sedimentary plains, and hills
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Assinniboine sandy clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,050 feet south and 2,130 feet west of the northeast corner of sec. 21, T. 2 N., R. 57 E.

A—0 to 3 inches; grayish brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; loose, friable, nonsticky, nonplastic; few fine and medium and many very fine roots; neutral; clear smooth boundary.

Bt1—3 to 16 inches; grayish brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky, slightly plastic; many very fine roots; common distinct clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—16 to 23 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky, slightly plastic; common very fine, fine, and medium roots; many distinct clay films on faces of peds and in pores; slightly alkaline; clear smooth boundary.

Btk—23 to 32 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine roots; few very fine and fine pores; few faint clay films on faces of ped and in pores; few fine seams of lime; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bk—32 to 42 inches; light gray (2.5Y 7/2) sandy loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine roots; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

BC—42 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; massive; loose, friable, nonsticky, nonplastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Btk horizon: 10 to 25 inches
Other features: In areas that are cultivated, a sandy clay loam texture results from mixing the A and Bt horizons. Some pedons have a thin strata of loamy sand, loamy fine sand, or sand at depths below 40 inches.

A horizon
Hue: 10YR or 2.5Y
Chroma: 2 or 3
Texture: Fine sandy loam or sandy clay loam when mixed to 7 inches

Content of rock fragments: 0 to 15 percent pebbles
Clay content: 5 to 25 percent
Reaction: pH 6.1 to 7.8

Bt horizons
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Sandy clay loam or fine sandy loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.6 to 7.8

Btk and Bk horizons
Hue: 2.5Y or 10YR
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Sandy loam, fine sandy loam, or sandy clay loam
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

BC horizon
Hue: 2.5Y or 10YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Stratifications of fine sandy loam, sandy loam, loamy fine sand, and fine sand
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 7.4 to 8.4

74A—Assinniboine sandy clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Assinniboine and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 4 percent
Chinook and similar soils: 0 to 4 percent
Marmarth and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Sandy clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

74C—Assinniboine sandy clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Assinniboine and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 4 percent
Chinook and similar soils: 0 to 4 percent
Marmarth and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Sandy clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

174C—Assinniboine-Ynot complex, 2 to 8 percent slopes

Setting

Landform:
- Assinniboine—Alluvial fans and stream terraces
- Ynot—Alluvial fans and stream terraces

Slope:
- Assinniboine—2 to 8 percent
- Ynot—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Assinniboine and similar soils: 50 percent
Ynot and similar soils: 35 percent

Minor Components
Marmarth and similar soils: 0 to 4 percent
Twilight and similar soils: 0 to 4 percent
Soils that have slopes more than 8 percent: 0 to 4 percent
Soils with lighter colored surface layers: 0 to 2 percent
Areas of blowouts: 0 to 1 percent

Major Component Description

Assinniboine
Surface layer texture: Sandy clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

Ynot
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

13F—Badland

Setting

Landform: Hills
Slope: 8 to 70 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Badland: 85 percent

Minor Components
Cabbart and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 3 percent
Yawdim and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 2 percent
Very shallow loamy soils: 0 to 2 percent
Weingart and similar soils: 0 to 2 percent

Major Component Description

Definition: Badlands are barren or nearly barren of vegetation and have numerous deeply entrenched, intermittent drainageways. They were formed by active geologic erosion of soft, multicolored sedimentary beds that are mainly sandstone, siltstone, and shale.
Surface layer texture: Unweathered bedrock
Flooding: None

Bascovy Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 0 to 21 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Leptic Udic Haplusterts

Typical Pedon

Bascovy clay, in an area of Neldore-Bascovy clays, 4 to 15 percent slopes, in an area of rangeland, 1,500 feet north and 800 feet west of the southeast corner of sec. 22, T. 3 S., R. 58 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately

sticky, moderately plastic; few fine and many very fine roots; few very fine pores; neutral; clear smooth boundary.

Bss—3 to 12 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm, very sticky, very plastic; few fine and many very fine roots; common very fine pores; common distinct slickensides; neutral; clear smooth boundary.

Bssy—12 to 19 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; very hard, firm, very sticky, very plastic; few very fine roots; common very fine pores; common distinct slickensides; many very fine and fine masses and seams of gypsum crystals; disseminated lime; slightly effervescent; slightly alkaline; clear smooth boundary.

BC—19 to 26 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, moderately sticky, moderately plastic; few very fine roots; slightly alkaline; gradual smooth boundary.

C—26 to 34 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, moderately sticky, moderately plastic; slightly acid; abrupt smooth boundary.

Cr—34 to 60 inches; grayish brown (2.5Y 5/2) semiconsolidated shale that crushes to clay, dark grayish brown (2.5Y 4/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Cr horizon: 20 to 40 inches
Soil phases: Warm
Taxonomic note: Map units 623D, 633D, and 635C are taxadjuncts to the Bascovy series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 1 to 3
Clay content: 40 to 60 percent
Electrical conductivity: 2 to 4 mmhos/cm
Reaction: pH 6.6 to 8.4

Bss horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 2 to 4 mmhos/cm
Reaction: pH 6.1 to 8.4

Bssy horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Gypsum content: 1 to 5 percent
Electrical conductivity: 2 to 4 mmhos/cm
Reaction: pH 6.1 to 8.4

BC and C horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 2 to 8 mmhos/cm
Reaction: pH 5.1 to 8.4

90C—Bascovy clay, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Soils with silt loam surface layers: 0 to 3 percent
Soils with calcareous surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

90D—Bascovy clay, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 4 percent
Soils with silt loam surface layers: 0 to 2 percent
Soils with calcareous surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

490C—Bascovy-Ethridge complex, 2 to 8 percent slopes

Setting

Landform:
- Bascovy—Sedimentary plains
- Ethridge—Stream terraces

Slope:
- Bascovy—2 to 8 percent
- Ethridge—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 50 percent
Ethridge and similar soils: 35 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Abor and similar soils: 0 to 1 percent

Major Component Description

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

Ethridge
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

590C—Bascovy-Marvan complex, 2 to 8 percent slopes

Setting

Landform:
- Bascovy—Sedimentary plains
- Marvan—Sedimentary plains

Slope:
- Bascovy—2 to 8 percent
- Marvan—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 50 percent
Marvan and similar soils: 35 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 4 percent
Abor and similar soils: 0 to 3 percent

Major Component Description

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

Marvan
Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

623D—Bascovy clay, warm, 0 to 9 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 0 to 9 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Soils with calcareous surface layers: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 2 percent
Soils with silty clay loam surfaces: 0 to 1 percent

Major Component Description

Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

633D—Bascovy-Neldore clays, warm, 6 to 21 percent slopes

Setting

Landform:
- Bascovy—Sedimentary plains and hills
- Neldore—Sedimentary plains and hills

Position on landform:
- Bascovy—Backslopes and shoulders
- Neldore—Shoulders and summits

Slope:
- Bascovy—6 to 21 percent
- Neldore—6 to 21 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bascovy and similar soils: 50 percent
Neldore and similar soils: 35 percent

Minor Components
Abor and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 4 percent

Volborg and similar soils: 0 to 4 percent
Vaeda and similar soils: 0 to 3 percent

Major Component Description

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

Neldore
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beaverflat Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour) over rapid (6.0 to 20.0 inches/hour)
Landform: Relict stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal mixed Aridic Argiborolls

Typical Pedon

Beaverflat loam, 0 to 4 percent slopes, in an area of cropland, 1,300 feet south and 50 feet west of the northeast corner of sec. 27, T. 2 N., R. 56 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few very fine and fine pores; slightly acid; clear smooth boundary.

Bt1—7 to 15 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine tubular pores; common faint clay films on faces of peds and in pores; slightly acid; clear wavy boundary.

Bt2—15 to 30 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong fine and medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; few fine and common very fine roots; common very fine and fine tubular pores; common faint clay films on faces of peds and in pores; neutral; gradual wavy boundary.

BC—30 to 34 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; very hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; neutral; abrupt wavy boundary.

2C—34 to 60 inches; variegated colored sand; single grain; loose, nonsticky, nonplastic; 10 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 10 to 16 inches
Depth to the 2C horizon: 20 to 40 inches

Ap horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 5.6 to 6.5

Bt horizons
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

BC horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Loam or sandy clay loam
Clay content: 15 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.6 to 7.3

2C horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 3 or 4
Texture: Sand or loamy sand
Clay content: 0 to 5 percent
Content of rock fragments: 0 to 35 percent pebbles
Reaction: pH 6.6 to 7.3

30A—Beaverflat loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Beaverflat and similar soils: 85 percent

Minor Components
Varney and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 4 percent
Soils with lighter colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

130A—Beaverflat sandy loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Beaverflat and similar soils: 85 percent

Minor Components
Varney and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 4 percent
Soils with calcareous surface layers: 0 to 4 percent
Soils with darker colored surface layers: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beenom Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Bedrock-floored plains
Parent material: Sandstone and quartzite residuum
Slope range: 1 to 8 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Loamy, mixed Lithic Argiborolls

Typical Pedon

Beenom loam, in an area of Beenom-Parchin complex, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet north and 500 feet west of the southeast corner of sec. 10, T. 1 S., R. 61 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, nonplastic; many very fine roots; neutral; clear smooth boundary.

Bt1—4 to 10 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; many faint clay films on faces of peds, continuous distinct clay films in pores; slightly alkaline; clear smooth boundary.

Bt2—10 to 16 inches; pale brown (10YR 6/3) gravelly sandy clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, plastic; common very fine and fine roots; few very fine pores; many faint clay films on faces of peds and sandstone fragments, many distinct clay films in pores; 30 percent sandstone fragments; slightly alkaline; abrupt smooth boundary.

R—16 to 60 inches; hard platy sandstone.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Thickness of the mollic epipedon: 8 to 13 inches
Depth to bedrock: 10 to 20 inches
Other features: Some pedons have a Btk horizon.
Taxonomic note: Map unit 49A is a taxadjunct to the Beenom series because of fragmental material to 30 inches.

A horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.6 to 7.8

Bt1 horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3, 4, or 5 dry; 2, 3, or 4 moist
Chroma: 2 or 3
Texture: Clay loam, fine sandy loam, or sandy clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 30 percent pebbles
Reaction: pH 7.4 to 8.4

Bt2 horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 6 dry; 3 or 4 moist
Chroma: 2 or 3
Texture: Clay loam, fine sandy loam, or sandy clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 30 percent pebbles
Reaction: pH 7.4 to 8.4

49A—Beenom-Reeder loams, 1 to 4 percent slopes

Setting

Landform:
- Beenom—Bedrock-floored plains
- Reeder—Sedimentary plains

Slope:
- Beenom—1 to 4 percent
- Reeder—1 to 4 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Beenom and similar soils: 60 percent
Reeder and similar soils: 25 percent

Minor Components
Very deep loamy soils: 0 to 5 percent
Soils with slopes more than 4 percent: 0 to 5 percent
Deep soils over hard sandstone: 0 to 5 percent

Major Component Description

Beenom
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Quartzite residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

116C—Beenom-Parchin complex, 2 to 8 percent slopes

Setting

Landform:
- Beenom—Bedrock-floored plains
- Parchin—Sedimentary plains

Slope:
- Beenom—2 to 8 percent
- Parchin—2 to 8 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Beenom and similar soils: 50 percent
Parchin and similar soils: 35 percent

Minor Components
Areas of rock outcrop: 0 to 4 percent
Very shallow soils: 0 to 4 percent
Moderately deep loamy soils: 0 to 3 percent
Very deep sandy loam soils: 0 to 2 percent
Soils with flaggy sandy loam surfaces: 0 to 2 percent

Major Component Description

Beenom
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Sandstone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.6 inches

Parchin
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Belltower Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 4 to 60 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed Mollic Eutroboralfs

Typical Pedon

Belltower loam, in an area of Belltower-Dast complex, 35 to 60 percent slopes, in an area of forestland, 1,300 feet north and 2,600 feet east of the southwest corner of sec. 24, T. 1 N., R. 57 E.

Oi—2 inches to 0; partially decomposed forest litter.
A—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common medium and coarse and many very fine and fine roots; common fine and many very fine tubular pores; slightly acid; clear smooth boundary.
E—8 to 17 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine tubular pores; 5 percent soft channers; neutral; clear wavy boundary.
Bt—17 to 32 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to

strong medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; few fine and medium and common very fine roots; common fine and many very fine tubular pores; 20 percent soft channers; common faint clay films on faces of peds, common distinct clay films in pores; neutral; clear wavy boundary.

Bk—32 to 36 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; moderate medium prismatic structure; soft, very friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine tubular pores; 50 percent soft channers and flagstones; few fine and medium masses and seams of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr—36 to 60 inches; light gray (5Y 7/2) semiconsolidated loamy sedimentary beds that crush to a loam, olive gray (5Y 5/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bt horizon: 10 to 18 inches
Depth to the Bk horizon: 19 to 35 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 12 to 20 percent
Content of rock fragments: 0 to 30 percent—0 to 5 percent hard flagstones; 0 to 5 percent hard channers; 0 to 20 percent soft flagstones and channers
Reaction: pH 6.1 to 7.3

E horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 12 to 18 percent
Content of rock fragments: 0 to 30 percent—0 to 5 percent hard flagstones; 0 to 5 percent hard channers; 0 to 20 percent soft flagstones and channers
Reaction: pH 6.1 to 7.3

Bt horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 10 to 60 percent—0 to 5 percent hard flagstones; 0 to 5 percent hard channers; 10 to 50 percent soft flagstones and channers
Reaction: pH 6.1 to 7.3

Bk horizon
Hue: 2.5Y or 5Y
Value: 5, 6, or 7 dry
Chroma: 2 to 4
Texture: Loam, clay loam, sandy clay loam, or fine sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 20 to 80 percent—0 to 5 percent hard flagstones; 0 to 5 percent hard channers; 20 to 70 percent soft flagstones and channers
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

144D—Belltower-Reeder-Vebar complex, 4 to 15 percent slopes

Setting

Landform:
- Belltower—Sedimentary plains and hills
- Reeder—Sedimentary plains and hills
- Vebar—Sedimentary plains and hills

Slope:
- Belltower—4 to 15 percent
- Reeder—4 to 15 percent
- Vebar—4 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Belltower and similar soils: 30 percent
Reeder and similar soils: 30 percent
Vebar and similar soils: 25 percent

Minor Components
Very shallow loamy soils: 0 to 4 percent
Shallow loamy soils: 0 to 4 percent
Very deep sandy soils: 0 to 3 percent
Soils with flaggy and channery surfaces: 0 to 2 percent
Soils with flagstones: 0 to 2 percent

Major Component Description

Belltower
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.2 inches

Vebar
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

144E—Belltower-Dast-Reeder complex, 15 to 35 percent slopes

Setting

Landform:
- Belltower—Hills
- Dast—Hills
- Reeder—Hills

Slope:
- Belltower—15 to 35 percent
- Dast—15 to 35 percent
- Reeder—15 to 35 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Belltower and similar soils: 30 percent
Dast and similar soils: 30 percent
Reeder and similar soils: 25 percent

Minor Components
Shallow sandy soils: 0 to 4 percent
Shallow loamy soils: 0 to 4 percent
Areas of rock outcrop: 0 to 4 percent
Very deep sandy soils: 0 to 3 percent

Major Component Description

Belltower
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

144F—Belltower-Dast complex, 35 to 60 percent slopes

Setting

Landform:
- Belltower—Hills
- Dast—Hills

Slope:
- Belltower—35 to 60 percent
- Dast—35 to 60 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Belltower and similar soils: 45 percent
Dast and similar soils: 40 percent

Minor Components
Shallow sandy soils: 0 to 4 percent
Shallow loamy soils: 0 to 4 percent
Soils that have slopes less than 35 percent: 0 to 4 percent
Moderately deep loamy soils: 0 to 3 percent

Major Component Description

Belltower
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 5.1 inches

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bickerdyke Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Sodic Haplusterts

Typical Pedon

Bickerdyke clay, 0 to 2 percent slopes, in an area of rangeland, 2,200 feet north and 1,800 feet west of the southeast corner of sec. 27, T. 5 S., R. 61 E.

E—0 to 1 inch; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive crust; hard, friable, very sticky, very plastic; many very fine roots; many very fine pores; moderately alkaline; abrupt smooth boundary.

Bss—1 to 8 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; many very fine roots; few fine and many very fine pores; few faint slickensides; moderately alkaline; clear smooth boundary.

Bssy—8 to 14 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common intersecting slickensides; common fine nests and seams of gypsum crystals; moderately alkaline; clear smooth boundary.

Bssyz—14 to 22 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common intersecting slickensides; common fine nests and seams of gypsum crystals; few fine seams and nests of other salts; strongly alkaline; gradual smooth boundary.

Byz—22 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine roots; common very fine pores; common fine nests and seams of gypsum crystals; few fine seams and nests of other salts; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Depth to the Bssy horizon: 6 to 15 inches
Other features: This soil has 1/2- to 1-inch cracks that extend to 20 inches or more and have few to many slickensides. The 1 chromas are lithochromic.

E horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 or 2
Clay content: 40 to 60 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bss horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.9 to 8.4

Bssy horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 10 to 15
Gypsum content: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Bssyz horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 15 to 30
Gypsum content: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Byz horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 15 to 30
Reaction: pH 7.9 to 9.4

87A—Bickerdyke clay, 0 to 2 percent slopes

Setting

Landform: Sedimentary plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bickerdyke and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent
Bascovy and similar soils: 0 to 2 percent
Soils with silty clay loam surfaces: 0 to 2 percent

Major Component Description

Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

87C—Bickerdyke clay, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bickerdyke and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent

Weingart and similar soils: 0 to 3 percent
Bascovy and similar soils: 0 to 2 percent
Soils with silty clay loam surfaces: 0 to 2 percent

Major Component Description

Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blacksheep Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Hills and sedimentary plains
Parent material: Semiconsolidated, sandy sedimentary beds
Slope range: 4 to 50 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Aridic Ustorthents

Typical Pedon

Blacksheep fine sandy loam, in an area of Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes, in an area of rangeland, 2,100 feet south and 1,800 feet west of the northeast corner of sec. 33, T. 6 S., R. 55 E.

A—0 to 4 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; few very fine and fine pores; slightly effervescent; slightly alkaline; clear wavy boundary.

Bk—4 to 16 inches; light olive brown (2.5Y 5/4) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; few very fine pores; few fine masses of lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Cr—16 to 60 inches; light yellowish brown (2.5Y 6/4) semiconsolidated sandy sedimentary beds that crush to loamy sand, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Depth to the Cr horizon: 10 to 20 inches

A horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Very fine sandy loam, fine sandy loam, sandy loam, or loamy fine sand
Clay content: 5 to 15 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 8.4

55D—Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes

Setting

Landform:
- Blacksheep—Hills
- Twilight—Hills

Position on landform:
- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

Slope:
- Blacksheep—8 to 15 percent
- Twilight—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Blacksheep and similar soils: 45 percent
Twilight and similar soils: 45 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Busby and similar soils: 0 to 2 percent

Very shallow loamy soils: 0 to 2 percent
Shallow silt loam soils: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 1 percent
Areas of blowouts: 0 to 1 percent

Major Component Description

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

55E—Blacksheep-Twilight fine sandy loams, 15 to 45 percent slopes

Setting

Landform:
- Blacksheep—Hills
- Twilight—Hills

Position on landform:
- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

Slope:
- Blacksheep—15 to 45 percent
- Twilight—15 to 45 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Blacksheep and similar soils: 50 percent
Twilight and similar soils: 40 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Shallow silt loam soils: 0 to 2 percent
Areas of blowouts: 0 to 2 percent
Areas of rock outcrop: 0 to 2 percent
Very shallow loamy soils: 0 to 1 percent
Soils that have slopes less than 15 percent: 0 to 1 percent

Major Component Description

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

155E—Blacksheep-Rock outcrop complex, 25 to 50 percent slopes

Setting

Landform:
- Blacksheep—Hills
- Rock outcrop—Hills

Position on landform:
- Blacksheep—Backslopes
- Rock outcrop—Shoulders and summits

Slope: 25 to 50 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Blacksheep and similar soils: 60 percent
Rock outcrop: 30 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Areas of blowouts: 0 to 2 percent
Soils that have slopes more than 50 percent: 0 to 2 percent
Soils that have slopes less than 25 percent: 0 to 2 percent
Delpoint and similar soils: 0 to 2 percent

Major Component Description

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Rock outcrop
Definition: Consolidated sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bonfri Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Interbedded sandstone and shale
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Typic Eutroboralfs

Typical Pedon

Bonfri loam, 8 to 15 percent slopes, in an area of rangeland, 500 feet north and 2,400 feet west of the southeast corner of sec. 22, T. 3 N., R. 57 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; neutral; clear smooth boundary.

Bt—4 to 18 inches; light olive brown (2.5Y 5/4) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; few fine and common very fine pores; many faint clay films on faces of peds, many distinct clay films in pores; neutral; gradual wavy boundary.

Bk—18 to 30 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common very fine roots; few very fine pores; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Cr—30 to 60 inches; light gray (2.5Y 7/2) interbedded sandstone and shale that crush to sandy loam, light brownish gray (2.5Y 6/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 13 to 30 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 7.8

Bt horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam, silty clay loam, or sandy clay loam
Clay content: 27 to 35 percent
Sand content: Greater than 15 percent fine sand or coarser

Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 7.8

Bk horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Clay loam, loam, or sandy clay loam
Clay content: 20 to 32 percent
Content of rock fragments: 0 to 10 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

91C—Bonfri loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bonfri and similar soils: 85 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

91D—Bonfri loam, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bonfri and similar soils: 85 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

191C—Bonfri-Cambeth complex, 2 to 8 percent slopes

Setting

Landform:
• Bonfri—Sedimentary plains
• Cambeth—Sedimentary plains
Slope:
• Bonfri—2 to 8 percent
• Cambeth—2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bonfri and similar soils: 50 percent
Cambeth and similar soils: 35 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Twilight and similar soils: 0 to 4 percent
Busby and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 2 percent
Soils with darker colored surface layers: 0 to 1 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Bonfri
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

291D—Bonfri-Cabbart loams, 8 to 15 percent slopes

Setting

Landform:
- Bonfri—Hills
- Cabbart—Hills

Position on landform:
- Bonfri—Backslopes and shoulders
- Cabbart—Shoulders and summits

Slope:
- Bonfri—8 to 15 percent
- Cabbart—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bonfri and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Very shallow loamy soils: 0 to 3 percent
Deep loamy soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Bonfri
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

391C—Bonfri-Parchin complex, 2 to 8 percent slopes

Setting

Landform:
- Bonfri—Sedimentary plains
- Parchin—Sedimentary plains

Slope:
- Bonfri—2 to 8 percent
- Parchin—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Bonfri and similar soils: 45 percent
Parchin and similar soils: 40 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Cabbart and similar soils: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Bonfri
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Parchin
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Broadus Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Hills
Parent material: Colluvium
Slope range: 8 to 65 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed, frigid Typic Ustochrepts

Typical Pedon

Broadus loam, in an area of Broadus-Ridge-Reeder complex, 8 to 25 percent slopes, in an area of forestland, 1,500 feet north and 300 feet east of the southwest corner of sec. 5, T. 8 S., R. 55 E.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 4 inches; light yellowish brown (10YR 6/4) loam, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; neutral; clear smooth boundary.
Bw—4 to 12 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; few fine and many very fine tubular pores; slightly effervescent; slightly alkaline; clear smooth boundary.
Bk1—12 to 18 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; many fine tubular pores; many fine masses of lime; violently effervescent; slightly alkaline; gradual smooth boundary.
Bk2—18 to 34 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; many fine tubular pores; many medium and coarse masses

of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—34 to 60 inches; light gray (2.5Y 7/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; slightly hard, friable, moderately sticky, moderately plastic; many medium roots; many fine tubular pores; many medium and coarse masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Depth to the Bk horizon: 11 to 15 inches

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Clay content: 18 to 27 percent
Reaction: pH 6.6 to 7.8

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Sand content: 15 to 35 percent fine and medium sand
Reaction: pH 7.4 to 7.8

Bk1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Sand content: 15 to 35 percent fine and medium sand
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Bk2 and Bk3 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Loam, silt loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Sand content: 15 to 35 percent fine and medium sand
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

126D—Broadus-Ridge-Reeder complex, 8 to 25 percent slopes

Setting

Landform:
- Broadus—Hills
- Ridge—Hills
- Reeder—Hills

Position on landform:
- Broadus—Backslopes
- Ridge—Shoulders and summits
- Reeder—Footslopes

Slope:
- Broadus—8 to 25 percent
- Ridge—8 to 25 percent
- Reeder—8 to 25 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Broadus and similar soils: 40 percent
Ridge and similar soils: 30 percent
Reeder and similar soils: 20 percent

Minor Components
Cabba and similar soils: 0 to 3 percent
Dast and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 2 percent
Areas of rock outcrop: 0 to 2 percent

Major Component Description

Broadus
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.2 inches

Ridge
Surface layer texture: Sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.2 inches

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

126F—Broadus-Ridge-Rock outcrop complex, 25 to 65 percent slopes

Setting

Landform:
- Broadus—Hills
- Ridge—Hills
- Rock outcrop—Hills

Position on landform:
- Broadus—Backslopes
- Ridge—Shoulders and summits
- Rock outcrop—Summits

Slope:
- Broadus—25 to 65 percent
- Ridge—25 to 65 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Broadus and similar soils: 30 percent
Ridge and similar soils: 30 percent
Rock outcrop: 30 percent

Minor Components
Cabba and similar soils: 0 to 4 percent
Dast and similar soils: 0 to 3 percent
Moderately deep loamy soils: 0 to 3 percent

Major Component Description

Broadus
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 10.2 inches

Ridge
Surface layer texture: Sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.2 inches

Rock outcrop
Definition: Consolidated sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bullock Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Borollic Natrargids

Typical Pedon

Bullock clay loam, in an area of Parchin-Bullock complex, 2 to 8 percent slopes, in an area of rangeland, 2,000 feet south and 1,000 feet east of the northwest corner of sec. 34, T. 2 N., R. 55 E.

E—0 to 2 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; many very fine roots; few very fine and fine pores; slightly alkaline; abrupt smooth boundary.

Btn1—2 to 6 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium columnar structure parting to moderate medium

subangular blocky; hard, firm, moderately sticky, very plastic; many very fine and fine roots; few very fine pores; few faint clay films on faces of peds and in pores; moderately alkaline; gradual smooth boundary.

Btn2—6 to 12 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky, very plastic; few fine and common very fine roots; few very fine pores; few faint clay films on faces of peds and in pores; strongly alkaline; clear smooth boundary.

Bkz—12 to 25 inches; light yellowish brown (2.5Y 6/4) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; few fine nests of salt crystals; disseminated lime; few fine threads of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Bky—25 to 35 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; few fine soft masses of gypsum; common medium masses of lime and few fine seams of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

Cr—35 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated, loamy sedimentary beds that crush to silty clay loam, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Depth to the Bkz horizon: 10 to 15 inches
Depth to the Cr horizon: 20 to 40 inches
Other features: A clay loam texture results from mixing the E and Btn horizons in areas that are cultivated.
Taxonomic note: Bullock soil is a taxadjunct to the series. It classifies as Fine-loamy, mixed Typic Natriboralfs. Use and management are similar.

E horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Clay loam when mixed to 7 inches
Clay content: 5 to 10 percent
Reaction: pH 7.4 to 7.8

Btn horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay loam or sandy clay loam
Clay content: 27 to 35 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 7.8 to 9.6

Bkz and Bky horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Clay loam, sandy clay loam, or loam
Clay content: 25 to 32 percent
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 20 to 40
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.8 to 9.6

Busby Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Alluvium
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed, frigid Aridic Ustochrepts

Typical Pedon

Busby fine sandy loam, in an area of Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes, in an area of rangeland, 2,200 feet south and 2,000 feet west of the northeast corner of sec. 32, T. 2 S., R. 56 E.

A—0 to 4 inches; grayish brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; slightly alkaline; clear smooth boundary.

Bw—4 to 12 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; few very fine pores; slightly alkaline; clear wavy boundary.

Bk1—12 to 23 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; few

very fine pores; few very fine masses, seams, and threads of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—23 to 46 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; few very fine and medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C—46 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; massive; loose, nonsticky, nonplastic; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 16 inches
Soil phases: Gullied

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 10 to 18 percent
Reaction: pH 7.4 to 8.4

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 10 to 18 percent
Reaction: pH 7.4 to 8.4

Bk horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

C horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, loamy fine sand, loamy sand, or fine sand (The loamy fine sand, loamy sand, or fine sand textures are below depths of 40 inches.)
Clay content: 3 to 18 percent
Reaction: pH 7.9 to 8.4

70C—Busby fine sandy loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Busby and similar soils: 85 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Soils that have slopes less than 2 percent: 0 to 2 percent
Soils with darker colored surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

70D—Busby fine sandy loam, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Busby and similar soils: 85 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 2 percent
Soils with darker colored surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

170D—Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes

Setting

Landform:
- Busby—Hills
- Blacksheep—Hills
- Twilight—Hills

Position on landform:
- Busby—Backslopes and footslopes
- Blacksheep—Shoulders and summits
- Twilight—Backslopes and footslopes

Slope:
- Busby—8 to 15 percent
- Blacksheep—8 to 25 percent
- Twilight—8 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Busby and similar soils: 40 percent
Blacksheep and similar soils: 30 percent
Twilight and similar soils: 15 percent

Minor Components
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Very shallow loamy soils: 0 to 3 percent
Areas of rock outcrop: 0 to 2 percent
Areas of blowouts: 0 to 2 percent
Soils with darker colored surface layers: 0 to 2 percent

Major Component Description

Busby
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

170E—Busby-Blacksheep-Rock outcrop complex, 8 to 25 percent slopes

Setting

Landform:
- Busby—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

Position on landform:
- Busby—Footslopes and toeslopes
- Blacksheep—Shoulders and summits
- Rock outcrop—Summits

Slope:
- Busby—8 to 15 percent
- Blacksheep—8 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Busby and similar soils: 40 percent
Blacksheep and similar soils: 30 percent
Rock outcrop: 20 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Twilight and similar soils: 0 to 2 percent
Chinook and similar soils: 0 to 2 percent
Areas of blowouts: 0 to 2 percent
Yamacall and similar soils: 0 to 1 percent
Delpoint and similar soils: 0 to 1 percent

Major Component Description

Busby
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Rock outcrop
Definition: Consolidated sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

270E—Busby, gullied-Delpoint-Yawdim complex, 8 to 25 percent slopes

Setting

Landform:
- Busby—Hills
- Delpoint—Hills
- Yawdim—Hills

Position on landform:
- Busby—Backslopes and footslopes
- Delpoint—Backslopes
- Yawdim—Shoulders and summits

Slope:
- Busby—8 to 15 percent
- Delpoint—8 to 25 percent
- Yawdim—8 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Busby and similar soils: 35 percent
Delpoint and similar soils: 30 percent
Yawdim and similar soils: 20 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Areas of rock outcrop: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 2 percent
Poorly drained soils: 0 to 1 percent

Major Component Description

Busby
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cabba Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 4 to 60 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents

Typical Pedon

Cabba loam, in an area of Reeder-Cabba loams, 4 to 15 percent slopes, in an area of rangeland, 2,000 feet north and 1,600 feet east of the southwest corner of sec. 4, T. 2 S., R. 61 E.

A—0 to 3 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—3 to 7 inches; pale brown (10YR 6/3) loam, light olive brown (2.5Y 5/4) moist; weak thick platy structure; soft, friable, slightly sticky, slightly plastic; few fine and common very fine roots; few very fine pores; few fine and medium masses of lime; violently effervescent; slightly alkaline; clear wavy boundary.

C—7 to 16 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, slightly sticky, slightly plastic; few fine and common very fine roots; few very fine pores; disseminated lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cr—16 to 60 inches; pale yellow (2.5Y 7/4) semiconsolidated loamy sedimentary beds that crush to loam, light yellowish brown (2.5Y 6/4) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Cr horizon: 10 to 20 inches
Soil phases: Stony; the hard rock fragments in the stony and gravelly phases are mainly surficial deposits.

A horizon
Hue: 10YR or 2.5Y
Value: 3, 4, 5, or 6 dry; 3 or 4 moist
Chroma: 1 to 4
Texture: Loam or silt loam
Clay content: 10 to 27 percent
Content of rock fragments: 0 to 60 percent—0 to 40 percent boulders, stones, or cobbles; 0 to 30 percent pebbles or channers
Content of rock fragments, surface cover: 0 to 0.1 percent stones
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 9.0

Bk and C horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
Chroma: 1 to 4 or 6
Texture: Loam, silt loam, clay loam, or silty clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles or channers
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 0 to 8 mmhos/cm
Reaction: pH 7.4 to 9.0

112D—Cabba silt loam, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Cabba and similar soils: 85 percent

Minor Components
Very shallow loamy soils: 0 to 4 percent
Dast and similar soils: 0 to 4 percent
Moderately deep loamy soils: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

212E—Cabba-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:
- Cabba—Hills
- Rock outcrop—Hills

Position on landform:
- Cabba—Backslopes
- Rock outcrop—Summits

Slope: 15 to 45 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Cabba and similar soils: 50 percent
Rock outcrop: 35 percent

Minor Components
Dast and similar soils: 0 to 5 percent
Very shallow loamy soils: 0 to 5 percent
Moderately deep loamy soils: 0 to 5 percent

Major Component Description

Cabba
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches

Rock outcrop
Definition: Consolidated sandstone and shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

312D—Cabba-Dast complex, 8 to 15 percent slopes

Setting

Landform:
- Cabba—Hills
- Dast—Hills

Position on landform:
- Cabba—Shoulders and summits
- Dast—Backslopes and footslopes

Slope:
- Cabba—8 to 15 percent
- Dast—8 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Cabba and similar soils: 50 percent
Dast and similar soils: 35 percent

Minor Components
Very shallow sandy soils: 0 to 5 percent
Moderately deep loamy soils: 0 to 5 percent
Very deep silt loam soils: 0 to 5 percent

Major Component Description

Cabba
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Flooding: None
Available water capacity: Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cabbart Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 70 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Aridic Ustorthents

Typical Pedon

Cabbart loam, in an area of Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes, in an area of rangeland, 2,100 feet south and 1,000 feet east of the northwest corner of sec. 15, T. 4 N., R. 57 E.

A—0 to 3 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few very fine and fine pores; violently effervescent; moderately alkaline; clear smooth boundary.

Bk—3 to 12 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; few very fine pores; common fine and medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—12 to 60 inches; pale yellow (2.5Y 7/4) semiconsolidated, loamy sedimentary beds that crush to silt loam, light yellowish brown (2.5Y 6/4) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Cr horizon: 10 to 20 inches

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Loam or silt loam
Clay content: 18 to 27 percent
Electrical conductivity: 0 to 4 mmhos/cm
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 9.0

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam or silt loam
Clay content: 18 to 27 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 5
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.4 to 9.0

60D—Cabbart silt loam, 4 to 15 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cabbart and similar soils: 85 percent

Minor Components
Blacksheep and similar soils: 0 to 4 percent
Delpoint and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 4 percent
Areas of rock outcrop: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

160E—Cabbart-Rock outcrop-Delpoint complex, 15 to 50 percent slopes

Setting

Landform:
- Cabbart—Hills
- Rock outcrop—Hills
- Delpoint—Hills

Position on landform:
- Cabbart—Backslopes and shoulders
- Rock outcrop—Summits
- Delpoint—Backslopes

Slope:
- Cabbart—15 to 50 percent
- Delpoint—15 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cabbart and similar soils: 50 percent
Rock outcrop: 20 percent
Delpoint and similar soils: 15 percent

Minor Components
Weingart and similar soils: 0 to 5 percent
Very shallow loamy soils: 0 to 5 percent
Yamacall and similar soils: 0 to 4 percent
Poorly drained soils: 0 to 1 percent

Major Component Description

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

Rock outcrop
Definition: Consolidated sedimentary beds

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

160F—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes

Setting

Landform:
- Cabbart—Hills
- Rock outcrop—Hills
- Yawdim—Hills

Position on landform:
- Cabbart—Backslopes and shoulders
- Rock outcrop—Summits
- Yawdim—Backslopes and footslopes

Slope:
- Cabbart—15 to 70 percent
- Yawdim—15 to 70 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cabbart and similar soils: 35 percent
Rock outcrop: 25 percent
Yawdim and similar soils: 25 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 4 percent
Soils that have slopes less than 15 percent: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent

Major Component Description

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 2.2 inches

Rock outcrop
Definition: Consolidated sedimentary beds

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

260D—Cabbart-Cambeth silt loams, 8 to 15 percent slopes

Setting

Landform:
- Cabbart—Hills
- Cambeth—Hills

Position on landform:
- Cabbart—Shoulders and summits
- Cambeth—Backslopes

Slope:
- Cabbart—8 to 15 percent
- Cambeth—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cabbart and similar soils: 50 percent
Cambeth and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 4 percent
Yamacall and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 2 percent
Soils that have slopes less than 8 percent: 0 to 2 percent

Major Component Description

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

360D—Cabbart-Bascovy complex, 4 to 15 percent slopes

Setting

Landform:
- Cabbart—Sedimentary plains and hills
- Bascovy—Sedimentary plains and hills

Position on landform:
- Cabbart—Shoulders and summits
- Bascovy—Backslopes and footslopes

Slope:
- Cabbart—4 to 15 percent
- Bascovy—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cabbart and similar soils: 50 percent
Bascovy and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent

Parchin and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 2 percent
Neldore and similar soils: 0 to 2 percent

Major Component Description

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cambeth Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 25 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-silty, mixed, frigid Aridic Ustochrepts

Typical Pedon

Cambeth silt loam, in an area of Yamacall-Cambeth complex, 2 to 8 percent slopes, in an area of rangeland, 250 feet north and 1,500 feet east of the southwest corner of sec. 33, T. 8 S., R. 61 E.

A—0 to 4 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; weak medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—4 to 12 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, moderately plastic; few very fine and fine roots; few very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—12 to 32 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; many fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—32 to 60 inches; white (2.5Y 8/2) semiconsolidated, loamy sedimentary beds that crush to silt loam, light gray (2.5Y 7/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 15 inches
Depth to the Cr horizon: 20 to 40 inches
Soil phases: Calcareous

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 18 to 27 percent
Effervescence: None to violently
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 7.4 to 8.4

Bw horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, silt loam, or silty clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 0 to 10 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent
Calcium carbonate equivalent: 10 to 20 percent
Reaction: pH 7.9 to 9.0

160D—Cambeth-Yamacall complex, 8 to 15 percent slopes

Setting

Landform:
- Cambeth—Hills
- Yamacall—Hills

Position on landform:
- Cambeth—Shoulders and summits
- Yamacall—Backslopes and footslopes

Slope:
- Cambeth—8 to 15 percent
- Yamacall—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cambeth and similar soils: 55 percent
Yamacall and similar soils: 30 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Cabbart and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent
Very shallow loamy soils: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 2 percent

Major Component Description

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.6 inches

Yamacall
Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

260C—Cambeth-Cabbart silt loams, 2 to 8 percent slopes

Setting

Landform:
- Cambeth—Sedimentary plains
- Cabbart—Sedimentary plains

Position on landform: Backslopes and footslopes

Slope:
- Cambeth—2 to 8 percent
- Cabbart—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cambeth and similar soils: 60 percent
Cabbart and similar soils: 25 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Twilight and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 3 percent
Yamacall and similar soils: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.6 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

260E—Cambeth-Cabbart-Yawdim complex, 15 to 25 percent slopes

Setting

Landform:
- Cambeth—Hills
- Cabbart—Hills
- Yawdim—Hills

Position on landform:
- Cambeth—Backslopes and footslopes
- Cabbart—Shoulders and summits
- Yawdim—Shoulders and summits

Slope:
- Cambeth—15 to 25 percent
- Cabbart—15 to 25 percent
- Yawdim—15 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Cambeth and similar soils: 40 percent
Cabbart and similar soils: 30 percent
Yawdim and similar soils: 15 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Very shallow loamy soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Areas of rock outcrop: 0 to 3 percent
Soils that have slopes more than 25 percent: 0 to 2 percent
Soils that have slopes less than 15 percent: 0 to 1 percent

Major Component Description

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.6 inches

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Carfall Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Alluvium
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Pachic Argiborolls

Typical Pedon

Carfall fine sandy loam, 8 to 15 percent slopes, in an area of rangeland, 2,500 feet north and 1,600 feet east of the southwest corner of sec. 1, T. 5 N., R. 55 E.

A—0 to 9 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist;

moderate medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; neutral; clear smooth boundary.

Bt1—9 to 15 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, slightly sticky, moderately plastic; many very fine roots; few fine pores; many faint clay films on faces of peds and in pores; neutral; gradual smooth boundary.

Bt2—15 to 20 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; few fine pores; many faint clay films on faces of peds and in pores; neutral; gradual wavy boundary.

BC—20 to 30 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; neutral, gradual wavy boundary.

C—30 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 17 to 35 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or fine sandy loam
Clay content: 10 to 25 percent
Reaction: pH 6.1 to 7.3

Bt horizons
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Sandy clay loam, clay loam, or loam
Clay content: 20 to 35 percent
Reaction: pH 6.1 to 7.3

BC and C horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Sandy loam or loamy sand
Clay content: 10 to 20 percent
Reaction: pH 6.1 to 7.3

14C—Carfall loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Carfall and similar soils: 85 percent

Minor Components
Yamacall and similar soils: 0 to 4 percent
Delpoint and similar soils: 0 to 4 percent
Busby and similar soils: 0 to 3 percent
Areas of blowouts: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

114C—Carfall-Assinniboine complex, 2 to 8 percent slopes

Setting

Landform:
- Carfall—Sedimentary plains
- Assinniboine—Sedimentary plains

Slope:
- Carfall—2 to 8 percent
- Assinniboine—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Carfall and similar soils: 55 percent
Assinniboine and similar soils: 30 percent

Minor Components
Delpoint and similar soils: 0 to 5 percent
Busby and similar soils: 0 to 5 percent
Soils with lighter colored surface layers: 0 to 5 percent

Major Component Description

Carfall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Assinniboine
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

114D—Carfall-Assinniboine complex, 8 to 15 percent slopes

Setting

Landform:
- Carfall—Hills
- Assinniboine—Hills

Slope:
- Carfall—8 to 15 percent
- Assinniboine—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Carfall and similar soils: 55 percent
Assinniboine and similar soils: 30 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Busby and similar soils: 0 to 4 percent
Soils with lighter colored surface layers: 0 to 4 percent
Soils that have slopes more than 15 percent: 0 to 3 percent

Major Component Description

Carfall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Assinniboine
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

214C—Carfall fine sandy loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Carfall and similar soils: 85 percent

Minor Components
Soils that are calcareous throughout: 0 to 3 percent
Carfall with loam surfaces: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

214D—Carfall fine sandy loam, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Carfall and similar soils: 85 percent

Minor Components
Yamacall and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Chinook Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed Aridic Haploborolls

Typical Pedon

Chinook sandy loam, 2 to 8 percent slopes, in an area of rangeland, 1,500 feet north and 1,600 feet east of the southwest corner of sec. 29, T. 3 S., R. 62 E.

A—0 to 5 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; few very fine and fine pores; neutral; clear smooth boundary.

Bw1—5 to 13 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; few very fine and fine pores; neutral; clear smooth boundary.

Bw2—13 to 24 inches; grayish brown (2.5Y 5/2) sandy loam; dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; few very fine pores; slightly alkaline; clear smooth boundary.

Bk1—24 to 35 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine and fine roots; few very fine pores; few fine masses of lime; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bk2—35 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common fine masses of lime; violently effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 15 inches
Depth to the Bk horizon: 12 to 35 inches

A horizon
- Hue: 10YR or 2.5Y
- Value: 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 5 to 18 percent
- Content of rock fragments: 0 to 35 percent pebbles
- Reaction: pH 6.6 to 8.4

Bw horizons
- Hue: 10YR or 2.5Y
- Value: 4, 5, or 6 dry; 3, 4, or 5 moist
- Chroma: 2 to 4
- Texture: Fine sandy loam or sandy loam
- Clay content: 5 to 18 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Reaction: pH 6.6 to 8.4

Bk1 horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4 or 5 moist
- Chroma: 2 to 4
- Texture: Fine sandy loam or sandy loam
- Clay content: 5 to 15 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Calcium carbonate equivalent: 5 to 12 percent
- Reaction: pH 7.4 to 9.0

Bk2 horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 2 to 4
- Texture: Fine sandy loam or sandy loam
- Clay content: 5 to 15 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Calcium carbonate equivalent: 5 to 15 percent
- Reaction: pH 7.4 to 9.0

83A—Chinook sandy loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Chinook and similar soils: 85 percent

Minor Components
Assinniboine and similar soils: 0 to 3 percent
Eapa and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Soils with gravelly surface layers: 0 to 2 percent
Soils that have slopes more than 2 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

83C—Chinook sandy loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Chinook and similar soils: 85 percent

Minor Components
Assinniboine and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Eapa and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 2 percent
Delpoint and similar soils: 0 to 1 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

83D—Chinook sandy loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Chinook and similar soils: 85 percent

Minor Components
Busby and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Soils with gravelly surface layers: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Areas of blowouts: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

183C—Chinook-Assinniboine complex, 2 to 8 percent slopes

Setting

Landform:
- Chinook—Alluvial fans and stream terraces
- Assinniboine—Alluvial fans and stream terraces

Position on landform:
- Chinook—Backslopes and footslopes
- Assinniboine—Backslopes and footslopes

Slope:
- Chinook—2 to 8 percent
- Assinniboine—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Chinook and similar soils: 45 percent
Assinniboine and similar soils: 40 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Eapa and similar soils: 0 to 3 percent
Marmarth and similar soils: 0 to 3 percent
Soils with gravelly surface layers: 0 to 3 percent
Areas of blowouts: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Chinook
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

Assinniboine
Surface layer texture: Sandy clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

283C—Chinook-Archin complex, 2 to 8 percent slopes

Setting

Landform:
- Chinook—Alluvial fans and stream terraces
- Archin—Alluvial fans and stream terraces

Slope:
- Chinook—2 to 8 percent
- Archin—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Chinook and similar soils: 45 percent
Archin and similar soils: 40 percent

Minor Components
Busby and similar soils: 0 to 3 percent
Twilight and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent
Soils with slopes more than 8 percent: 0 to 3 percent

Major Component Description

Chinook
Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

Archin
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cohagen Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Soft sandstone bedrock
Slope range: 4 to 15 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents

Typical Pedon

Cohagen fine sandy loam, in an area of Parshall-Cohagen fine sandy loams, 4 to 15 percent slopes, in an area of rangeland, 2,000 feet south and 2,300 feet east of the northwest corner of sec. 29, T. 2 N., R. 62 E.

A—0 to 3 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few fine and many very fine roots; few very fine pores; slightly alkaline; abrupt wavy boundary.

C—3 to 12 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many very fine roots; 30 percent soft sandstone fragments; disseminated lime; violently effervescent; slightly alkaline; clear wavy boundary.

Cr—12 to 60 inches; light gray (10YR 7/2) soft sandstone bedrock that crushes to fine sandy loam, grayish brown (10YR 5/2) moist.

Range in Characteristics

Depth to the Cr horizon: 10 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 15 percent soft sandstone fragments
Reaction: pH 7.4 to 8.4

C horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 50 percent soft sandstone fragments
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 7.4 to 8.4

Creed Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Typic Natriboralfs

Typical Pedon

Creed loam, in an area of Creed-Absher complex, 2 to 8 percent slopes, in an area of rangeland, 1,000 feet south and 1,700 feet west of the northeast corner of sec. 8, T. 3 N., R. 56 E.

A—0 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; strong thin platy structure parting to strong very fine and fine granular; soft, very friable, nonsticky, slightly plastic; few fine and many very fine roots; common very fine and fine pores; neutral; clear smooth boundary.

E—5 to 8 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate thin platy; slightly hard, very friable, nonsticky, slightly plastic; few fine and many very fine roots; few fine and many very fine pores; neutral; abrupt smooth boundary.

Btn—8 to 17 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse columnar structure parting to moderate medium subangular blocky; very hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; many distinct clay films on faces of peds, continuous prominent clay films in pores; slightly alkaline; clear smooth boundary.

Bkn—17 to 30 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, very firm, sticky and plastic; common very fine roots; common very fine tubular pores; common fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

Bky—30 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, very firm, sticky and plastic; few very fine roots; few very fine pores; many fine nests and seams of gypsum crystals; many fine and medium masses of lime; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bkn horizon: 16 to 20 inches
Depth to the Bky horizon: 25 to 30 inches
Soil phase: Warm
Taxonomic note: Map unit 602C is a taxadjunct to the Creed series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 8.4

E horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, 6, or 7 moist
Chroma: 2 or 3
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 8.4

Btn horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 or 3
Texture: Clay loam, silty clay loam, clay, or silty clay
Clay content: 35 to 55 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 8 to 20
Reaction: pH 6.6 to 9.0

Bkn horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Silty clay loam, clay loam, sandy clay loam, loam, or clay
Content of rock fragments: 0 to 15 percent pebbles
Clay content: 27 to 45 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 20
Gypsum content: 0 to 2 percent
Reaction: pH 7.9 to 9.0

Bky horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, clay loam, sandy clay loam, or silty clay loam
Clay content: 25 to 35 percent
Calcium carbonate equivalent: 5 to 10 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 25
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 9.0

54A—Creed loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Creed and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent
Archin and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

54C—Creed loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Creed and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 2 percent
Soils with darker colored surface layers: 0 to 1 percent
Soils that have slopes less than 2 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

154C—Creed-Absher complex, 2 to 8 percent slopes

Setting

Landform:
- Creed—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Creed—Microhighs
- Absher—Microlows

Slope:
- Creed—2 to 8 percent
- Absher—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Creed and similar soils: 55 percent
Absher and similar soils: 30 percent

Minor Components
Gerdrum and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 4 percent
Very deep nonsaline soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent
Soils with darker colored surface layers: 0 to 1 percent

Major Component Description

Creed
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

254C—Creed-Gerdrum complex, 2 to 8 percent slopes

Setting

Landform:
- Creed—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

Position on landform:
- Creed—Microhighs
- Gerdrum—Microlows

Slope:
- Creed—2 to 8 percent
- Gerdrum—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Creed and similar soils: 45 percent
Gerdrum and similar soils: 40 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Yamacall and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 4 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Creed
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

602C—Creed-Gerdrum complex, warm, 2 to 6 percent slopes

Setting

Landform:
- Creed—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

Position on landform:
- Creed—Microhighs
- Gerdrum—Microlows

Slope:
- Creed—2 to 6 percent
- Gerdrum—2 to 6 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Creed and similar soils: 45 percent
Gerdrum and similar soils: 40 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 4 percent
Yamacall and similar soils: 0 to 4 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Creed
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Daglum Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Vertic Natriborolls

Typical Pedon

Daglum loam, 0 to 4 percent slopes, in an area of rangeland, 2,600 feet south and 800 feet west of the northeast corner of sec. 11, T. 4 S., R. 60 E.

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; few fine and common very fine pores; slightly acid; clear smooth boundary.

E—6 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; few very fine and fine pores; neutral; abrupt smooth boundary.

Btn1—9 to 13 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; moderate medium and coarse columnar structure parting to strong fine and medium subangular blocky; extremely hard, very firm, very sticky, very plastic; common very fine roots; few very fine and fine pores; continuous distinct clay films on faces of peds, continuous prominent clay films in pores; moderately alkaline; gradual wavy boundary.

Btn2—13 to 21 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, very plastic; common very fine roots; few very fine pores; common distinct clay films on faces of peds, continuous distinct clay films in pores; moderately alkaline; gradual wavy boundary.

Bky—21 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure; very hard, firm, very sticky, moderately plastic; few very fine roots; few very fine pores; common fine seams and nests of gypsum crystals; common fine masses of lime; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 15 inches
Taxonomic note: Daglum soil, as used in Carter County, is a taxadjunct to the series. It classifies as Fine, montmorillonitic Aridic Natriborolls. Use and management is similar.

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Clay content: 18 to 26 percent
Reaction: pH 5.6 to 7.3

E horizon
Hue: 10YR or 2.5Y
Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist
Chroma: 1 or 2
Clay content: 18 to 26 percent
Reaction: pH 5.6 to 7.3

Btn horizons
Hue: 10YR or 2.5Y
Value: 3, 4, 5, or 6 dry; 2, 3, 4, or 5 moist
Chroma: 2 or 3
Texture: Clay, silty clay, silty clay loam, or clay loam
Clay content: 35 to 60 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 10 to 20
Reaction: pH 6.1 to 9.0

Bky horizon
Hue: 2.5Y or 5Y
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Clay loam, silty clay, silty clay loam, or clay
Clay content: 35 to 60 percent
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH 7.4 to 9.0

45B—Daglum loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Daglum and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils that have slopes more than 4 percent: 0 to 2 percent
Somewhat poorly drained soils: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Dast Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, sandy sedimentary beds

Slope range: 4 to 60 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Coarse-loamy, mixed frigid Typic Ustochrepts

Typical Pedon

Dast sandy loam, in an area of Dast-Ridge-Rock outcrop complex, 35 to 60 percent slopes, in an area of forestland, 200 feet south and 1,400 feet east of the northwest corner of sec. 17, T. 3 S., R. 62 E.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 5 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.
Bw—5 to 13 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; many very fine roots; few very fine pores; slightly alkaline; gradual wavy boundary.
Bk—13 to 28 inches; light gray (2.5Y 7/2) sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; common very fine roots; few fine pores; 30 percent soft channers; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.
Cr—28 to 60 inches; white (2.5Y 8/2) semiconsolidated, sandy sedimentary beds that crush to fine sandy loam; light gray (2.5Y 7/2) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 13 to 24 inches
Depth to bedrock: 20 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 2 to 18 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 7.4 to 8.4

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 2 to 18 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, or loam
Clay content: 2 to 18 percent
Content of rock fragments: 0 to 15 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

125F—Dast-Ridge-Rock outcrop complex, 35 to 60 percent slopes

Setting

Landform:
- Dast—Hills
- Ridge—Hills
- Rock outcrop—Hills

Position on landform:
- Dast—Backslopes
- Ridge—Summits
- Rock outcrop—Shoulders and summits

Slope:
- Dast—35 to 60 percent
- Ridge—35 to 60 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Dast and similar soils: 30 percent
Ridge and similar soils: 30 percent
Rock outcrop: 25 percent

Minor Components
Moderately deep loamy soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 4 percent
Soils that have slopes less than 35 percent: 0 to 4 percent
Soils with flagstones: 0 to 3 percent

Major Component Description

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland

Flooding: None
Available water capacity: Mainly 3.6 inches

Ridge
Surface layer texture: Sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 2.2 inches

Rock outcrop
Definition: Consolidated sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

225E—Dast-Vebar complex, 15 to 35 percent slopes

Setting

Landform:
- Dast—Hills
- Vebar—Hills

Slope:
- Dast—15 to 35 percent
- Vebar—15 to 35 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Dast and similar soils: 50 percent
Vebar and similar soils: 35 percent

Minor Components
Cabba and similar soils: 0 to 4 percent
Noncalcareous soils: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Sandy textured soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 1 percent

Major Component Description

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

Vebar
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

225F—Dast-Vebar complex, 35 to 60 percent slopes

Setting

Landform:
- Dast—Hills
- Vebar—Hills

Slope:
- Dast—35 to 60 percent
- Vebar—35 to 50 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Dast and similar soils: 50 percent
Vebar and similar soils: 35 percent

Minor Components
Shallow sandy soils: 0 to 4 percent
Shallow loamy soils: 0 to 4 percent

Noncalcareous soils: 0 to 3 percent
Areas of rock outcrop: 0 to 2 percent
Soils that have slopes less than 35 percent: 0 to 2 percent

Major Component Description

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

Vebar
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

325E—Dast-Cabba-Mowbray complex, 15 to 35 percent slopes

Setting

Landform:
- Dast—Hills
- Cabba—Hills
- Mowbray—Hills

Slope:
- Dast—15 to 35 percent, north aspect
- Cabba—15 to 35 percent, south aspect
- Mowbray—15 to 35 percent, north aspect

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Dast and similar soils: 35 percent
Cabba and similar soils: 30 percent
Mowbray and similar soils: 20 percent

Minor Components
Very shallow loamy soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent
Soils that have slopes less than 15 percent: 0 to 3 percent
Soils that have slopes more than 35 percent: 0 to 3 percent
Areas of rock outcrop: 0 to 2 percent

Major Component Description

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

Cabba
Surface layer texture: Very stony loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

Mowbray
Surface layer texture: Very channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Delpoint Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 25 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed, frigid Aridic Ustochrepts

Typical Pedon

Delpoint loam, in an area of Delpoint-Cabbart complex, 8 to 15 percent slopes, in an area of rangeland, 1,700 feet south and 900 feet west of the northeast corner of sec. 16, T. 6 S., R. 59 E.

A—0 to 5 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine pores; slightly alkaline; clear wavy boundary.

Bw—5 to 19 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—19 to 29 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; few fine and common very fine pores; common fine and medium masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr—29 to 60 inches; very pale brown (10YR 7/3) semiconsolidated, loamy sedimentary beds that crush to loam, pale brown (10YR 6/3) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 20 inches
Depth to the Cr horizon: 20 to 40 inches
Other features: In areas that are cultivated, slight to strong effervescence may result from mixing the A and Bw horizons.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Clay content: 20 to 27 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 8.4

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, sandy loam, clay loam, or silty clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

71C—Delpoint loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Delpoint and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Yamacall and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Soils that are calcareous throughout: 0 to 3 percent
Archin and similar soils: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

171C—Delpoint-Cabbart complex, 2 to 8 percent slopes

Setting

Landform:
- Delpoint—Sedimentary plains
- Cabbart—Sedimentary plains

Position on landform:
- Delpoint—Backslopes
- Cabbart—Shoulders and summits

Slope:
- Delpoint—2 to 8 percent
- Cabbart—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Delpoint and similar soils: 60 percent
Cabbart and similar soils: 30 percent

Minor Components
Yamacall and similar soils: 0 to 2 percent
Kremlin and similar soils: 0 to 2 percent
Marmarth and similar soils: 0 to 2 percent
Archin and similar soils: 0 to 2 percent
Very shallow loamy soils: 0 to 1 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

171D—Delpoint-Cabbart complex, 8 to 15 percent slopes

Setting

Landform:
- Delpoint—Hills
- Cabbart—Hills

Position on landform:
- Delpoint—Backslopes
- Cabbart—Shoulders and summits

Slope:
- Delpoint—8 to 15 percent
- Cabbart—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Delpoint and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Yamacall and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Blacksheep and similar soils: 0 to 3 percent
Very shallow loamy soils: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 3 percent

Major Component Description

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

271D—Delpoint-Yamacall loams, 8 to 15 percent slopes

Setting

Landform:
- Delpoint—Hills
- Yamacall—Hills

Position on landform:
- Delpoint—Backslopes and shoulders
- Yamacall—Footslopes and toeslopes

Slope:
- Delpoint—8 to 15 percent
- Yamacall—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Delpoint and similar soils: 50 percent
Yamacall and similar soils: 35 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Cambeth and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 3 percent
Soils that are calcareous throughout: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 1 percent

Major Component Description

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

DA—Denied access

Composition

Major Components
Denied access: 100 percent

Major Component Description

Definition: Areas where soil mapping access was denied by the landowner

Eapa Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Eapa loam, 0 to 2 percent slopes, in an area of cropland, 300 feet north and 300 feet east of the southwest corner of sec. 16, T. 3 S., R. 61 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; common very fine pores; neutral; abrupt smooth boundary.

Bt1—8 to 13 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; very hard, friable, moderately sticky, moderately plastic; few fine and many very fine roots; many very fine pores; common faint clay films on faces of peds and in pores; neutral; gradual wavy boundary.

Bt2—13 to 24 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; extremely hard, firm, very sticky, very plastic; common very fine roots; few very fine pores; common faint clay films on faces of peds and in pores; slightly alkaline; gradual wavy boundary.

Bk—24 to 60 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, very sticky, moderately plastic; few very fine roots; few very fine tubular pores; many fine and medium masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 15 to 30 inches
Soil phases: Warm
Taxonomic note: Map unit 603C is a taxadjunct to the Eapa series because the average soil temperature is greater than 47 degrees F.

Ap horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 20 to 30 percent
Reaction: pH 6.1 to 7.8

Bt horizons
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Loam or clay loam
Clay content: 24 to 34 percent
Reaction: pH 6.1 to 7.8

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

84A—Eapa loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 85 percent

Minor Components
Ethridge and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Soils that have slopes more than 2 percent: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

84C—Eapa loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 85 percent

Minor Components
Ethridge and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 3 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

84D—Eapa loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 85 percent

Minor Components
Kremlin and similar soils: 0 to 3 percent
Marmarth and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Soils that have slopes less than 8 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

167C—Eapa-Yamacall loams, 2 to 8 percent slopes

Setting

Landform:
- Eapa—Alluvial fans and stream terraces
- Yamacall—Alluvial fans and stream terraces

Slope:
- Eapa—2 to 8 percent
- Yamacall—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 45 percent
Yamacall and similar soils: 40 percent

Minor Components
Cambeth and similar soils: 0 to 4 percent
Delpoint and similar soils: 0 to 4 percent
Marmarth and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Eapa
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 11.1 inches

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

184C—Eapa-Archin loams, 2 to 8 percent slopes

Setting

Landform:
- Eapa—Alluvial fans
- Archin—Alluvial fans

Slope:
- Eapa—2 to 8 percent
- Archin—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 45 percent
Archin and similar soils: 40 percent

Minor Components
Cambeth and similar soils: 0 to 4 percent
Busby and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent
Marmarth and similar soils: 0 to 2 percent
Soils that have slopes less than 2 percent: 0 to 2 percent

Major Component Description

Eapa
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.1 inches

Archin
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

603C—Eapa loam, warm, 1 to 6 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 1 to 6 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Eapa and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Soils that have slopes more than 6 percent: 0 to 3 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Ethridge Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Aridic Argiborolls

Typical Pedon

Ethridge loam, 2 to 8 percent slopes, in an area of rangeland, 2,300 feet south and 2,500 feet east of the northwest corner of sec. 24, T. 6 S., R. 55 E.

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky, slightly plastic; few fine and coarse and common very fine roots; many very fine pores; slightly acid; clear wavy boundary.

Bt1—6 to 14 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure parting to moderate fine angular blocky; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine pores; continuous distinct clay films on faces of peds, continuous prominent clay films in pores; neutral; clear wavy boundary.

Bt2—14 to 24 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; very hard, firm, very sticky, moderately plastic; common very fine roots; few very fine pores; common faint clay films on faces of peds, common distinct clay films in pores; neutral; clear wavy boundary.

Bk—24 to 29 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bky—29 to 60 inches; light olive brown (2.5Y 5/4) clay loam, grayish brown (2.5Y 4/4) moist; weak coarse subangular blocky structure; hard, firm, moderately sticky, slightly plastic; few very fine roots; few very fine pores; few very fine masses, common threads and seams of lime; few fine seams of gypsum; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 14 inches
Taxonomic note: Map unit 626C is a taxadjunct to the Ethridge series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR or 2.5Y
Value: 2 or 3 moist
Chroma: 2 or 3
Texture: Loam or silty clay loam
Clay content: 20 to 35 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.1 to 7.8

Bt horizons
Hue: 10YR or 2.5Y
Value: 3 or 4 moist
Chroma: 2 to 4
Texture: Clay, silty clay, clay loam, or silty clay loam
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Silty clay loam, loam, or clay loam
Clay content: 25 to 40 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

Bky horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Clay loam, silt loam, loam, or silty clay loam

Clay content: 25 to 40 percent
Content of rock fragments: 0 to 5 percent pebbles
Electrical conductivity: 2 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 5
Calcium carbonate equivalent: 5 to 15 percent
Gypsum content: 1 to 3 percent
Reaction: pH 7.4 to 9.0

66C—Ethridge silty clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ethridge and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 2 percent
Soils that have darker colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

85A—Ethridge loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ethridge and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 4 percent
Marias and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 3 percent
Soils with silty clay loam surfaces: 0 to 3 percent
Soils that have slopes more than 2 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

85C—Ethridge loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ethridge and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Marias and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Soils with silty clay loam surfaces: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

185A—Ethridge-Daglum complex, 0 to 4 percent slopes

Setting

Landform:
- Ethridge—Alluvial fans and stream terraces
- Daglum—Alluvial fans and stream terraces

Slope:
- Ethridge—0 to 4 percent
- Daglum—0 to 4 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ethridge and similar soils: 50 percent
Daglum and similar soils: 35 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Absher and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils that have slopes more than 4 percent: 0 to 2 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Ethridge
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

Daglum
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

626C—Ethridge silty clay loam, warm, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ethridge and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 2 percent
Soils with darker colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Gerdrum Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very slow (less than 0.06 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 9 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Typic Natriboralfs

Typical Pedon

Gerdrum clay loam, 2 to 8 percent slopes, in an area of rangeland, 1,800 feet north and 1,000 feet east of the southwest corner of sec. 12, T. 3 N., R. 55 E.

A—0 to 2 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; few fine and many very fine roots; slightly alkaline; clear smooth boundary.

E—2 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; strong thin platy structure parting to strong fine granular; slightly hard, friable, slightly sticky, slightly plastic; few fine and many very fine roots; common very fine and fine pores; slightly alkaline; abrupt smooth boundary.

Btn—4 to 14 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium columnar structure parting to strong medium and coarse subangular blocky; extremely hard, firm, very sticky, very plastic; few fine and many very fine roots; few fine and common very fine pores; continuous distinct clay films on faces of peds and in pores; strongly alkaline; clear smooth boundary.

Btkn—14 to 26 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; slightly hard, firm, moderately sticky, moderately plastic; few fine and common very fine roots; few very fine and fine pores; many faint clay films on faces of peds, many distinct clay films in pores; few fine masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bknyz1—26 to 38 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, firm, very sticky, very plastic; few very fine roots; few very fine pores; common fine nests and seams of gypsum crystals; few fine seams and threads of other salts; many fine masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bknyz2—38 to 60 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; massive; hard, firm, very sticky, very plastic; few very fine roots; common fine nests and seams of gypsum crystals; few fine seams and threads of other salts; many fine masses of lime; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Btkn horizon: 10 to 24 inches
Soil phases: Warm
Taxonomic note: Map units 602C, 611B, and 611D are taxadjuncts to the Gerdrum series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
- Hue: 10YR or 2.5Y
- Value: 5, 6, or 7 dry; 4 or 5 moist
- Chroma: 2 or 3
- Texture: Clay loam when mixed to 7 inches
- Clay content: 10 to 25 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Reaction: pH 6.6 to 7.8

E horizon
- Hue: 10YR or 2.5Y
- Value: 6 or 7 dry; 4, 5, or 6 moist
- Chroma: 2 or 3
- Clay content: 10 to 25 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Reaction: pH 6.6 to 7.8

Btn horizon
- Hue: 10YR or 2.5Y
- Value: 5, 6, or 7 dry; 4 or 5 moist
- Chroma: 2 to 4
- Texture: Clay, silty clay, or silty clay loam
- Clay content: 35 to 55 percent
- Content of rock fragments: 0 to 10 percent pebbles
- Electrical conductivity: 2 to 8 mmhos/cm
- Sodium adsorption ratio: 10 to 20; pedons with sodium adsorption ratio of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchange acidity at pH 8.2.
- Reaction: pH 7.4 to 9.0

Btkn horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Clay, silty clay, silty clay loam, or clay loam
Clay content: 30 to 50 percent
Content of rock fragments: 0 to 10 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH 7.9 to 9.0

Bknyz horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Textures: Clay loam, sandy clay loam, clay, or silty clay
Clay content: 10 to 50 percent
Content of rock fragments: 0 to 10 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 20
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 9.0

65A—Gerdrum clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

65C—Gerdrum clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 85 percent

Minor Components
Absher and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

165A—Gerdrum-Absher complex, 0 to 2 percent slopes

Setting

Landform:
- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Gerdrum—Microhighs
- Absher—Microlows

Slope:
- Gerdrum—0 to 2 percent
- Absher—0 to 2 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 60 percent
Absher and similar soils: 30 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Kobase and similar soils: 0 to 2 percent

Major Component Description

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

165C—Gerdrum-Absher complex, 2 to 8 percent slopes

Setting

Landform:
- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Gerdrum—Microhighs
- Absher—Microlows

Slope:
- Gerdrum—2 to 8 percent
- Absher—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 60 percent
Absher and similar soils: 30 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Kobase and similar soils: 0 to 2 percent

Major Component Description

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

611B—Gerdrum-Absher complex, warm, 0 to 3 percent slopes

Setting

Landform:
- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Gerdrum—Microhighs
- Absher—Microlows

Slope:
- Gerdrum—0 to 3 percent
- Absher—0 to 3 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 60 percent
Absher and similar soils: 30 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Kobase and similar soils: 0 to 2 percent

Major Component Description

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

611D—Gerdrum-Absher complex, warm, 3 to 9 percent slopes

Setting

Landform:
- Gerdrum—Alluvial fans and stream terraces
- Absher—Alluvial fans and stream terraces

Position on landform:
- Gerdrum—Microhighs
- Absher—Microlows

Slope:
- Gerdrum—3 to 9 percent
- Absher—3 to 9 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Gerdrum and similar soils: 60 percent
Absher and similar soils: 30 percent

Minor Components
Weingart and similar soils: 0 to 3 percent
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Kobase and similar soils: 0 to 2 percent

Major Component Description

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Absher
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)

Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Glendive Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained or moderately well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed (calcareous), frigid Aridic Ustifluvents

Typical Pedon

Glendive sandy loam, 0 to 2 percent slopes, in an area of rangeland, 1,850 feet south and 100 feet west of the northeast corner of sec. 36, T. 3 S., R. 61 E.

A—0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine roots; few fine and common very fine pores; slightly alkaline; gradual smooth boundary.

C1—4 to 18 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common very fine roots; few very fine and fine pores; slightly alkaline; gradual wavy boundary.

C2—18 to 36 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; few thin strata of loamy sand; disseminated lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

C3—36 to 60 inches; light brownish gray (10YR 6/2) stratified fine sandy loam and loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; disseminated lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Soil phases: Saline

A horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 4, 5, or 6 dry; 3, 4, or 5 moist
- Chroma: 2 or 3
- Clay content: 5 to 15 percent
- Electrical conductivity: 0 to 2 mmhos/cm; saline phase: 4 to 8 mmhos/cm
- Sodium adsorption ratio: 0 to 5; saline phase: 13 to 70
- Calcium carbonate equivalent: 0 to 5 percent
- Reaction: pH 6.6 to 9.0

C1 and C2 horizons
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 2 to 4
- Texture: Loam, silt loam, sandy loam, or fine sandy loam
- Clay content: 5 to 18 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 16 mmhos/cm
- Sodium adsorption ratio: 0 to 5; saline phase: 13 to 70
- Reaction: pH 7.4 to 9.0

C3 horizon
- Hue: 10YR, 2.5Y, or 5Y
- Value: 5, 6, or 7 dry; 4, 5, or 6 moist
- Chroma: 2 to 4
- Texture: Sandy loam or fine sandy loam consisting of thin layers of loam, sandy loam, silt loam, loamy sand, loamy fine sand, and occasionally clay loam
- Clay content: 5 to 18 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 32 mmhos/cm

Sodium adsorption ratio: 0 to 5; saline phase: 13 to 70
Reaction: pH 7.4 to 9.0

61A—Glendive sandy loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Glendive and similar soils: 85 percent

Minor Components
Havre and similar soils: 0 to 4 percent
Hanly and similar soils: 0 to 4 percent
Ryell and similar soils: 0 to 3 percent
Poorly drained and ponded soils: 0 to 2 percent
Areas of channels with steep slopes: 0 to 1 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

161B—Glendive sandy loam, saline, 0 to 4 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 4 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Glendive and similar soils: 85 percent

Minor Components
Havre and similar soils: 0 to 4 percent
Ryell and similar soils: 0 to 4 percent
Hanly and similar soils: 0 to 3 percent
Areas of channels with steep slopes: 0 to 2 percent
Poorly drained and ponded soils: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Hanly Series

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20.0 inches/hour)
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Sandy, mixed, frigid Aridic Ustifluvents

Typical Pedon

Hanly fine sandy loam, in an area of Hanly-Ryell fine sandy loams, 0 to 4 percent slopes, in an area of cropland, 2,400 feet north and 1,000 feet west of the southeast corner of sec. 5, T. 2 N., R. 58 E.

Ap—0 to 6 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure; soft, very friable, nonsticky, nonplastic; common fine and many very fine roots; slightly alkaline; abrupt smooth boundary.

C1—6 to 15 inches; grayish brown (2.5Y 5/2) fine sandy loam consisting of thin strata of sandy

loam and loamy sand, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; common very fine roots; moderately alkaline; clear smooth boundary.

C2—15 to 30 inches; light brownish gray (2.5Y 6/2) loamy sand consisting of thin strata of loamy fine sand and sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

C3—30 to 60 inches; light gray (2.5Y 7/2) loamy sand consisting of thin strata of loamy fine sand and sand, light brownish gray (2.5Y 6/2) moist; single grain; loose, nonsticky, nonplastic; disseminated lime; slightly effervescent; moderately alkaline.

Range in Characteristics

Ap horizon

Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Reaction: pH 6.6 to 8.4

C horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Clay content: 5 to 10 percent
Content of rock fragments: 0 to 10 percent pebbles below 40 inches
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 7.4 to 8.4

7B—Hanly-Ryell fine sandy loams, 0 to 4 percent slopes

Setting

Landform:
- Hanly—Flood plains
- Ryell—Flood plains

Slope:
- Hanly—0 to 4 percent
- Ryell—0 to 4 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Hanly and similar soils: 50 percent
Ryell and similar soils: 35 percent

Minor Components
Havre and similar soils: 0 to 5 percent
Glendive and similar soils: 0 to 5 percent
Poorly drained and ponded soils: 0 to 3 percent
Areas of channels with steep slopes: 0 to 2 percent

Major Component Description

Hanly
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 5.9 inches

Ryell
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 5.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Haploborolls

Depth class: Deep (40 to 60 inches) to very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour) to moderately rapid (2.0 to 6.0 inches/hour)
Landform: Hills (slump area)
Parent material: Alluvium and colluvium
Slope range: 15 to 45 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Aridic Haploborolls

Typical Pedon

Haploborolls, in an area of Ustochrepts-Haploborolls complex, slump, 15 to 45 percent slopes, in an area of rangeland, 950 feet north and 50 feet east of the southwest corner of sec. 8, T. 4 S., R. 60 E.

A—0 to 6 inches; brown (10YR 5/3) channery fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; few very fine pores; 20 percent channers; slightly alkaline; clear smooth boundary.

Bw—6 to 13 inches; brown (10YR 5/3) channery fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; common fine and many very fine roots; few very fine pores; 30 percent channers; disseminated lime; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk—13 to 25 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; common very fine and fine roots; few very fine pores; 10 percent channers; 60 percent soft coarse fragments; few fine and medium masses and seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C—25 to 60 inches; pale brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; 40 percent soft coarse fragments; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Rock fragments in the control section: 0 to 35 percent channers or flagstones
Soft coarse fragments in the control section: 0 to 80 percent
Depth to calcium carbonate: 0 to 35 inches
Other features: Rock fragments occur in the upper portion of the profile; soft coarse fragments commonly increase with depth.

A horizon
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.8

Bw horizon
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Clay content: 5 to 35 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

C horizon
Clay content: 5 to 35 percent
Reaction: pH 7.4 to 9.0

Harlake Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained or moderately well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Aridic Ustifluvents

Typical Pedon

Harlake silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 1,100 feet north and 650 feet east of the southwest corner of sec. 19, T. 5 S., R. 55 E.

A—0 to 10 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; hard, firm, very sticky, very plastic; common very fine roots; few very fine pores; moderately alkaline; abrupt smooth boundary.

C1—10 to 27 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure parting to moderate fine and medium granular; hard, very firm, very sticky, very plastic; common very fine roots; few very fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—27 to 40 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, very firm, very sticky, moderately plastic; few very fine roots; few thin strata of clay loam; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C3—40 to 60 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, very firm, very sticky, moderately plastic; few very fine roots; few thin strata of clay loam; disseminated lime; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Soil phases: Saline or warm
Taxonomic note: Map units 606B and 608B are taxadjuncts to the Harlake series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Silty clay loam, silty clay, or clay
Clay content: 27 to 55 percent
Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 4 to 8 mmhos/cm
Sodium adsorption ratio: 0 to 8
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 6.6 to 8.4

C1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay; silty clay, or silty clay loam consisting of stratified layers of clay, silt loam, silty clay loam, and silty clay
Clay content: 35 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 4 to 10; saline phase: 13 to 30
Calcium carbonate equivalent: 2 to 10 percent
Reaction: pH 7.4 to 9.0

C2 and C3 horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay; silty clay, or silty clay loam consisting of stratified layers of clay, silt loam, silty clay loam, and silty clay
Clay content: 35 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 4 to 10; saline phase: 13 to 30
Calcium carbonate equivalent: 2 to 10 percent
Reaction: pH 7.4 to 9.0

57A—Harlake silty clay, saline, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Harlake and similar soils: 85 percent

Minor Components
Havre and similar soils: 0 to 5 percent
Nonsaline soils: 0 to 5 percent
Soils with silty clay loam surfaces: 0 to 3 percent
Poorly drained and ponded soils: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

157A—Harlake silty clay loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Harlake and similar soils: 90 percent

Minor Components
Havre and similar soils: 0 to 3 percent
Moderately saline soils: 0 to 3 percent
Moderately sodic soils: 0 to 2 percent
Areas of channels with steep slopes: 0 to 1 percent
Poorly drained and ponded soils: 0 to 1 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

606B—Harlake silty clay loam, warm, saline, 0 to 3 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Harlake and similar soils: 85 percent

Minor Components
Havre and similar soils: 0 to 5 percent
Nonsaline soils: 0 to 4 percent
Soils that are noncalcareous throughout: 0 to 3 percent
Poorly drained and ponded soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

608B—Harlake clay, warm, 0 to 3 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 3 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Harlake and similar soils: 85 percent

Minor Components
Havre and similar soils: 0 to 5 percent
Moderately saline soils: 0 to 3 percent
Moderately sodic soils: 0 to 3 percent
Areas of channels with steep slopes: 0 to 2 percent
Poorly drained and ponded soils: 0 to 2 percent

Major Component Description

Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Havre Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained or moderately well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed (calcareous), frigid Aridic Ustifluvents

Typical Pedon

Havre loam, 0 to 2 percent slopes, in an area of cropland, 2,150 feet south and 750 feet west of the northeast corner of sec. 9, T. 5 S., R. 62 E.

Ap—0 to 5 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; neutral; abrupt smooth boundary.

C1—5 to 25 inches; pale brown (10YR 6/3) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—25 to 60 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; few thin strata of fine sandy loam, loam, and clay loam; disseminated lime; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Soil phases: Saline

Ap horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Calcium carbonate equivalent: 0 to 5 percent
Electrical conductivity: 0 to 2 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 4
Reaction: pH 6.1 to 9.0

C1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, silt loam, or clay loam that consist of strata of silt loam, fine sandy loam, silty clay loam, and clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 1 to 10 percent
Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 4; saline phase: 13 to 30
Reaction: pH 7.4 to 9.0

C2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam, silt loam, or clay loam that consist of strata of silt loam, fine sandy loam, silty clay loam, and clay loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 1 to 10 percent
Electrical conductivity: 0 to 4 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 4; saline phase: 13 to 30
Reaction: pH 7.4 to 9.0

56A—Havre loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Havre and similar soils: 85 percent

Minor Components
Harlake and similar soils: 0 to 4 percent
Glendive and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent
Areas of channels with steep slopes: 0 to 2 percent
Moderately saline soils: 0 to 1 percent
Poorly drained and ponded soils: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

156A—Havre loam, saline, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Havre and similar soils: 85 percent

Minor Components
Harlake and similar soils: 0 to 4 percent
Glendive and similar soils: 0 to 4 percent
Nonsaline soils: 0 to 2 percent
Areas of channels with steep slopes: 0 to 2 percent
Soils that are noncalcareous throughout: 0 to 2 percent
Poorly drained and ponded soils: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

256A—Havre-Harlake complex, 0 to 2 percent slopes

Setting

Landform:
- Havre—Flood plains
- Harlake—Flood plains

Slope:
- Havre—0 to 2 percent
- Harlake—0 to 2 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Havre and similar soils: 50 percent
Harlake and similar soils: 40 percent

Minor Components
Glendive and similar soils: 0 to 3 percent
Very deep silt loam soils: 0 to 2 percent
Moderately saline soils: 0 to 2 percent
Areas of channels with steep slopes: 0 to 2 percent
Poorly drained and ponded soils: 0 to 1 percent

Major Component Description

Havre
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.7 inches

Harlake
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Julin Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Hills and sedimentary plains
Parent material: Semiconsolidated shale
Slope range: 6 to 25 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, acid, frigid Aridic Ustorthents

Typical Pedon

Julin silty clay loam, in an area of Volborg-Julin-Rock outcrop complex, 8 to 25 percent slopes, in an area of rangeland, 2,500 feet north and 200 feet west of the southeast corner of sec. 31, T. 9 S., R. 59 E.

A1—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, moderately plastic; many very fine and fine roots; few very fine and fine pores; 10 percent soft shale fragments, very strongly acid; clear smooth boundary.

A2—3 to 7 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; few very fine pores; 5 percent soft shale fragments; strongly acid; clear smooth boundary.

C1—7 to 15 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, moderately sticky, moderately plastic; few fine and common very fine roots; few very fine and fine pores; 25 percent soft shale fragments; 5 percent hard shale channers; very strongly acid; clear smooth boundary.

C2—15 to 21 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; 35 percent soft shale fragments; 25 percent hard shale channers; very strongly acid; clear wavy boundary.

C3—21 to 28 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 4/2) moist; massive; hard, friable, moderately sticky, moderately plastic; few very fine roots; 45 percent soft shale fragments; 20 percent hard shale channers; very strongly acid; clear wavy boundary.

Cr—28 to 60 inches; light brownish gray (10YR 6/2) semiconsolidated shale, dark grayish brown (10YR 4/2) moist; sulphur coats on some shale fragments.

Range in Characteristics

Soil temperature: 44 to 47 degrees F
Depth to the Cr horizon: 20 to 40 inches
Taxonomic note: Map unit 634E is a taxadjunct to the Julin series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 to 3
Clay content: 35 to 40 percent
Content of rock fragments: 0 to 35 percent shale fragments—0 to 25 percent soft shale; 0 to 10 percent hard shale
Reaction: pH 3.6 to 5.5

C horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 to 3
Texture: Silty clay or clay
Clay content: 40 to 55 percent
Content of rock fragments: 30 to 85 percent shale fragments—25 to 60 percent soft shale; 5 to 25 percent hard shale
Reaction: pH 3.6 to 5.5

Cr horizon
Material: Semiconsolidated shale
Reaction: pH 3.6 to 5.5

Kirby Series

Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Permeability: Rapid (6.0 to 20.0 inches/hour)
Landform: Hills
Parent material: Colluvium and residuum from scorio (baked shale and sandstone)

Slope range: 8 to 60 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Loamy-skeletal over fragmental, mixed (calcareous), frigid Aridic Ustorthents

Typical Pedon

Kirby channery loam, in an area of Kirby-Cabbart complex, 8 to 25 percent slopes, in an area of rangeland, 50 feet north and 2,250 feet west of the southeast corner of sec. 21, T. 1 N., R. 62 E.

A—0 to 6 inches; reddish brown (5YR 5/3) channery loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 30 percent channers; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—6 to 11 inches; light reddish brown (5YR 6/4) extremely channery loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine and fine roots matted between channers; 70 percent channers and 5 percent flagstones; common fine masses of lime; common distinct lime coats on rock fragments; disseminated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—11 to 60 inches; yellowish red (5YR 5/6) hard, shattered and fractured scorio, reddish brown (5YR 4/4) moist; few fine roots in fractures; common thin lime coats on lower surfaces of rock fragments in the upper few inches.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to fragmental material: 11 to 20 inches
Other features: The rock fragments in the Kirby soil are called scorio. Scorio is defined as the product resulting from the baking of shale and sandstone bedrock that was adjacent to burning coal beds.

A horizon
Hue: 5YR or 7.5YR
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 3, 4, or 6
Clay content: 10 to 22 percent
Content of rock fragments: 15 to 70 percent—0 to 5 percent flagstones; 15 to 65 percent channers
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 2.5YR, 5YR, or 7.5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3, 4, or 6
Texture: Loam or sandy loam
Clay content: 8 to 22 percent
Content of rock fragments: 40 to 90 percent—5 to 20 percent flagstones and cobbles; 35 to 70 percent channers
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

2C horizon
Features: This horizon consists of highly fractured and displaced scorio. The coloring of this material ranges from reddish gray (10R 6/1) through yellowish red (5YR 4/6). Rock fragments of stones, flagstones, and channers make up 90 to 95 percent of this horizon.

176D—Kirby-Cabbart complex, 8 to 25 percent slopes

Setting

Landform:
- Kirby—Hills
- Cabbart—Hills

Position on landform:
- Kirby—Shoulders and summits
- Cabbart—Backslopes and shoulders

Slope:
- Kirby—8 to 25 percent
- Cabbart—8 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kirby and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Bonfri and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Very shallow loamy soils: 0 to 2 percent
Areas of rock outcrop: 0 to 2 percent
Soils that have slopes more than 25 percent: 0 to 2 percent

Major Component Description

Kirby
Surface layer texture: Channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Material weathered from baked sandstone and shale
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 1.3 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

276F—Kirby-Blacksheep-Rock outcrop complex, 25 to 60 percent slopes

Setting

Landform:
- Kirby—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

Position on landform:
- Kirby—Shoulders and summits
- Blacksheep—Backslopes and shoulders

Slope:
- Kirby—25 to 60 percent
- Blacksheep—25 to 50 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kirby and similar soils: 40 percent
Blacksheep and similar soils: 35 percent
Rock outcrop: 15 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Twilight and similar soils: 0 to 2 percent
Very shallow loamy soils: 0 to 2 percent
Cambeth and similar soils: 0 to 2 percent
Soils with stony surface layers: 0 to 1 percent
Soils that have slopes less than 25 percent: 0 to 1 percent

Major Component Description

Kirby
Surface layer texture: Channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Material weathered from baked sandstone and shale
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.3 inches

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Rock outcrop
Definition: Mainly consolidated baked shale and sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Kobase Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Aridic Ustochrepts

Typical Pedon

Kobase silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 500 feet north and 300 feet west of the southeast corner of sec. 26, T. 4 S., R. 56 E.

A—0 to 5 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to moderate very fine and fine granular; very hard, friable, very sticky, moderately plastic; few medium and common very fine and fine roots; few very fine, fine, and medium pores; neutral; clear smooth boundary.

Bw—5 to 12 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky, very plastic; common very fine and fine roots; few fine and common very fine pores; disseminated lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk—12 to 29 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; extremely hard, firm, moderately sticky, very plastic; few very fine roots; few very fine and fine pores; common fine masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

Bky—29 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, firm, moderately sticky, very plastic; few very fine roots; few very fine pores; common fine nests of gypsum crystals; common fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 12 to 17 inches
Depth to the Bky horizon: 25 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 40 percent
Content of rock fragments: 0 to 5 percent pebbles
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 6.6 to 8.4

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 10 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Sodium adsorption ratio: 5 to 10
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.9 to 9.0

Bky horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Sodium adsorption ratio: 8 to 13
Electrical conductivity: 0 to 4 mmhos/cm
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 9.0

78A—Kobase silty clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kobase and similar soils: 85 percent

Minor Components
Marias and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Orinoco and similar soils: 0 to 3 percent
Soils with silt loam surface layers: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

78C—Kobase silty clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kobase and similar soils: 85 percent

Minor Components
Marias and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Orinoco and similar soils: 0 to 3 percent
Soils with silt loam surface layers: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Kremlin Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Aridic Haploborolls

Typical Pedon

Kremlin loam, 2 to 8 percent slopes, in an area of cropland, 1,450 feet north and 1,400 feet east of the southwest corner of sec. 9, T. 7 S., R. 55 E.

Ap1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine and medium granular; soft, very friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few very fine and fine pores; neutral; clear wavy boundary.

Ap2—4 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate thick platy structure parting to moderate fine subangular blocky; hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few very fine pores; neutral; clear smooth boundary.

Bw—8 to 13 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; few very fine pores; neutral; clear wavy boundary.

Bk1—13 to 32 inches; gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; few fine and medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—32 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, moderately sticky, moderately plastic; common fine masses of lime and few medium masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 15 inches
Depth to the Bk horizon: 10 to 24 inches

Ap1 horizon
Hue: 10YR or 2.5Y
Value: 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.1 to 7.8

Ap2 horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 7.8

Bw horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Loam, silt loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 7.8

Bk1 horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Loam, silt loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bk2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, silt loam, clay loam, or sandy clay loam consisting of thin layers of different textures
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 12 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

72A—Kremlin loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kremlin and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 2 percent
Soils with gravelly surface layers: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

72C—Kremlin loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kremlin and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Soils with gravelly surface layers: 0 to 2 percent
Busby and similar soils: 0 to 2 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

172C—Kremlin-Cabbart complex, 2 to 8 percent slopes

Setting

Landform:
- Kremlin—Alluvial fans
- Cabbart—Sedimentary plains

Slope:
- Kremlin—2 to 8 percent
- Cabbart—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Kremlin and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Cambeth and similar soils: 0 to 3 percent
Marmarth and similar soils: 0 to 3 percent
Very shallow loamy soils: 0 to 3 percent
Moderately saline soils: 0 to 2 percent
Very deep clayey soils: 0 to 2 percent
Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description

Kremlin
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

Cabbart
Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Marias Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Chromic Udic Haplusterts

Typical Pedon

Marias silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 1,900 feet north and 350 feet east of the southwest corner of sec. 2, T. 8 S., R. 60 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; strong very fine granular structure; soft, friable, moderately sticky, moderately plastic; many very

fine and fine roots; slightly alkaline; clear smooth boundary.

Bss1—4 to 10 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium subangular blocky structure; very hard, firm, moderately sticky, very plastic; many very fine and fine roots; few very fine pores; few slickensides; disseminated lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bss2—10 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium subangular blocky structure; very hard, firm, moderately sticky, very plastic; common very fine roots; few very fine pores; few slickensides; disseminated lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bssy—23 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky, very plastic; few very fine roots; common distinct slickensides; common fine and medium nests and seams of gypsum crystals; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bssy horizon: 20 to 45 inches
Linear extensibility: .06 to .10 in the upper 30 inches of soil; 1/4- to 2-inch wide cracks to a depth of 20 inches

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 1 to 3
Clay content: 27 to 40 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 4
Reaction: pH 7.4 to 8.4

Bss1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 4
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 8.4

Bss2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 1 to 4
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

Bssy horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 1 to 3
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Gypsum content: 1 to 6 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 4 to 13
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

94A—Marias silty clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marias and similar soils: 85 percent

Minor Components
Ethridge and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

94C—Marias silty clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marias and similar soils: 85 percent

Minor Components
Ethridge and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Marmarth Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Marmarth loam, 2 to 8 percent slopes, in an area of rangeland, 600 feet north and 2,500 feet west of the southeast corner of sec. 36, T. 9 S., R. 62 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky, slightly plastic; common very fine and fine roots; few fine and common very fine pores; neutral; clear smooth boundary.

Bt—4 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; hard, firm, slightly sticky, moderately plastic; few fine and common very fine roots; few fine and common very fine tubular pores; continuous distinct clay films on faces of peds, continuous prominent clay films in pores; neutral; clear wavy boundary.

Bk1—13 to 18 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky, moderately plastic; few very fine roots; few very fine pores; common fine masses of lime; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk2—18 to 27 inches; light olive gray (5Y 6/2) loam, olive gray (5Y 4/2) moist; weak medium subangular blocky structure; soft, friable, nonsticky, slightly plastic; few very fine roots; many very fine and fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—27 to 60 inches; light brownish gray (5Y 6/2) semiconsolidated, loamy sedimentary beds that crush to a sandy loam, olive brown (2.5Y 4/4) moist.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 12 to 24 inches
Depth to the Cr horizon: 20 to 40 inches
Taxonomic note: Map unit 629C is a taxadjunct to the Marmarth series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Value: 3, 4, or 5 moist
Chroma: 2 or 3
Clay content: 20 to 27 percent
Reaction: pH 6.1 to 7.3

Bt horizon
Hue: 10YR or 2.5Y
Value: 3, 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.1 to 7.8

Bk horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, fine sandy loam, or clay loam
Clay content: 15 to 30 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

81C—Marmarth loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marmarth and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Eapa and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Moderately saline soils: 0 to 3 percent
Cambeth and similar soils: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this pub

629C—Marmarth loam, warm, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marmarth and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Cambeth and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Eapa and similar soils: 0 to 3 percent
Moderately saline soils: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Marvan Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)

Landform: Alluvial fans, stream terraces, and sedimentary plains
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Sodic Haplusterts

Typical Pedon

Marvan silty clay, 0 to 2 percent slopes, in an area of cropland, 1,000 feet north and 2,500 feet west of the southeast corner of sec. 1, T. 2 S., R. 58 E.

Ap—0 to 7 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; strong fine and medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; few very fine and fine pores; disseminated lime; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bss—7 to 18 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, moderately plastic; many very fine and fine roots; few very fine pores; few slickensides; disseminated lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bssy—18 to 32 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium subangular blocky structure; extremely hard, very firm, moderately sticky, very plastic; few fine and common very fine roots; few very fine pores; few slickensides; common fine nests and seams of gypsum crystals; disseminated lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bssyz—32 to 60 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, moderately sticky, very plastic; few very fine roots; few distinct slickensides; common fine and medium nests and seams of gypsum crystals; few fine seams of other salts; disseminated lime; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bssy horizon: 10 to 24 inches
Soil phases: Warm
Other features: When dry, this soil has 1/4- to 1-inch cracks that extend to a depth of about 20 inches. Slickensides range from few to common in all horizons except the surface.
Taxonomic note: Map units 613B, 614C, and 635C are taxadjuncts to the Marvan series in order to join soils that have an average soil temperature greater than 47 degrees F.

Ap horizon
Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 0 to 4
Calcium carbonate equivalent: 1 to 5 percent
Reaction: pH 7.4 to 8.4

Bss horizon
Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 45 to 60 percent
Electrical conductivity: 2 to 4 mmhos/cm
Sodium adsorption ratio: 4 to 13
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

Bssy horizon
Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 45 to 60 percent
Gypsum content: 1 to 3 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 4 to 13
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

Bssyz horizon
Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Clay or silty clay
Clay content: 45 to 60 percent
Gypsum content: 1 to 5 percent
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 38

Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

89A—Marvan silty clay, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marvan and similar soils: 85 percent

Minor Components
Kobase and similar soils: 0 to 4 percent
Teigen and similar soils: 0 to 3 percent
Vaeda and similar soils: 0 to 3 percent
Vanda and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

89C—Marvan silty clay, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marvan and similar soils: 85 percent

Minor Components
Kobase and similar soils: 0 to 3 percent
Teigen and similar soils: 0 to 3 percent
Vaeda and similar soils: 0 to 3 percent
Vanda and similar soils: 0 to 2 percent
Absher and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

613B—Marvan-Vanda clays, warm, 0 to 3 percent slopes

Setting

Landform:
- Marvan—Alluvial fans and stream terraces
- Vanda—Alluvial fans and stream terraces

Slope:
- Marvan—0 to 3 percent
- Vanda—0 to 3 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marvan and similar soils: 45 percent
Vanda and similar soils: 40 percent

Minor Components
Very deep nonsaline soils: 0 to 4 percent
Vaeda and similar soils: 0 to 3 percent
Gerdrum and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent
Soils that have slopes more than 3 percent: 0 to 2 percent

Major Component Description

Marvan
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

Vanda
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

614C—Marvan clay, warm, 0 to 6 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 6 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marvan and similar soils: 85 percent

Minor Components
Yamacall and similar soils: 0 to 4 percent
Absher and similar soils: 0 to 3 percent
Vaeda and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

635C—Marvan-Bascovy clays, warm, 0 to 6 percent slopes

Setting

Landform:
- Marvan—Alluvial fans
- Bascovy—Sedimentary plains

Slope:
- Marvan—0 to 6 percent
- Bascovy—0 to 6 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Marvan and similar soils: 50 percent
Bascovy and similar soils: 35 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 3 percent
Orinoco and similar soils: 0 to 3 percent
Soils that have slopes more than 6 percent: 0 to 3 percent
Marias and similar soils: 0 to 2 percent

Major Component Description

Marvan
Surface layer texture: Clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

M-W—Miscellaneous water

Composition

Major Components
Miscellaneous Water: 100 percent

Major Component Description

Definition: Open water in areas such as sewage lagoons, industrial waste pits, and fish hatcheries

Mowbray Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Hills
Parent material: Colluvium
Slope range: 15 to 60 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Loamy-skeletal, mixed, frigid Typic Ustochrepts

Typical Pedon

Mowbray very channery loam, in an area of Mowbray-Cabba-Vebar complex, 35 to 60 percent slopes, in an area of forestland, 2,150 feet north and 1,400 feet east of the southwest corner of sec. 5, T. 3 S., R. 62 E.

Oi—2 inches to 0; undecomposed and slightly decomposed forest litter.

A—0 to 2 inches; dark grayish brown (2.5Y 4/2) very channery loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine and many very fine pores; 20 percent channers, 10 percent flagstones, and 5 percent cobbles; neutral; abrupt smooth boundary.

Bw—2 to 11 inches; olive (5Y 5/3) very channery loam, olive (5Y 4/3) moist; moderate coarse subangular blocky structure parting to moderate fine granular; hard, very friable, slightly sticky, slightly plastic; few coarse and many very fine, fine, and medium roots; common fine and many very fine pores; 20 percent channers, 15 percent flagstones, and 10 percent cobbles; neutral; clear smooth boundary.

Bk—11 to 22 inches; olive (5Y 5/3) very flaggy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few coarse and common very fine and fine roots; common very fine pores; 20 percent flagstones, 15 percent cobbles, and 15 percent channers; 40 percent soft channers; many distinct lime coats on coarse fragments; violently effervescent; slightly alkaline; gradual wavy boundary.

BC—22 to 60 inches; grayish brown (2.5Y 5/2) very flaggy loam, dark grayish brown (2.5Y 4/2) moist; weak very thin platy structure; soft, very friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; few very fine pores; 30 percent flagstones, 10 percent cobbles, 10 percent channers, and 20 percent soft channers; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 20 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 2, 3, or 4 moist
Chroma: 2 or 3
Clay content: 15 to 25 percent
Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles; 10 to 20 percent flagstones; 20 to 35 percent channers
Reaction: pH 6.6 to 7.8

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 15 to 27 percent
Content of rock fragments: 30 to 65 percent—0 to 10 percent cobbles; 15 to 25 percent flagstones; 20 to 45 percent channers

Soft fragments: 0 to 20 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 15 to 27 percent
Content of rock fragments: 40 to 80 percent—0 to 15 percent cobbles; 15 to 25 percent flagstones; 15 to 45 percent channers
Soft fragments: 10 to 40 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

BC horizon
Hue: 2.5Y or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Clay content: 15 to 27 percent
Content of rock fragments: 35 to 65 percent—0 to 10 percent cobbles; 25 to 35 percent flagstones; 10 to 25 percent channers
Soft coarse fragments: 10 to 40 percent
Calcium carbonate equivalent: 0 to 15 percent
Reaction: pH 7.4 to 8.4

152F—Mowbray-Cabba-Vebar complex, 35 to 60 percent slopes

Setting

Landform:
- Mowbray—Hills
- Cabba—Hills
- Vebar—Hills

Slope:
- Mowbray—35 to 60 percent
- Cabba—35 to 60 percent
- Vebar—35 to 50 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Mowbray and similar soils: 35 percent
Cabba and similar soils: 25 percent
Vebar and similar soils: 25 percent

Minor Components
Dast and similar soils: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Very shallow loamy soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent
Soils that have slopes more than 60 percent: 0 to 2 percent

Major Component Description

Mowbray
Surface layer texture: Very channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

Cabba
Surface layer texture: Very stony loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

Vebar
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Moyerson Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 4 to 50 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Moyerson silty clay loam, in an area of Rock outcrop-Moyerson complex, 15 to 50 percent slopes, in an area of rangeland, 1,200 feet north and 1,400 feet west of the southeast corner of sec. 27, T. 6 S., R. 58 E.

A—0 to 4 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure parting to strong fine granular; hard, friable, moderately sticky, slightly plastic; many very fine and fine roots; few fine and common very fine pores; disseminated lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

C1—4 to 8 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to strong very fine subangular blocky; hard, friable, moderately sticky, slightly plastic; common very fine roots; few very fine and fine tubular pores; few fine masses, nests, and seams of gypsum crystals; few fine seams and nests of other salts crystals; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

C2—8 to 14 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, moderately sticky, moderately plastic; few very fine roots; disseminated lime; slightly effervescent; slightly alkaline; gradual wavy boundary.

Cr—14 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated shale that crushes to silty clay loam, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Depth to the Cr horizon: 10 to 20 inches
Soil phases: Saline or warm
Taxonomic note: The Moyerson soil is a taxadjunct to the series. It classifies as Clayey, montmorillonitic (calcareous), frigid, shallow Aridic Ustorthents. Use and management are similar. Map unit 605E is a taxadjunct to the Moyerson series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 5Y, 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 1 to 4
Clay content: 30 to 40 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

C1 horizon
Hue: 5Y, 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 1 to 4
Clay content: 35 to 60 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 5 to 13
Gypsum content: 1 to 5 percent
Reaction: pH 7.4 to 8.4

C2 horizon
Hue: 5Y, 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 1 to 4
Clay content: 35 to 60 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 5 to 13
Reaction: pH 7.4 to 8.4

77D—Moyerson silty clay loam, 4 to 15 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Moyerson and similar soils: 85 percent

Minor Components
Very shallow clayey soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

277D—Moyerson-Orinoco silty clay loams, 4 to 15 percent slopes

Setting

Landform:
- Moyerson—Sedimentary plains and hills
- Orinoco—Hills

Position on landform:
- Moyerson—Shoulders and summits
- Orinoco—Backslopes and footslopes

Slope:
- Moyerson—4 to 15 percent
- Orinoco—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Moyerson and similar soils: 50 percent
Orinoco and similar soils: 40 percent

Minor Components
Very shallow clayey soils: 0 to 3 percent
Bascovy and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Vanda and similar soils: 0 to 2 percent

Major Component Description

Moyerson
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.8 inches

Orinoco
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

477E—Moyerson silty clay loam, 15 to 35 percent slopes

Setting

Landform: Hills
Slope: 15 to 35 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Moyerson and similar soils: 85 percent

Minor Components
Very shallow clayey soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

605E—Moyerson, warm-Rock outcrop complex, 9 to 45 percent slopes

Setting

Landform:
- Moyerson—Hills
- Rock outcrop—Hills

Slope: 9 to 45 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Moyerson and similar soils: 55 percent
Rock outcrop: 30 percent

Minor Components
Very shallow clayey soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 3 percent

Major Component Description

Moyerson
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.8 inches

Rock outcrop
Definition: Consolidated shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Neldore Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 3 to 45 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Clayey, montmorillonitic, nonacid, frigid, shallow Aridic Ustorthents

Typical Pedon

Neldore clay, in an area of Neldore-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 250 feet south and 485 feet west of the northeast corner of sec. 26, T. 9 S., R. 58 E.

A—0 to 2 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to strong fine granular; hard, firm, very sticky, very plastic; few fine and many very fine roots; few very fine and fine pores; neutral; clear smooth boundary.

C1—2 to 6 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, very sticky, very plastic; few fine and common very fine roots; few very fine pores; slightly alkaline; gradual smooth boundary.

C2—6 to 12 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, very sticky, very plastic; few very fine roots; slightly alkaline; gradual wavy boundary.

Cr—12 to 60 inches; dark gray (10YR 4/1) semiconsolidated shale, very dark gray (10YR 3/1) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Cr horizon: 10 to 20 inches
Taxonomic note: Map units 625E and 633D are taxadjuncts to the Neldore series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 1 or 2
Clay content: 40 to 50 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 5.6 to 7.8

C1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2; 4 or 6 for stains of shale
Texture: Clay or silty clay
Clay content: 40 to 50 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 5.6 to 7.8

C2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Clay or silty clay
Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 5.6 to 7.8

Cr horizon
Features: The shale fragments are extremely hard or very hard when dry and extremely firm or very firm when moist.
Reaction: pH 5.1 to 7.3

58D—Neldore-Rock outcrop complex, 4 to 15 percent slopes

Setting

Landform:
- Neldore—Sedimentary plains and hills
- Rock outcrop—Hills

Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 50 percent
Rock outcrop: 35 percent

Minor Components
Volborg and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 4 percent
Very shallow clayey soils: 0 to 3 percent
Orinoco and similar soils: 0 to 2 percent
Vaeda and similar soils: 0 to 2 percent

Major Component Description

Neldore
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Rock outcrop
Definition: Consolidated shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

58E—Neldore-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:
- Neldore—Hills
- Rock outcrop—Hills

Slope: 15 to 45 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 45 percent
Rock outcrop: 40 percent

Minor Components
Volborg and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 4 percent
Very shallow clayey soils: 0 to 3 percent
Orinoco and similar soils: 0 to 2 percent
Vaeda and similar soils: 0 to 2 percent

Major Component Description

Neldore
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Rock outcrop
Definition: Consolidated shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

158D—Neldore clay, 4 to 15 percent slopes

Setting

Landform: Hills
Slope: 15 to 35 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 85 percent

Minor Components
Volborg and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 3 percent
Vaeda and similar soils: 0 to 2 percent
Yawdim and similar soils: 0 to 2 percent
Soils that have slopes more than 35 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

158E—Neldore clay, 15 to 35 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 85 percent

Minor Components
Volborg and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 3 percent
Yawdim and similar soils: 0 to 2 percent
Vaeda and similar soils: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

258D—Neldore-Volborg clays, 4 to 15 percent slopes

Setting

Landform:
- Neldore—Sedimentary plains and hills
- Volborg—Sedimentary plains and hills

Slope:
- Neldore—4 to 15 percent
- Volborg—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 50 percent
Volborg and similar soils: 35 percent

Minor Components
Bascovy and similar soils: 0 to 4 percent
Very shallow clayey soils: 0 to 3 percent
Areas of rock outcrop: 0 to 3 percent
Areas of blowouts: 0 to 3 percent
Yawdim and similar soils: 0 to 2 percent

Major Component Description

Neldore
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 1.8 inches

Volborg
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

358D—Neldore-Bascovy clays, 4 to 15 percent slopes

Setting

Landform:
- Neldore—Sedimentary plains and hills
- Bascovy—Sedimentary plains and hills

Position on landform:
- Neldore—Shoulders and summits
- Bascovy—Backslopes and shoulders

Slope:
- Neldore—4 to 15 percent
- Bascovy—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 45 percent
Bascovy and similar soils: 40 percent

Minor Components
Yawdim and similar soils: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Orinoco and similar soils: 0 to 3 percent
Bickerdyke and similar soils: 0 to 2 percent
Vaeda and similar soils: 0 to 2 percent
Very shallow clayey soils: 0 to 1 percent

Major Component Description

Neldore
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

Bascovy
Surface layer texture: Clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

625E—Neldore clay, warm, 3 to 25 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 3 to 25 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Neldore and similar soils: 85 percent

Minor Components
Volborg and similar soils: 0 to 4 percent
Bascovy and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 3 percent
Vaeda and similar soils: 0 to 2 percent
Yawdim and similar soils: 0 to 2 percent
Soils that have slopes more than 25 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Noonan Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans
Parent material: Alluvium
Slope range: 4 to 15 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed Aridic Natriborolls

Typical Pedon

Noonan loam, in an area of Shambo-Noonan loams, 4 to 15 percent slopes, in an area of rangeland, 1,800 feet south and 2,500 feet west of the northeast corner of sec. 10, T. 3 S., R. 62 S.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine and common very fine pores; neutral; clear wavy boundary.

A2—8 to 11 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate thick platy structure; slightly hard, very friable, nonsticky, slightly plastic; common very fine roots; few fine and common very fine pores; slightly alkaline; abrupt wavy boundary.

Btn—11 to 16 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong coarse columnar structure; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; common faint clay films on faces of peds and in pores; strongly alkaline; clear wavy boundary.

Bk1—16 to 25 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; strong coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; few fine masses and seams of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk2—25 to 35 inches; pale olive (5Y 6/3) sandy clay loam, olive (5Y 5/3) moist; strong coarse prismatic structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; common very fine pores; few fine masses and seams of lime; violently effervescent; strongly alkaline; clear smooth boundary.

BC—35 to 60 inches; pale olive (5Y 6/4) sandy clay loam, olive (5Y 5/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; disseminated lime; violently effervescent; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 13 to 30 inches

A horizons
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Reaction: pH 6.1 to 7.8

Btn horizon
Hue: 10YR or 2.5Y
Value: 3, 4, 5, or 6 dry; 2, 3, or 4 moist
Chroma: 2 to 4
Clay content: 27 to 35 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 13 to 30
Reaction: pH 7.4 to 9.0

Bk horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or sandy clay loam
Clay content: 20 to 30 percent
Electrical conductivity: 0 to 2 mmhos/cm
Sodium adsorption ratio: 13 to 30
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

BC horizon
Hue: 2.5Y or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Clay content: 20 to 30 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 9.0

Orinoco Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Aridic Ustorthents

Typical Pedon

Orinoco silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 1,850 feet east of the southwest corner of sec. 9, T. 9 S., R. 61 E.

A—0 to 2 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, friable, moderately sticky, moderately plastic; common very fine roots; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bw—2 to 9 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine roots; common fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bky1—9 to 22 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine roots; common very fine pores; common very fine nests and seams of gypsum crystals; many fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bky2—22 to 32 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine pores; many fine gypsum crystals; few fine masses of lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Cr—32 to 60 inches; gray (10YR 5/1) semiconsolidated shale, dark gray (10YR 4/1) moist.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Depth to the Bky horizon: 6 to 10 inches
Depth to the Cr horizon: 20 to 40 inches
Taxonomic note: Map unit 631D is a taxadjunct to the Orinoco series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Value: 5 or 6 dry; 4 or 5 moist
Clay content: 30 to 40 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 7.4 to 8.4

Bw horizon
Value: 5 or 6 dry; 4 or 5 moist
Texture: Silty clay loam or silty clay
Clay content: 35 to 45 percent
Electrical conductivity: 4 to 8 mmhos/cm
Sodium adsorption ratio: 5 to 15
Reaction: pH 7.9 to 8.4

Bky horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 or 2
Texture: Silty clay loam, clay, or silty clay
Clay content: 35 to 45 percent
Content of rock fragments: 0 to 5 percent pebbles
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 15 to 30
Calcium carbonate equivalent: 5 to 15 percent
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 8.4

Cr horizon
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 15 to 30
Reaction: pH 6.1 to 7.8

53C—Orinoco silty clay loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Orinoco and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 5 percent
Kobase and similar soils: 0 to 5 percent
Yawdim and similar soils: 0 to 3 percent
Bascovy and similar soils: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

153D—Orinoco-Yawdim silty clay loams, 4 to 15 percent slopes

Setting

Landform:
- Orinoco—Sedimentary plains and hills
- Yawdim—Sedimentary plains and hills

Position on landform:
- Orinoco—Backslopes
- Yawdim—Summits

Slope:
- Orinoco—4 to 15 percent
- Yawdim—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Orinoco and similar soils: 50 percent
Yawdim and similar soils: 35 percent

Minor Components
Kobase and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Absher and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Orinoco
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

253D—Orinoco-Weingart complex, 4 to 15 percent slopes

Setting

Landform:
- Orinoco—Sedimentary plains and hills
- Weingart—Sedimentary plains and hills

Slope:
- Orinoco—4 to 15 percent
- Weingart—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Orinoco and similar soils: 45 percent
Weingart and similar soils: 40 percent

Minor Components
Neldore and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Absher and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Orinoco
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

Weingart
Surface layer texture: Silty clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

631D—Orinoco-Yawdim silty clay loams, warm, 4 to 15 percent slopes

Setting

Landform:
- Orinoco—Sedimentary plains and hills
- Yawdim—Sedimentary plains and hills

Position on landform:
- Orinoco—Backslopes
- Yawdim—Summits

Slope:
- Orinoco—4 to 15 percent
- Yawdim—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Orinoco and similar soils: 50 percent
Yawdim and similar soils: 35 percent

Minor Components
Neldore and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Absher and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 3 percent
Kobase and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Orinoco
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 3.8 inches

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Parchin Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 8 percent
Annual precipitation: 12 to 17 inches

Taxonomic Class: Fine-loamy, mixed Borollic Natrargids

Typical Pedon

Parchin fine sandy loam, in an area of Parchin fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 500 feet south and 40 feet west of the northeast corner of sec. 11, T. 5 S., R. 62 E.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; neutral; abrupt smooth boundary.

E—6 to 11 inches; pale brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; few very fine and fine pores; neutral; abrupt smooth boundary.

Btn—11 to 17 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate coarse columnar structure parting to strong fine and medium subangular blocky; very hard, firm, slightly sticky, moderately plastic; few very fine and fine roots; few fine and common very fine pores; many distinct clay films on faces of peds and in pores; moderately alkaline; gradual wavy boundary.

Btkn—17 to 22 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; few faint clay films on faces of peds and common distinct clay films in pores; many fine and medium masses of lime; moderately alkaline; gradual wavy boundary.

Bk—22 to 28 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive, very hard, moderately sticky, moderately plastic; many fine and medium masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Cr—28 to 60 inches; brown (10YR 5/3) semiconsolidated loamy sedimentary beds that crush to sandy clay loam, brown (10YR 4/3) moist.

Range in Characteristics

Depth to the Bk horizon: 13 to 25 inches
Depth to the Cr horizon: 20 to 40 inches
Other features: Fine threads of gypsum or other salts are present in the lower part of the Btn horizon in some pedons. Pedons with sodium adsorption ratios of less than 13 have more exchangeable magnesium plus sodium than calcium plus exchangeable acidity at pH 8.2. Some pedons contain few or common threads and nests of gypsum and other salts.
Taxonomic note: The Parchin soil is a taxadjunct to the series. It classifies as Fine-loamy, mixed Typic Natriboralfs. Map units 116C and 231D are taxadjuncts to the Parchin series. These soils receive more precipitation than is normal for the series, but this does not affect the use and management.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Reaction: pH 5.6 to 7.3

E horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Reaction: pH 5.6 to 7.3

Btn horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay loam, sandy clay loam, or loam
Clay content: 25 to 34 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 20
Reaction: pH 7.9 to 9.0

Btkn and Bk horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Clay loam, sandy clay loam, or loam
Clay content: 20 to 30 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 13 to 20
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

21C—Parchin fine sandy loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Parchin and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

121C—Parchin-Bullock complex, 2 to 8 percent slopes

Setting

Landform:
- Parchin—Sedimentary plains
- Bullock—Sedimentary plains

Slope:
- Parchin—2 to 8 percent
- Bullock—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Parchin and similar soils: 50 percent
Bullock and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Cabbart and similar soils: 0 to 3 percent
Bascovy and similar soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Parchin
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.0 inches

Bullock
Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Parshall Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Alluvial fans, stream terraces, and drainageways
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Coarse-loamy, mixed Pachic Haploborolls

Typical Pedon

Parshall fine sandy loam, in an area of Parshall-Cohagen fine sandy loams, 4 to 15 percent slopes, in an area of rangeland, 1,400 feet south and 300 feet west of the northeast corner of sec. 17, T. 4 S., R. 60 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak thin platy structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; few very fine pores; neutral; abrupt smooth boundary.

A2—3 to 7 inches; dark brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common fine and many very fine roots; few very fine and fine pores; neutral; clear smooth boundary.

Bw—7 to 32 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few very fine and common fine roots; few very fine pores; neutral; abrupt smooth boundary.

Bk—32 to 42 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few very fine roots; few very fine pores; few fine masses of lime; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Ab—42 to 47 inches; light brownish gray (2.5Y 6/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate coarse subangular blocky structure; soft, very friable, nonsticky, slightly plastic; few very fine roots; few very fine pores; disseminated lime, strongly effervescent; moderately alkaline; clear smooth boundary.

Bkb—47 to 60 inches; light gray (2.5Y 7/2) fine sandy loam, light olive brown (2.5Y 5/2) moist; weak medium platy structure; soft, very friable, nonsticky, slightly plastic; few very fine roots; few very fine pores; few fine seams and masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 17 to 40 inches
Depth to the Bk horizon: 24 to 60 inches
Other features: Some pedons do not have buried horizons (Ab or Bkb horizons).

A horizons
Value: 2, 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 18 percent
Reaction: pH 6.6 to 7.3

Bw horizon
Hue: 10YR or 2.5Y
Value: 3, 4, 5, or 6 dry; 2, 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, sandy loam, loam, or loamy fine sand
Clay content: 10 to 18 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam, loamy fine sand, or loamy sand
Clay content: 5 to 18 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Ab and Bkb horizons
Clay content: 5 to 18 percent
Reaction: pH 7.4 to 8.4

36A—Parshall sandy loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans, stream terraces, and drainageways
Slope: 0 to 4 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Parshall and similar soils: 85 percent

Minor Components
Chinook and similar soils: 0 to 4 percent
Assinniboine and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Marmarth and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

36D—Parshall fine sandy loam, 4 to 15 percent slopes

Setting

Landform: Alluvial fans, stream terraces, and drainageways
Slope: 4 to 15 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Parshall and similar soils: 85 percent

Minor Components
Chinook and similar soils: 0 to 4 percent
Assinniboine and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Marmarth and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

136D—Parshall-Cohagen fine sandy loams, 4 to 15 percent slopes

Setting

Landform:
- Parshall—Alluvial fans, stream terraces, and drainageways
- Cohagen—Sedimentary plains and hills

Slope:
- Parshall—4 to 15 percent
- Cohagen—4 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Parshall and similar soils: 50 percent
Cohagen and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Marmarth and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Shallow soils with channers: 0 to 3 percent
Soils with flagstones: 0 to 2 percent

Major Component Description

Parshall
Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

Cohagen
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Sandstone residuum
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 1.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Prego Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Relict stream terraces
Parent material: Alluvium
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed Aridic Argiborolls

Typical Pedon

Prego sandy loam, 2 to 15 percent slopes, in an area of rangeland, 1,300 feet south and 1,400 feet west of the northeast corner of sec. 7, T. 1 N., R. 57 E.

A—0 to 5 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; few fine and many very fine roots; slightly acid; clear smooth boundary.

Bt1—5 to 10 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to moderate fine and medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; few distinct clay bridges between mineral grains; neutral; clear smooth boundary.

Bt2—10 to 16 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; few faint clay films on faces of peds and clay bridges between mineral grains; neutral; abrupt smooth boundary.

2C—16 to 60 inches; light olive brown (2.5Y 5/4) sand; olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky, nonplastic; 10 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 10 inches
Depth to the 2C horizon: 10 to 20 inches

A horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 8 to 14 percent
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizons
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Sandy loam or fine sandy loam
Clay content: 14 to 18
Content of rock fragments: 0 to 15 percent pebbles
Reaction: pH 6.1 to 7.3

2C horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 4 or 5 moist
Chroma: 3 or 4
Texture: Sand or loamy sand
Clay content: 1 to 8 percent
Content of rock fragments: 5 to 35 percent pebbles
Reaction: pH 6.1 to 7.3

48D—Prego sandy loam, 2 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 2 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Prego and similar soils: 85 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent

Soils with gravelly surface layers: 0 to 2 percent
Soils with darker colored surface layers: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Reeder Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 1 to 35 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed Typic Argiborolls

Typical Pedon

Reeder loam, in an area of Belltower-Reeder-Vebar complex, 4 to 15 percent slopes, in an area of forestland, 1,700 feet north and 2,200 feet west of the southeast corner of sec. 34, T. 2 S., R. 61 E.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; common very fine pores; neutral; clear smooth boundary.
Bt—8 to 19 inches; light brownish gray, (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; strong medium and coarse prismatic structure parting to strong fine and medium subangular blocky; hard, firm, moderately sticky, moderately plastic; few medium and common very fine and fine roots; common very fine and fine pores; few faint clay films on faces of peds and in pores; 15 percent soft coarse fragments; slightly alkaline; gradual wavy boundary.
Bk—19 to 31 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine pores; 20 percent soft coarse fragments; common fine seams and masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.
Cr—31 to 60 inches; white (2.5Y 8/0) semiconsolidated loamy sedimentary beds that crush to a loam, light gray (2.5Y 7/2) moist.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 11 to 26 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 15 to 27 percent
Reaction: pH 6.1 to 7.3

Bt horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Loam, sandy clay loam, or clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, silt loam, silty clay loam, clay loam, or sandy clay loam
Clay content: 15 to 30 percent
Content of soft rock fragments: 35 to 60 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

42C—Reeder loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Reeder and similar soils: 85 percent

Minor Components
Cabba and similar soils: 0 to 4 percent
Very deep loamy soils: 0 to 3 percent
Moderately saline soils: 0 to 3 percent
Soils that are calcareous throughout: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

142D—Reeder-Cabba loams, 4 to 15 percent slopes

Setting

Landform:
- Reeder—Sedimentary plains and hills
- Cabba—Sedimentary plains and hills

Position on landform:
- Reeder—Backslopes and footslopes
- Cabba—Shoulders and summits

Slope:
- Reeder—4 to 15 percent
- Cabba—4 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Reeder and similar soils: 55 percent
Cabba and similar soils: 30 percent

Minor Components
Dast and similar soils: 0 to 4 percent
Very deep loamy soils: 0 to 4 percent
Very shallow loamy soils: 0 to 3 percent
Moderately saline soils: 0 to 2 percent
Soils that have slopes less than 4 percent: 0 to 2 percent

Major Component Description

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

Cabba
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

242D—Reeder-Dast complex, 4 to 15 percent slopes

Setting

Landform:
- Reeder—Sedimentary plains and hills
- Dast—Sedimentary plains and hills

Position on landform:
- Reeder—Backslopes and shoulders
- Dast—Shoulders and summits

Slope:
- Reeder—4 to 15 percent
- Dast—4 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Reeder and similar soils: 45 percent
Dast and similar soils: 40 percent

Minor Components
Very deep loamy soils: 0 to 4 percent
Cabba and similar soils: 0 to 4 percent
Moderately deep clayey soils: 0 to 4 percent
Soils that have slopes less than 4 percent: 0 to 3 percent

Major Component Description

Reeder
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

Dast
Surface layer texture: Sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Rentsac Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Bedrock-floored plains and hills
Parent material: Hard sandstone
Slope range: 2 to 45 percent
Annual precipitation: 12 to 17 inches

Taxonomic Class: Loamy-skeletal, mixed (calcareous), frigid Lithic Ustic Torriorthents

Typical Pedon

Rentsac sandy loam, in an area of Rentsac-Twilight-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 1,600 feet south and 1,500 feet west of the northeast corner of sec. 2, T. 1 S., R. 61 E.

A—0 to 4 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—4 to 16 inches; brown (10YR 5/3) very channery sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; 55 percent channers; common fine and medium masses of lime; common faint lime coats on undersides of channers; violently effervescent; moderately alkaline.

R—16 to 60 inches; hard sandstone.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the R horizon: 10 to 20 inches

A horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Clay content: 7 to 18 percent
Content of rock fragments: 0 to 15 percent channers
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Loam, sandy loam, or fine sandy loam
Clay content: 7 to 18 percent
Content of rock fragments: 35 to 70 percent pebbles, channers, and flagstones
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

99F—Rentsac-Twilight-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:
- Rentsac—Hills
- Twilight—Hills
- Rock outcrop—Hills

Slope:
- Rentsac—15 to 45 percent
- Twilight—15 to 45 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Rentsac and similar soils: 35 percent
Twilight and similar soils: 30 percent
Rock outcrop: 20 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Yamacall and similar soils: 0 to 4 percent
Blacksheep and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 3 percent

Major Component Description

Rentsac
Surface layer texture: Sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Sandstone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.4 inches

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Rock outcrop
Definition: Hard sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Ridge Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Hills
Parent material: Semiconsolidated, sandy sedimentary beds
Slope range: 8 to 65 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Loamy, mixed, frigid, shallow Typic Ustochrepts

Typical Pedon

Ridge sandy loam, in an area of Broadus-Ridge-Reeder complex, 8 to 25 percent slopes, in an area of forestland, 2,500 feet north and 1,500 feet west of the southeast corner of sec. 18, T. 8 S., R. 55 E.

Oi—1/2 inch to 0; slightly decomposed forest litter.
A—0 to 2 inches; brown (10YR 5/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; loose, very friable, nonsticky, nonplastic; many fine roots; many very fine and fine pores; disseminated lime; slightly effervescent; slightly alkaline; clear smooth boundary.
Bw1—2 to 6 inches; pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; many fine roots; few fine and many very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.
Bw2—6 to 12 inches; pale brown (10YR 6/3) sandy loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; soft, friable, nonsticky, nonplastic; many fine roots; few fine and common very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.
Bk—12 to 16 inches; light gray (2.5Y 7/2) sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, friable, nonsticky, nonplastic; common fine roots; few very fine masses and threads of lime;

violently effervescent; moderately alkaline; clear smooth boundary.

Cr—16 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, sandy sedimentary beds that crush to loamy sand, grayish brown (2.5Y 5/2) moist; common fine roots in cracks; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 16 inches
Depth to the Cr horizon: 12 to 20 inches

A horizon
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Clay content: 5 to 20 percent
Reaction: pH 7.4 to 7.8

Bw horizons
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Sandy loam or loam
Clay content: 5 to 20 percent
Reaction: pH 7.4 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Sandy loam or loam
Clay content: 5 to 20 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Cr horizon
Reaction: pH 7.4 to 8.4

13E—Rock outcrop

Setting

Landform: Escarpments
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Rock outcrop: 85 percent

Minor Components
Blacksheep and similar soils: 0 to 4 percent
Cabbart and similar soils: 0 to 4 percent
Very shallow loamy soils: 0 to 4 percent
Very shallow clayey soils: 0 to 3 percent

Major Component Description

Definition: Hard calcareous sandstone

177E—Rock outcrop-Moyerson complex, 15 to 50 percent slopes

Setting

Landform:
- Rock outcrop—Hills
- Moyerson—Hills

Slope:
- Moyerson—15 to 50 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Rock outcrop: 55 percent
Moyerson and similar soils: 30 percent

Minor Components
Very shallow clayey soils: 0 to 4 percent
Strongly saline soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Yawdim and similar soils: 0 to 3 percent

Major Component Description

Rock outcrop
Definition: Consolidated sandstone and shale

Moyerson
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Ryell Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Permeability: Moderate (0.6 to 2.0 inches/hour) above the 2C3 horizon; rapid (6.0 to 20.0 inches/hour) in the 2C3 horizon
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy over sandy or sandy skeletal, mixed (calcareous), frigid Aridic Ustifluvents

Typical Pedon

Ryell fine sandy loam, in an area of Hanly-Ryell fine sandy loams, 0 to 4 percent slopes, in an area of rangeland, 1,600 feet south and 300 feet west of the northeast corner of sec. 26, T. 1 N., R. 60 E.

A—0 to 10 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; few very fine and fine pores; slightly alkaline; clear smooth boundary.

C1—10 to 21 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; loose, very friable, slightly sticky, slightly plastic; common very fine and fine roots; few very fine pores; 5 percent pebbles; few thin strata of sandy loam; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

C2—21 to 31 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; 5 percent pebbles; few thin strata of sandy loam; disseminated lime; strongly effervescent; slightly alkaline; clear smooth boundary.

2C3—31 to 60 inches; grayish brown (2.5Y 5/2) stratified very gravelly loamy sand and very gravelly sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; 40 percent pebbles and 10 percent cobbles; disseminated lime; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Depth to the 2C3 horizon: 18 to 36 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 10 to 20 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

C1 and C2 horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Very fine sandy loam, loamy very fine sand, or loam
Clay content: 10 to 18 percent
Content of rock fragments: 0 to 5 percent pebbles
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

2C3 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Sand or loamy sand
Clay content: 0 to 10 percent
Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Shambo Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans, sedimentary plains, and hills
Parent material: Alluvium
Slope range: 4 to 15 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed Typic Haploborolls

Typical Pedon

Shambo loam, in an area of Shambo-Mowbray-Parchin complex, 4 to 25 percent slopes, in an area of rangeland, 2,300 feet south and 2,300 feet east of the northwest corner of sec. 9, T. 3 S., R. 62 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; common very fine pores; neutral; clear smooth boundary.

Bw1—5 to 14 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure;

slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and common very fine pores; neutral; clear smooth boundary.

Bw2—14 to 23 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; common very fine pores and few fine pores; neutral; clear smooth boundary.

Bw3—23 to 30 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine pores; slightly alkaline; gradual wavy boundary.

Bk—30 to 60 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few very fine roots; few very fine pores; common fine masses and seams of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 14 to 30 inches

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Reaction: pH 6.6 to 7.8

Bw horizons
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Loam, silt loam, or clay loam
Clay content: 18 to 35 percent
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, silty clay loam, or silt loam
Clay content: 18 to 35 percent
Calcium carbonate equivalent: 10 to 15 percent
Reaction: pH 7.4 to 9.0

131C—Shambo-Noonan loams, 4 to 15 percent slopes

Setting

Landform:
- Shambo—Alluvial fans
- Noonan—Alluvial fans

Slope:
- Shambo—4 to 15 percent
- Noonan—4 to 15 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Shambo and similar soils: 45 percent
Noonan and similar soils: 40 percent

Minor Components
Deep moderately saline soils: 0 to 4 percent
Cabba and similar soils: 0 to 4 percent
Shallow cobbly soils: 0 to 4 percent
Shallow bouldery soils: 0 to 3 percent

Major Component Description

Shambo
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

Noonan
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

231D—Shambo-Mowbray-Parchin complex, 4 to 25 percent slopes

Setting

Landform:
- Shambo—Sedimentary plains and hills
- Mowbray—Hills
- Parchin—Sedimentary plains

Slope:
- Shambo—4 to 15 percent
- Mowbray—15 to 25 percent
- Parchin—4 to 8 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Shambo and similar soils: 40 percent
Mowbray and similar soils: 25 percent
Parchin and similar soils: 20 percent

Minor Components
Cabba and similar soils: 0 to 4 percent
Reeder and similar soils: 0 to 4 percent
Vebar and similar soils: 0 to 3 percent
Very shallow sandy soils: 0 to 2 percent
Areas of slickspots: 0 to 2 percent

Major Component Description

Shambo
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

Mowbray
Surface layer texture: Very channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forestland
Flooding: None
Available water capacity: Mainly 4.4 inches

Parchin
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tanna Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Aridic Argiborolls

Typical Pedon

Tanna silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 500 feet north and 500 feet west of the southeast corner of sec. 20, T. 9 S., R. 61 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky, plastic; many very fine and fine roots; slightly alkaline; abrupt smooth boundary.

A2—2 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine pores; slightly alkaline; clear smooth boundary.

Bt—7 to 19 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, firm, moderately sticky, moderately plastic; few fine and many very fine roots; common very fine pores; many distinct clay films on faces of peds and in pores; slightly alkaline; gradual smooth boundary.

Bk—19 to 27 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; massive; hard, friable, moderately sticky, moderately plastic; few very

fine roots; few very fine pores; many medium and common fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cr—27 to 60 inches; light brownish gray (10YR 6/2) semiconsolidated shale that crushes to clay loam, dark grayish brown (10YR 4/2) moist.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Thickness of the mollic epipedon: 7 to 12 inches
Depth to the Bk horizon: 10 to 20 inches
Depth to bedrock: 20 to 40 inches

A horizons
Hue: 10YR or 2.5Y
Value: 2 or 3 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers
Reaction: pH 6.6 to 7.8

Bt horizon
Hue: 10YR or 2.5Y
Value: 3 or 4 moist
Chroma: 2 or 3
Texture: Clay loam, silty clay loam, clay, or silty clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay loam, silty clay loam, or clay
Clay content: 35 to 50 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent channers
Electrical conductivity: 2 to 4 mmhos/cm
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Cr horizon
Material: Semiconsolidated shale with thin layers of hard sandstone that are rippable

64C—Tanna silty clay loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Tanna and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 3 percent
Eapa and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

164C—Tanna-Ethridge silty clay loams, 2 to 8 percent slopes

Setting

Landform:
- Tanna—Sedimentary plains
- Ethridge—Alluvial fans

Slope:
- Tanna—2 to 8 percent
- Ethridge—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Tanna and similar soils: 50 percent
Ethridge and similar soils: 35 percent

Minor Components
Eapa and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 2 percent
Soils with sandy loam surface layers: 0 to 2 percent
Soils that have slopes less than 2 percent: 0 to 2 percent

Major Component Description

Tanna
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

Ethridge
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

164D—Tanna-Ethridge silty clay loams, 8 to 15 percent slopes

Setting

Landform:
- Tanna—Hills
- Ethridge—Alluvial fans

Slope:
- Tanna—8 to 15 percent
- Ethridge—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Tanna and similar soils: 55 percent
Ethridge and similar soils: 30 percent

Minor Components
Weingart and similar soils: 0 to 4 percent
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Soils with sandy loam surface layers: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 2 percent

Major Component Description

Tanna
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

Ethridge
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Teigen Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Aridic Ustochrepts

Typical Pedon

Teigen silty clay loam, 0 to 4 percent slopes, in an area of rangeland, 1,340 feet north and 240 feet east of the southwest corner of sec. 24, T. 9 S., R. 58 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate thick platy structure; slightly hard, firm, moderately sticky, moderately plastic; few very fine and fine roots; few very fine pores; moderately acid; clear smooth boundary.

Bw1—3 to 15 inches; light brownish gray (10YR 6/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine pores; moderately acid; gradual smooth boundary.

Bw2—15 to 24 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; 5 percent soft shale channers; moderately acid; gradual wavy boundary.

BC—24 to 28 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; 5 percent pebbles and 10 percent soft shale channers; slightly acid; gradual wavy boundary.

C—28 to 60 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; 5 percent soft shale channers; moderately acid.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Soil phases: Gullied

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Silty clay loam or clay loam
Clay content: 30 to 40 percent
Content of rock fragments: 0 to 10 percent shale fragments—0 to 5 percent soft shale; 0 to 5 percent hard shale
Reaction: pH 4.5 to 6.0

Bw horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Clay loam, silty clay loam, or silty clay
Clay content: 35 to 55 percent
Content of rock fragments: 0 to 10 percent shale fragments—0 to 5 percent soft shale; 0 to 5 percent hard shale
Reaction: pH 4.5 to 6.5

BC and C horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Texture: Loam, silt loam, clay loam, silty clay loam, or silty clay
Clay content: 35 to 55 percent
Content of rock fragments: 5 to 15 percent shale fragments—5 to 10 percent soft shale; 0 to 5 percent hard shale
Reaction: pH 4.5 to 6.5

95A—Teigen silty clay loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Teigen and similar soils: 85 percent

Minor Components
Vaeda and similar soils: 0 to 4 percent
Creed and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Soils that have slopes more than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

95D—Teigen clay loam, gullied, 4 to 15 percent slopes

Setting

Landform: Alluvial fans
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Teigen and similar soils: 85 percent

Minor Components
Vaeda and similar soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Soils that are calcareous throughout: 0 to 4 percent
Weingart and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tricart Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Relict stream terraces
Parent material: Alluvium
Slope range: 4 to 45 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Loamy-skeletal, mixed Aridic Calciborolls

Typical Pedon

Tricart clay loam, 4 to 15 percent slopes, in an area of rangeland, 2,500 feet north and 500 feet east of the southwest corner of sec. 11, T. 5 S., R. 59 E.

A1—0 to 1 inch; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; common fine and many very fine roots; common very fine pores; neutral; clear smooth boundary.

A2—1 to 6 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; few fine and common very fine roots; few very fine pores; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—6 to 13 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky, moderately plastic; common very fine roots; few very fine pores; 10 percent pebbles; common fine and medium masses of lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

2Bk2—13 to 25 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; few very fine pores; 40 percent pebbles; common distinct lime coats on surfaces of pebbles; many fine and medium masses of lime; violently effervescent; moderately alkaline, gradual wavy boundary.

2Bk3—25 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; 55 percent pebbles; common distinct lime coats on surfaces of pebbles; many fine and medium masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 10 inches

A1 horizon
Hue: 10YR or 2.5Y
Chroma: 2 or 3
Texture: Loam or clay loam when mixed to 7 inches
Clay content: 15 to 35 percent
Content of rock fragments: 0 to 35 percent pebbles
Reaction: pH 6.6 to 8.4

A2 horizon
Hue: 10YR or 2.5Y
Chroma: 2 or 3
Texture: Loam or clay loam
Clay content: 15 to 35 percent
Content of rock fragments: 0 to 35 percent pebbles
Reaction: pH 6.6 to 8.4

Bk1 horizon
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Sandy loam, loam, or clay loam
Clay content: 15 to 35 percent
Content of rock fragments: 10 to 35 percent pebbles
Calcium carbonate equivalent: 10 to 30 percent
Reaction: pH 7.4 to 8.4

2Bk horizons
Hue: 10YR or 2.5Y
Value: 6 or 7 dry; 5 or 6 moist
Chroma: 2 or 3
Texture: Loam or sandy loam
Clay content: 5 to 15 percent
Content of rock fragments: 35 to 60 percent pebbles
Calcium carbonate equivalent: 15 to 30 percent
Reaction: pH 7.4 to 8.4

23D—Tricart clay loam, 4 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Tricart and similar soils: 85 percent

Minor Components
Yamacall and similar soils: 0 to 4 percent
Soils with gravelly surfaces: 0 to 4 percent
Delpoint and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils that have slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

23E—Tricart gravelly loam, 15 to 45 percent slopes

Setting

Landform: Relict stream terraces
Slope: 15 to 45 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Tricart and similar soils: 85 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Soils with very gravelly surfaces: 0 to 4 percent
Soils with darker colored surface layers: 0 to 4 percent
Soils that have slopes less than 15 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Twilight Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, sandy sedimentary beds
Slope range: 2 to 45 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed, frigid Aridic Ustochrepts

Typical Pedon

Twilight fine sandy loam, in an area of Blacksheep-Twilight fine sandy loams, 8 to 15 percent slopes, in an area of rangeland, 1,000 feet north and 2,700 feet east of the southwest corner of sec. 18, T. 2 S., R. 56 E.

A—0 to 3 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; few medium and common very fine roots; neutral; clear smooth boundary.

Bw1—3 to 12 inches; light olive brown (2.5Y 5/4) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; few fine and common very fine roots; few very fine and fine pores; slightly alkaline; clear wavy boundary.

Bw2—12 to 18 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky, nonplastic; common very fine roots; few very fine pores; slightly alkaline; clear wavy boundary.

Bk—18 to 30 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; few fine and medium masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr—30 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated, sandy sedimentary beds that crush to fine sandy loam, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Depth to the Bk horizon: 10 to 20 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 3 or 4 moist
Chroma: 2 or 3
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.8

Bw horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 5 to 18 percent
Reaction: pH 6.6 to 7.8

Bk horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 5 to 18 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

69C—Twilight fine sandy loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 85 percent

Minor Components
Bonfri and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 2 percent
Delpoint and similar soils: 0 to 2 percent
Chinook and similar soils: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

69D—Twilight fine sandy loam, 8 to 15 percent slopes

Setting

Landform: Hills
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 85 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Chinook and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

269C—Twilight-Bonfri complex, 2 to 8 percent slopes

Setting

Landform:
- Twilight—Sedimentary plains
- Bonfri—Sedimentary plains

Position on landform:
- Twilight—Shoulders and summits
- Bonfri—Backslopes and shoulders

Slope:
- Twilight—2 to 8 percent
- Bonfri—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 55 percent
Bonfri and similar soils: 30 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 2 percent
Cabbart and similar soils: 0 to 2 percent
Chinook and similar soils: 0 to 2 percent

Major Component Description

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Bonfri
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

269D—Twilight-Bonfri complex, 8 to 15 percent slopes

Setting

Landform:
- Twilight—Hills
- Bonfri—Hills

Position on landform:
- Twilight—Shoulders and summits
- Bonfri—Backslopes and shoulders

Slope:
- Twilight—8 to 15 percent
- Bonfri—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 55 percent
Bonfri and similar soils: 30 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 2 percent
Weingart and similar soils: 0 to 2 percent
Chinook and similar soils: 0 to 2 percent

Major Component Description

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Bonfri
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

369C—Twilight-Delpoint complex, 2 to 8 percent slopes

Setting

Landform:
- Twilight—Sedimentary plains
- Delpoint—Sedimentary plains

Position on landform:
- Twilight—Shoulders and summits
- Delpoint—Backslopes and shoulders

Slope:
- Twilight—2 to 8 percent
- Delpoint—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 50 percent
Delpoint and similar soils: 35 percent

Minor Components
Blacksheep and similar soils: 0 to 4 percent
Bonfri and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Soils with darker colored surface layers: 0 to 2 percent

Major Component Description

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

369D—Twilight-Cabbart complex, 8 to 15 percent slopes

Setting

Landform:
- Twilight—Hills
- Cabbart—Hills

Position on landform:
- Twilight—Backslopes and footslopes
- Cabbart—Shoulders and summits

Slope:
- Twilight—8 to 15 percent
- Cabbart—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Twilight and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Blacksheep and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Weingart and similar soils: 0 to 2 percent
Cambeth and similar soils: 0 to 2 percent
Soils with darker colored surface layers: 0 to 2 percent

Major Component Description

Twilight
Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Ustochrepts

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch/hour) to moderately rapid (2.0 to 6.0 inches/hour)
Landform: Hills (slump area)
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 15 to 45 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Aridic Ustochrepts

Typical Pedon

Ustochrepts, in an area of Ustochrepts-Haploborolls complex, slump, 15 to 45 percent slopes, in an area of rangeland, 2,500 feet north and 500 feet west of the southeast corner of sec. 7, T. 4 S., R. 60 E.

A—0 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; disseminated lime; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bw—5 to 12 inches; light brownish gray (10YR 6/2) channery loam, dark grayish brown (10YR 4/2) moist; strong medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine and fine roots; few fine and many very fine pores; 15 percent channers and 5 percent flagstones; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—12 to 20 inches; light yellowish brown (2.5Y 6/4) very channery loam, olive brown (2.5Y 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few medium and many very fine roots; common fine and many very fine pores; 30 percent channers and 5 percent flagstones; few fine masses and seams of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk2—20 to 37 inches; light yellowish brown (2.5Y 6/4) very channery loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few medium and common very fine and fine roots; 35 percent channers and 5 percent flagstones; few fine masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Cr—37 to 60 inches; semiconsolidated, loamy sedimentary beds.

Range in Characteristics

Content of soft coarse fragments in the control section: 0 to 80 percent

Content of rock fragments in the control section: 35 to 60 percent channers or flagstones

Depth to calcium carbonate: 0 to 10 inches

Other features: Soft coarse fragments increase with depth.

A horizon

Clay content: 12 to 27 percent
Content of rock fragments: 0 to 10 percent flagstones and channers
Electrical conductivity: 2 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 30
Reaction: pH 7.4 to 9.0

Bw horizon

Clay content: 12 to 27 percent
Content of rock fragments: 10 to 35 percent—10 to 35 percent channers; 0 to 5 percent flagstones
Electrical conductivity: 2 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 30
Reaction: pH 7.4 to 9.0

Bk horizons

Clay content: 12 to 35 percent
Content of rock fragments: 35 to 60 percent—35 to 60 percent channers; 0 to 10 percent flagstones
Electrical conductivity: 2 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 30
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 9.0

17E—Ustochrepts-Haploborolls complex, slump, 15 to 45 percent slopes

Setting

Landform:
- Ustochrepts—Hills
- Haploborolls—Hills

Slope:
- Ustochrepts—15 to 45 percent
- Haploborolls—15 to 45 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components

Ustochrepts and similar soils: 45 percent
Haploborolls and similar soils: 40 percent

Minor Components

Yawdim and similar soils: 0 to 4 percent
Areas of rock outcrop: 0 to 3 percent
Areas of gullied land: 0 to 3 percent
Areas with ponderosa pines: 0 to 3 percent
Soils that have slopes less than 15 percent: 0 to 1 percent
Very poorly drained soils: 0 to 1 percent

Major Component Description

Ustochrepts

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.1 inches

Haploborolls
Surface layer texture: Channery fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Vaeda Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, nonacid, frigid Aridic Ustochrepts

Typical Pedon

Vaeda silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 2,400 feet south and 1,900 feet east of the northwest corner of sec. 8, T. 9 S., R. 61 E.

E—0 to 2 inches; light gray (10YR 7/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; soft, very friable, very sticky, moderately plastic; few very fine and fine roots; common very fine and fine pores; neutral; gradual wavy boundary.

Bw—2 to 8 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, friable, very sticky, moderately plastic; few very fine and fine roots; common very fine pores; neutral; clear smooth boundary.

By1—8 to 24 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; hard, friable, very sticky, moderately plastic; few very fine and fine roots; common very fine pores; common fine nests and seams of gypsum crystals; slightly alkaline; gradual wavy boundary.

By2—24 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, dark gray (10YR 4/1) moist; moderate fine and medium subangular blocky structure; hard, firm, very sticky, moderately plastic; few very fine and fine roots; common very fine pores; few fine seams and nests of gypsum crystals; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the By horizon: 6 to 15 inches

E and Bw horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 or 3
Clay content: 35 to 40 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 2 to 4 mmhos/cm
Sodium adsorption ratio: 0 to 5
Reaction: pH 5.6 to 7.8

By1 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 10 to 20
Gypsum content: 1 to 5 percent
Reaction: pH 6.1 to 7.8

By2 horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 60 percent
Content of rock fragments: 0 to 15 percent pebbles
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 10 to 20
Gypsum content: 1 to 5 percent
Reaction: pH 6.1 to 8.4

96A—Vaeda silty clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Vaeda and similar soils: 85 percent

Minor Components
Vanda and similar soils: 0 to 4 percent
Bickerdyke and similar soils: 0 to 3 percent
Absher and similar soils: 0 to 3 percent
Gerdrum and similar soils: 0 to 3 percent
Soils that have slopes more than 2 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

196C—Vaeda-Creed complex, 0 to 4 percent slopes

Setting

Landform:
- Vaeda—Alluvial fans
- Creed—Alluvial fans

Slope:
- Vaeda—0 to 4 percent
- Creed—0 to 4 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Vaeda and similar soils: 70 percent
Creed and similar soils: 20 percent

Minor Components
Bickerdyke and similar soils: 0 to 3 percent
Vanda and similar soils: 0 to 3 percent
Gerdrum and similar soils: 0 to 2 percent
Soils that have slopes more than 4 percent: 0 to 2 percent

Major Component Description

Vaeda
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

Creed
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Vanda Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Aridic Ustorthents

Typical Pedon

Vanda silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 1,200 feet south and 600 feet east of the northwest corner of sec. 2, T. 8 S., R. 60 E.

A—0 to 3 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Byz1—3 to 17 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots; common very fine pores; common seams and nests of gypsum crystals; few fine seams and nests of other salts; disseminated lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Byz2—17 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 4/2) moist; massive; very hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; few fine seams and nests of gypsum crystals; few fine seams of other salts; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Soil phases: Warm
Taxonomic note: Map unit 613B is a taxadjunct to the Vanda series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Clay or silty clay loam
Clay content: 30 to 60 percent
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 20 to 30
Reaction: pH 7.8 to 9.6

Byz horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay, silty clay, or silty clay loam
Clay content: 35 to 60 percent
Gypsum content: 1 to 5 percent with total gypsum less than 150
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 30
Gypsum content: 1 to 5 percent
Reaction: pH 7.8 to 9.6

97A—Vanda silty clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Vanda and similar soils: 85 percent

Minor Components
Vaeda and similar soils: 0 to 4 percent
Marvan and similar soils: 0 to 4 percent
Absher and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

197A—Vanda-Marvan complex, 0 to 2 percent slopes

Setting

Landform:
- Vanda—Alluvial fans and stream terraces
- Marvan—Alluvial fans and stream terraces

Slope:
- Vanda—0 to 2 percent
- Marvan—0 to 2 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Vanda and similar soils: 45 percent
Marvan and similar soils: 40 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Vaeda and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 3 percent

Major Component Description

Vanda
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Marvan
Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

197C—Vanda-Marvan complex, 2 to 8 percent slopes

Setting

Landform:
- Vanda—Alluvial fans and stream terraces
- Marvan—Alluvial fans and stream terraces

Slope:
- Vanda—2 to 8 percent
- Marvan—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Vanda and similar soils: 45 percent
Marvan and similar soils: 40 percent

Minor Components
Absher and similar soils: 0 to 4 percent
Vaeda and similar soils: 0 to 4 percent
Gerdrum and similar soils: 0 to 4 percent
Kobase and similar soils: 0 to 3 percent

Major Component Description

Vanda
Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 6.1 inches

Marvan
Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Varney Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Varney loam, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet south and 400 feet west of the northeast corner of sec. 4, T. 2 S., R. 57 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few fine and medium and many very fine roots; neutral; clear smooth boundary.

Bt1—4 to 9 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, very friable, moderately sticky, moderately plastic; few fine and common very fine roots; many very fine pores; common faint clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—9 to 17 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, slightly plastic; few fine and common very fine roots; few fine and many very fine pores; common faint clay films on faces of peds, common distinct clay films in pores; slightly alkaline; clear wavy boundary.

Bk1—17 to 28 inches; pale brown (10YR 6/3) gravelly clay loam, grayish brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; 15 percent pebbles; many fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—28 to 36 inches; pale brown (10YR 6/3) gravelly sandy loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; 25 percent pebbles; common distinct lime coats on undersides of rock fragments; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—36 to 60 inches; very pale brown (10YR 7/3) gravelly sandy loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few very fine roots; 30 percent pebbles; common distinct lime coats on rock fragments; common fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F
Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 9 to 20 inches

A horizon
- Hue: 10YR or 2.5Y
- Value: 4 or 5 dry; 2 or 3 moist
- Chroma: 2 or 3
- Clay content: 18 to 27 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Electrical conductivity: 0 to 2 mmhos/cm
- Reaction: pH 6.6 to 7.3

Bt horizons
- Hue: 10YR or 2.5Y
- Value: 4, 5, or 6 dry; 3, 4, or 5 moist
- Chroma: 2 to 4
- Texture: Clay loam or sandy clay loam
- Clay content: 27 to 35 percent
- Content of rock fragments: 0 to 15 percent pebbles
- Electrical conductivity: 0 to 2 mmhos/cm
- Reaction: pH 6.6 to 7.8

Bk1 horizon
- Hue: 10YR or 2.5Y
- Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
- Chroma: 2 to 4
- Texture: Sandy loam, loam, clay loam, or sandy clay loam
- Clay content: 10 to 30 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles
- Calcium carbonate equivalent: 15 to 30 percent
- Electrical conductivity: 0 to 2 mmhos/cm
- Reaction: pH 7.4 to 8.4

Bk2 and Bk3 horizons
- Hue: 10YR or 2.5Y
- Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist
- Chroma: 3 or 4
- Texture: Sandy loam, loam, or sandy clay loam
- Clay content: 10 to 30 percent
- Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles
- Calcium carbonate equivalent: 15 to 30 percent
- Electrical conductivity: 0 to 2 mmhos/cm
- Reaction: pH 7.4 to 8.4

22A—Varney loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Varney and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Soils with very gravelly substratums: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils with cobbly surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

22C—Varney loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Varney and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Soils with very gravelly substratums: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent
Soils with cobbly surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

122C—Varney-Gerdrum complex, 2 to 8 percent slopes

Setting

Landform:
- Varney—Alluvial fans and stream terraces
- Gerdrum—Alluvial fans and stream terraces

Position on landform:
- Varney—Backslopes and footslopes
- Gerdrum—Microlows

Slope:
- Varney—2 to 8 percent
- Gerdrum—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Varney and similar soils: 50 percent
Gerdrum and similar soils: 35 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Soils with very gravelly substratums: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Soils with gravelly surface layers: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Varney
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.6 inches

Gerdrum
Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Vebar Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated, sandy sedimentary beds
Slope range: 4 to 50 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Coarse-loamy, mixed Typic Haploborolls

Typical Pedon

Vebar fine sandy loam, in an area of Belltower-Reeder-Vebar complex, 4 to 15 percent slopes, in an area of forestland, 500 feet south and 2,000 feet east of the northwest corner of sec. 4, T. 3 S., R. 61 E.

Oi—1 inch to 0; slightly decomposed forest litter.
A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine, medium, and coarse and many very fine roots; few very fine pores; slightly acid; clear smooth boundary.
Bw—6 to 15 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine, medium, and coarse roots; few very fine pores; slightly acid; clear wavy boundary.
Bk1—15 to 21 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; few very fine pores; few fine masses and threads of lime; 5 percent soft channers; strongly effervescent; moderately alkaline; gradual wavy boundary.
Bk2—21 to 31 inches; white (2.5Y 8/2) sandy loam, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, friable, nonsticky, nonplastic; few very fine roots; common fine masses of lime and few medium masses of lime; 25 percent soft channers; violently effervescent; moderately alkaline; clear wavy boundary.
Cr—31 to 60 inches; white (2.5Y 8/2) semiconsolidated, sandy sedimentary beds that crush to very fine sandy loam, light gray (2.5Y 7/2) moist.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to the Bk horizon: 10 to 16 inches
Depth to the Cr horizon: 20 to 40 inches

A horizon
Value: 3, 4, or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.8

Bw horizon
Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3 or 4 moist
Chroma: 2 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 8.4

Bk horizons
Hue: 10YR or 2.5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Fine sandy loam or sandy loam
Clay content: 7 to 15 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

Volborg Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 2 to 60 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Clayey, montmorillonitic, acid, frigid, shallow Aridic Ustorthents

Typical Pedon

Volborg clay, in an area of Neldore-Volborg clays, 4 to 15 percent slopes, in an area of rangeland, 2,000 feet north and 2,700 feet east of the southwest corner of sec. 3, T. 6 S., R. 59 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse granular structure; very hard, friable, very sticky, very plastic; few fine and common very fine roots; slightly acid; abrupt smooth boundary.

C1—3 to 10 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; very hard, friable, very sticky, very plastic; few fine and common very fine roots; few very fine pores; very strongly acid; clear wavy boundary.

C2—10 to 16 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; extremely hard, firm, very sticky, very plastic; few very fine roots; very strongly acid; clear wavy boundary.

Cr—16 to 60 inches; light gray (2.5Y 7/0) semiconsolidated shale, gray (2.5Y 5/0) moist.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Depth to bedrock: 10 to 20 inches; saline phase: 10 to 14 inches
Soil phases: Saline or warm
Taxonomic note: Map unit 634E is a taxadjunct to the Volborg series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Silty clay or clay
Clay content: 40 to 50 percent
Electrical conductivity: 0 to 4 mmhos/cm
Sodium adsorption ratio: 0 to 5; saline phase: 5 to 13
Reaction: pH 4.5 to 6.5

C horizons
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 3
Texture: Silty clay loam, silty clay, or clay
Clay content: 35 to 50 percent
Electrical conductivity: 2 to 8 mmhos/cm; saline phase: 8 to 16 mmhos/cm
Sodium adsorption ratio: 0 to 13
Reaction: pH 3.6 to 5.5

Cr horizon
Material: Semiconsolidated shale
Electrical conductivity: 8 to 16 mmhos/cm
Reaction: pH 3.6 to 5.5

98C—Volborg clay, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Volborg and similar soils: 85 percent

Minor Components
Julin and similar soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Very shallow clayey soils: 0 to 4 percent
Moderately saline soils: 0 to 3 percent

Major Component Description

Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

198D—Volborg silty clay, saline, 4 to 15 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Volborg and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 4 percent
Soils that are calcareous throughout: 0 to 4 percent
Very shallow clayey soils: 0 to 4 percent
Bascovy and similar soils: 0 to 3 percent

Major Component Description

Surface layer texture: Silty clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

298E—Volborg-Julin-Rock outcrop complex, 8 to 25 percent slopes

Setting

Landform:
- Volborg—Hills
- Julin—Hills
- Rock outcrop—Hills

Slope:
- Volborg—8 to 25 percent
- Julin—8 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Volborg and similar soils: 40 percent
Julin and similar soils: 35 percent
Rock outcrop: 15 percent

Minor Components
Teigen and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 2 percent
Weingart and similar soils: 0 to 2 percent
Marvan and similar soils: 0 to 2 percent
Orinoco and similar soils: 0 to 1 percent

Major Component Description

Volborg
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Julin
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.8 inches

Rock outcrop
Definition: Consolidated acid shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

398E—Volborg-Volborg, saline-Rock outcrop complex, 8 to 45 percent slopes

Setting

Landform:
- Volborg—Hills
- Volborg—Hills
- Rock outcrop—Hills

Slope:
- Volborg—8 to 45 percent
- Volborg—8 to 45 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Volborg and similar soils: 30 percent
Volborg and similar soils: 25 percent
Rock outcrop: 20 percent

Minor Components
Orinoco and similar soils: 0 to 4 percent
Neldore and similar soils: 0 to 4 percent
Very shallow clayey soils: 0 to 4 percent
Soils that are calcareous throughout: 0 to 3 percent

Major Component Description

Volborg
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Volborg
Surface layer texture: Silty clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Available water capacity: Mainly 1.4 inches

Rock outcrop
Definition: Consolidated acid shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

634E—Volborg-Julin complex, warm, 6 to 60 percent slopes

Setting

Landform:
- Volborg—Sedimentary plains and hills
- Julin—Sedimentary plains and hills

Slope:
- Volborg—6 to 60 percent
- Julin—6 to 25 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Volborg and similar soils: 50 percent
Julin and similar soils: 35 percent

Minor Components
Very shallow clayey soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 3 percent
Areas of shale outcroppings: 0 to 3 percent
Bascovy and similar soils: 0 to 2 percent
Soils that have slopes less than 6 percent: 0 to 1 percent

Major Component Description

Volborg
Surface layer texture: Clay
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Julin
Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

W—Water

Composition

Major Components
Water: 100 percent

Major Component Description

Definition: Areas of open water

Weingart Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Very slow (<0.06 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 0 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic Typic Natriboralfs

Typical Pedon

Weingart silty clay, 2 to 8 percent slopes, in an area of rangeland, 1,200 feet south and 1,200 feet west of the northeast corner of sec. 17, T. 8 S., R. 62 E.

E—0 to 2 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; few fine and common very fine pores; neutral; clear smooth boundary.

Btn—2 to 12 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate medium and coarse columnar structure parting to strong fine and medium subangular blocky; extremely hard, firm, moderately sticky, moderately plastic; many very fine roots; few very fine pores; many distinct clay films on faces of peds and in pores; moderately alkaline; clear smooth boundary.

Bkn—12 to 22 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine roots; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bnyz—22 to 30 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, moderately sticky, moderately plastic; few very fine roots; few very fine pores; many fine and medium nests and seams of gypsum crystals and other salts; moderately alkaline, clear smooth boundary.

Byz—30 to 36 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; massive; slightly hard, friable, moderately sticky, moderately plastic; few very fine roots; few very fine pores; 55 percent soft shale fragments and 5 percent channers; few fine nests and seams of gypsum and other salts; moderately alkaline; clear smooth boundary.

Cr—36 to 60 inches; very pale brown (10YR 7/3) semiconsolidated shale, grayish brown (10YR 5/3) moist.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bkn horizon: 10 to 16 inches
Depth to the Bnyz horizon: 16 to 24 inches
Depth to the Cr horizon: 20 to 40 inches
Soil phases: Warm
Other features: Some pedons are calcareous above 10 inches. When the sodium adsorption ratio is less than 13, there is more exchangeable magnesium plus sodium then calcium plus exchange acidity.
Taxonomic note: Map unit 620C is a taxadjunct to the Weingart series in order to join soils that have an average soil temperature greater than 47 degrees F.

E horizon
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 2 or 3
Texture: Clay, clay loam, or silty clay when mixed to 7 inches
Clay content: 27 to 40 percent
Content of rock fragments: 0 to 10 percent—0 to 10 percent stones and cobbles; 0 to 5 percent hard shale; 0 to 5 percent soft shale
Reaction: pH 5.6 to 7.8

Btn horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4
Texture: Clay, silty clay, or sandy clay
Clay content: 40 to 60 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale; 0 to 5 percent soft shale
Electrical conductivity: 2 to 8 mmhos/cm
Sodium adsorption ratio: 10 to 30
Reaction: pH 6.6 to 9.0

Bkn horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Clay loam, silty clay, clay, sandy clay, or silty clay loam
Clay content: 35 to 55 percent
Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale; 0 to 5 percent soft shale
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 30
Gypsum content: 0 to 1 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

Bnyz and Byz horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Clay, silty clay, clay loam, or silty clay loam
Clay content: 35 to 55 percent
Content of rock fragments: 0 to 75 percent—0 to 30 percent hard shale, 0 to 55 percent soft shale
Electrical conductivity: 4 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 30
Gypsum content: 1 to 5 percent
Reaction: pH 7.9 to 9.0

15C—Weingart silty clay, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Weingart and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Bascovy and similar soils: 0 to 3 percent
Neldore and similar soils: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 3 percent
Cabbart and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Surface layer texture: Silty clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

620C—Weingart silty clay loam, warm, 0 to 6 percent slopes

Setting

Landform: Sedimentary plains
Slope: 0 to 6 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Weingart and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Cabbart and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 3 percent
Neldore and similar soils: 0 to 2 percent
Areas of slickspots: 0 to 1 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland

Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 4.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Yamacall Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans, stream terraces, and hills
Parent material: Alluvium
Slope range: 0 to 25 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine-loamy, mixed, frigid Aridic Ustochrepts

Typical Pedon

Yamacall loam, in an area of Delpoint-Yamacall loams, 8 to 15 percent slopes, in an area of rangeland, 1,000 feet south and 1,800 feet west of the northeast corner of sec. 28, T. 4 S., R. 55 E.

A—0 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; few very fine pores; neutral; abrupt smooth boundary.

Bw—5 to 15 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, slightly plastic; many very fine roots; few very fine and fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—15 to 31 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine roots; few very fine pores; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

BC—31 to 60 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Depth to the Bk horizon: 10 to 20 inches
Other features: In some pedons, the material below 40 inches consists of a strata of loam, silt loam, clay loam, and loamy sand.

A horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6 dry; 3, 4, or 5 moist
Chroma: 2 to 4
Texture: Loam or silt loam
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Calcium carbonate equivalent: 0 to 5 percent
Effervescence: None to strongly
Reaction: pH 6.6 to 8.4

Bw horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or silt loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Reaction: pH 6.6 to 8.4

Bk horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or silt loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles
Electrical conductivity: 0 to 4 mmhos/cm
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 9.0

BC horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Loam, clay loam, or silt loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

86A—Yamacall loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 2 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Busby and similar soils: 0 to 2 percent
Soils that are calcareous throughout: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

86C—Yamacall loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 85 percent

Minor Components
Cabbart and similar soils: 0 to 3 percent
Delpoint and similar soils: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 2 percent
Soils with gravelly surface layers: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

86D—Yamacall loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 90 percent

Minor Components
Cabbart and similar soils: 0 to 2 percent
Delpoint and similar soils: 0 to 2 percent
Archin and similar soils: 0 to 2 percent
Cambeth and similar soils: 0 to 2 percent
Soils with darker colored surface layers: 0 to 1 percent
Soils that have slopes less than 8 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium

Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

186A—Yamacall-Havre loams, 0 to 2 percent slopes

Setting

Landform:
- Yamacall—Stream terraces
- Havre—Flood plains

Slope:
- Yamacall—0 to 2 percent
- Havre—0 to 2 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 70 percent
Havre and similar soils: 20 percent

Minor Components
Harlake and similar soils: 0 to 2 percent
Kremlin and similar soils: 0 to 2 percent
Cambeth and similar soils: 0 to 2 percent
Areas of channels with steep slopes: 0 to 1 percent
Poorly drained and ponded soils: 0 to 1 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Havre
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

186C—Yamacall-Havre loams, 2 to 8 percent slopes

Setting

Landform:
- Yamacall—Stream terraces
- Havre—Flood plains

Slope:
- Yamacall—2 to 8 percent
- Havre—2 to 4 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 70 percent
Havre and similar soils: 20 percent

Minor Components
Delpoint and similar soils: 0 to 2 percent
Harlake and similar soils: 0 to 2 percent
Kremlin and similar soils: 0 to 1 percent
Archin and similar soils: 0 to 1 percent
Areas of channels with steep slopes: 0 to 1 percent
Poorly drained soils: 0 to 1 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Havre
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: Rare
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

193C—Yamacall-Cambeth complex, 2 to 8 percent slopes

Setting

Landform:
- Yamacall—Alluvial fans and stream terraces
- Cambeth—Sedimentary plains

Slope:
- Yamacall—2 to 8 percent
- Cambeth—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 50 percent
Cambeth and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 4 percent
Cabbart and similar soils: 0 to 3 percent
Soils calcareous throughout: 0 to 3 percent
Soils with darker colored surface layers: 0 to 3 percent
Soils that have slopes more than 8 percent: 0 to 2 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Cambeth
Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

286C—Yamacall-Delpoint loams, 2 to 8 percent slopes

Setting

Landform:
- Yamacall—Alluvial fans
- Delpoint—Sedimentary plains

Slope:
- Yamacall—2 to 8 percent
- Delpoint—2 to 8 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 50 percent
Delpoint and similar soils: 35 percent

Minor Components
Cabbart and similar soils: 0 to 4 percent
Kremlin and similar soils: 0 to 4 percent
Soils that are calcareous throughout: 0 to 4 percent
Soils that have slopes more than 8 percent: 0 to 3 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 4.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

386E—Yamacall-Cabbart loams, 15 to 35 percent slopes

Setting

Landform:
- Yamacall—Hills
- Cabbart—Hills

Position on landform:
- Yamacall—Backslopes and footslopes
- Cabbart—Shoulders and summits

Slope:
- Yamacall—15 to 25 percent
- Cabbart—15 to 35 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 50 percent
Cabbart and similar soils: 35 percent

Minor Components
Delpoint and similar soils: 0 to 3 percent
Blacksheep and similar soils: 0 to 3 percent
Cambeth and similar soils: 0 to 3 percent
Soils with gravelly or stony surfaces: 0 to 3 percent
Areas of rock outcrop: 0 to 2 percent
Poorly drained soils: 0 to 1 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

586D—Yamacall-Delpoint-Cabbart loams, 8 to 15 percent slopes

Setting

Landform:
- Yamacall—Hills
- Delpoint—Hills
- Cabbart—Hills

Slope:
- Yamacall—8 to 15 percent
- Delpoint—8 to 15 percent
- Cabbart—8 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yamacall and similar soils: 40 percent
Delpoint and similar soils: 30 percent
Cabbart and similar soils: 15 percent

Minor Components
Cambeth and similar soils: 0 to 4 percent
Archin and similar soils: 0 to 3 percent
Soils that have slopes more than 15 percent: 0 to 3 percent
Kremlin and similar soils: 0 to 3 percent
Soils that are calcareous throughout: 0 to 2 percent

Major Component Description

Yamacall
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Delpoint
Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

Cabbart
Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Yawdim Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Sedimentary plains and hills
Parent material: Semiconsolidated shale
Slope range: 4 to 70 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Clayey, montmorillonitic (calcareous), frigid, shallow Aridic Ustorthents

Typical Pedon

Yawdim silty clay loam, 4 to 15 percent slopes, in an area of rangeland, 1,200 feet north and 400 feet west of the southeast corner of sec. 24, T. 8 N., R. 58 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; slightly hard, friable, very sticky, moderately plastic; many very fine roots; few fine and common very fine pores; slightly alkaline; gradual wavy boundary.

C—3 to 15 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate fine and medium subangular blocky structure; hard, friable, very sticky, moderately plastic; common very fine roots; few fine and common very fine pores; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—15 to 60 inches; light brownish gray (2.5Y 6/2) semiconsolidated shale that crushes to silty clay loam, grayish brown (2.5Y 5/2) moist.

Range in Characteristics

Depth to the Cr horizon: 10 to 20 inches
Taxonomic note: Map unit 631D is a taxadjunct to the Yawdim series in order to join soils that have an average soil temperature greater than 47 degrees F.

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 3 or 4 moist
Chroma: 1 or 2
Clay content: 27 to 40 percent
Reaction: pH 6.6 to 7.8

C horizon
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 1 to 4
Texture: Silty clay loam or silty clay
Clay content: 35 to 50 percent
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

162D—Yawdim silty clay loam, 4 to 15 percent slopes

Setting

Landform: Sedimentary plains and hills
Slope: 4 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yawdim and similar soils: 85 percent

Minor Components
Neldore and similar soils: 0 to 3 percent
Abor and similar soils: 0 to 3 percent
Orinoco and similar soils: 0 to 3 percent
Very shallow clayey soils: 0 to 2 percent

Cabbart and similar soils: 0 to 2 percent
Soils that have slopes less than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

262E—Yawdim-Blacksheep-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:
- Yawdim—Hills
- Blacksheep—Hills
- Rock outcrop—Hills

Position on landform:
- Yawdim—Backslopes and footslopes
- Blacksheep—Backslopes and shoulders
- Rock outcrop—Shoulders and summits

Slope:
- Yawdim—15 to 45 percent
- Blacksheep—15 to 45 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Yawdim and similar soils: 40 percent
Blacksheep and similar soils: 30 percent
Rock outcrop: 20 percent

Minor Components
Bascovy and similar soils: 0 to 2 percent
Cabbart and similar soils: 0 to 2 percent
Very shallow loamy soils: 0 to 2 percent
Orinoco and similar soils: 0 to 2 percent
Soils with stony surface layers: 0 to 1 percent
Soils that have slopes less than 15 percent: 0 to 1 percent

Major Component Description

Yawdim
Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Rock outcrop
Definition: Consolidated sandstone and shale

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Yegen Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 to 2.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 15 percent
Annual precipitation: 15 to 17 inches

Taxonomic Class: Fine-loamy, mixed Typic Argiborolls

Typical Pedon

Yegen loam, 8 to 15 percent slopes, in an area of rangeland, 2,000 feet north and 1,500 feet east of the southwest corner of sec. 3, T. 4 S., R. 60 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate thick platy structure; slightly hard, very friable, slightly sticky, slightly plastic; common

very fine and fine roots; few very fine pores; neutral; abrupt smooth boundary.

Bt1—6 to 11 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, slightly plastic; common very fine roots; few very fine pores; few distinct clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—11 to 32 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; few distinct clay films on faces of peds and in pores; neutral; abrupt smooth boundary.

Bk1—32 to 38 inches; light yellowish brown (2.5Y 6/4) sandy clay loam, light olive brown (2.5Y 5/6) moist; moderate coarse prismatic structure; hard, very friable, slightly sticky, slightly plastic; few very fine roots; few fine and medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—38 to 60 inches; pale yellow (2.5Y 7/3) sandy loam, light olive brown (2.5Y 5/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky, nonplastic; few very fine roots; few fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 47 degrees F
Thickness of the mollic epipedon: 10 to 16 inches
Depth to the Bk horizon: 24 to 40 inches

A horizon
Hue: 10YR or 2.5Y
Value: 3 or 4 dry; 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 27 percent
Reaction: pH 6.6 to 7.3

Bt horizons
Hue: 10YR or 2.5Y
Value: 3, 4, or 5 dry; 2 to 4 moist
Chroma: 2 to 4
Texture: Sandy clay loam or clay loam
Clay content: 20 to 35 percent
Reaction: pH 6.6 to 7.3

Bk horizons
Hue: 2.5Y or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 3, 4, or 6
Texture: Sandy loam or sandy clay loam
Clay content: 5 to 30 percent
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

41C—Yegen loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Yegen and similar soils: 85 percent

Minor Components
Reeder and similar soils: 0 to 4 percent
Moderately saline soils: 0 to 3 percent
Cabba and similar soils: 0 to 3 percent
Very deep sandy loam soils: 0 to 3 percent
Soils that have slopes less then 2 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

41D—Yegen loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans
Slope: 8 to 15 percent
Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Yegen and similar soils: 85 percent

Minor Components
Reeder and similar soils: 0 to 4 percent
Moderately saline soils: 0 to 3 percent
Cabba and similar soils: 0 to 3 percent
Very deep sandy loam soils: 0 to 3 percent
Soils that have slopes less than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

141C—Yegen-Rentsac complex, 2 to 8 percent slopes

Setting

Landform:
- Yegen—Alluvial fans
- Rentsac—Bedrock-floored plains

Slope:
- Yegen—2 to 8 percent
- Rentsac—2 to 8 percent

Mean annual precipitation: 15 to 17 inches

Composition

Major Components
Yegen and similar soils: 50 percent
Rentsac and similar soils: 35 percent

Minor Components
Reeder and similar soils: 0 to 4 percent
Cabba and similar soils: 0 to 4 percent
Very deep sandy loam soils: 0 to 4 percent
Soils with darker colored surface layers: 0 to 3 percent

Major Component Description

Yegen
Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.2 inches

Rentsac
Surface layer texture: Sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Sandstone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Ynot Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium and eolian deposits
Slope range: 2 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Coarse-loamy, mixed Aridic Haploborolls

Typical Pedon

Ynot sandy loam, 2 to 8 percent slopes, in an area of rangeland, 40 feet south and 2,300 feet west of the northeast corner of sec. 14, T. 4 S., R. 61 E.

A—0 to 10 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; loose, very friable, nonsticky, nonplastic; common fine and many very fine roots; neutral; clear wavy boundary.

Bw1—10 to 19 inches; brown (10YR 5/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; few fine and common very fine pores; neutral; gradual smooth boundary.

Bw2—19 to 31 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine and common very fine roots; common very fine pores and few fine pores; neutral; gradual wavy boundary.

C1—31 to 42 inches; pale brown (10YR 6/3) sandy loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky, nonplastic; few very fine roots; neutral; gradual wavy boundary.

C2—42 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Thickness of the mollic epipedon: 7 to 16 inches
Other features: Some soils are calcareous below a depth of 40 inches.

A horizon
Hue: 10YR or 2.5Y
Value: 2 or 3 moist
Chroma: 2 or 3
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.3

Bw horizons
Hue: 10YR or 2.5Y
Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Sandy loam or fine sandy loam
Clay content: 10 to 18
Reaction: pH 6.1 to 7.3

C horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2 to 4
Texture: Sandy loam or fine sandy loam
Clay content: 10 to 18 percent
Reaction: pH 6.1 to 7.8

59C—Ynot sandy loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ynot and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Soils with gravelly surface layers: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Areas of blowouts: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

59D—Ynot sandy loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans
Slope: 8 to 15 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Ynot and similar soils: 85 percent

Minor Components
Archin and similar soils: 0 to 4 percent
Soils with gravelly surface layers: 0 to 3 percent
Yamacall and similar soils: 0 to 3 percent
Areas of blowouts: 0 to 3 percent
Soils with lighter colored surface layers: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Zatoville Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch/hour)
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 8 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Fine, montmorillonitic, frigid Aridic Ustochrepts

Typical Pedon

Zatoville silty clay loam, 2 to 8 percent slopes, in an area of rangeland, 2,200 feet north and 2,100 feet west of the southeast corner of sec. 3, T. 4 S., R. 56 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, moderately plastic; many very fine roots; few very fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—3 to 10 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, firm, moderately sticky, moderately plastic; many very fine roots; few very fine pores; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

By1—10 to 13 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine roots; few very fine pores; common fine nests and seams of gypsum crystals; disseminated lime; slightly effervescent; moderately alkaline; clear smooth boundary.

By2—13 to 27 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; many fine and medium nests of gypsum crystals; disseminated lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

By3—27 to 60 inches; light gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) moist; massive; extremely hard, extremely firm, moderately sticky, moderately plastic; few very fine roots; common reddish yellow (7.5YR 6/6) iron stains; common fine and medium nests of gypsum crystals; disseminated lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Depth to the By horizon: 13 to 24 inches

A horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 40 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 9.0

Bw horizon
Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Silty clay loam or silty clay
Clay content: 33 to 45 percent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 9.0

By horizons
Hue: 10YR, 2.5Y, or 5Y
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 2 or 3
Texture: Silty clay loam or silty clay
Clay content: 30 to 45 percent
Electrical conductivity: 8 to 16 mmhos/cm
Sodium adsorption ratio: 13 to 30
Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.9 to 9.0

178C—Zatoville silty clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 8 percent
Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Zatoville and similar soils: 85 percent

Minor Components
Gerdrum and similar soils: 0 to 3 percent
Kobase and similar soils: 0 to 3 percent
Marvan and similar soils: 0 to 3 percent
Areas of slickspots: 0 to 3 percent
Soils that have slopes less than 2 percent: 0 to 2 percent
Soils that have slopes more than 8 percent: 0 to 1 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Zeona Series

Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Permeability: Rapid (6.0 to 20.0 inches/hour)
Landform: Sand dunes
Parent material: Eolian deposits
Slope range: 4 to 15 percent
Annual precipitation: 12 to 15 inches

Taxonomic Class: Mixed, frigid Typic Ustipsamments

Typical Pedon

Zeona loamy fine sand, in an area of Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes, in an area of rangeland, 1,500 feet south and 2,000 feet west of the northeast corner of sec. 32, T. 3 N., R. 55 E.

A—0 to 4 inches; yellowish brown (10YR 5/4) loamy fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; neutral; gradual irregular boundary.
C1—4 to 16 inches; yellowish brown (10YR 5/4) loamy fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; neutral; gradual irregular boundary.
C2—16 to 60 inches; light yellowish brown (10YR 6/4) loamy fine sand; brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Other features: Colors throughout the control section are typically “salt and pepper” with lighter- and darker-colored sand grains. Evidence of recent wind action such as thin dark layers and variations in textures are observable in some pedons. Some pedons are calcareous below 30 inches.

A horizon
Hue: 5Y, 2.5Y, 10YR, or 7.5YR
Value: 4, 5, 6, or 7 dry; 3, 4, 5, or 6 moist
Chroma: 2 to 4 or 6
Clay content: 0 to 10 percent
Reaction: pH 5.6 to 7.8

C horizons
Hue: 5Y, 2.5Y, 10YR, or 7.5YR
Value: 5, 6, or 7 dry; 4 or 5 moist
Chroma: 1 to 4
Texture: Loamy fine sand or fine sand
Clay content: 0 to 10 percent
Reaction: pH 6.1 to 8.4

119D—Zeona-Blacksheep-Rock outcrop complex, 4 to 15 percent slopes

Setting

Landform:
- Zeona—Sand dunes
- Blacksheep—Sedimentary plains and hills
- Rock outcrop—Hills

Slope:
- Zeona—4 to 15 percent
- Blacksheep—4 to 15 percent

Mean annual precipitation: 12 to 15 inches

Composition

Major Components
Zeona and similar soils: 40 percent
Blacksheep and similar soils: 30 percent
Rock outcrop: 15 percent

Minor Components
Very shallow loamy soils: 0 to 4 percent
Cabbart and similar soils: 0 to 3 percent
Archin and similar soils: 0 to 3 percent
Areas of blowouts: 0 to 3 percent
Areas with ponderosa pines: 0 to 2 percent

Major Component Description

Zeona
Surface layer texture: Loamy fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Eolian deposits
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.4 inches

Blacksheep
Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Rock outcrop
Definition: Consolidated sandstone

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

References

Alexander, R.R. 1967. Site indexes for Engelmann spruce. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station Research Paper, RP-32.

American Association of State Highway and Transportation Officials (AASHTO). 1986. Standard specifications for highway materials and methods of sampling and testing. 14th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 1988. Standard test method for classification of soils for engineering purposes. ASTM Standard D 2487-00.

Baker, F.S. 1925. Aspen in the Central Rocky Mountain Region. United States Department of Agriculture Bulletin 1291.

Brickell, J.E. 1968. A method for constructing site index curves from measurements of tree age and height—Its application to inland Douglas-fir. U.S. Department of Agriculture, Forest Service, Intermountain Research Station Research Paper INT-RP-47.

Brown, P.L., and G.R. Carlson. 1990. Grain yields related to stored soil water and growing season rainfall. Montana Agricultural Experiment Station Special Report Number 35.

Colton, R.B., R.W. Lemke, W. Richard, and R.M. Lindvall. 1961. Glacial map of Montana east of the Rocky Mountains. U.S. Geological Survey geologic map (1:500,000), I-0327.

Conner, R.C. 1993. Montana's forest resources. U.S. Department of Agriculture, Forest Service, Intermountain Research Station Resource Bulletin INT-RB-81.

Dahms, W.G. 1964. Gross and net yield tables for lodgepole pine. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR, Research Paper PNW-8.

Meyer, W.H. 1938. Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture, Technical Bulletin 630. Washington, DC.

Miller, M.R., W.M. Bermel, R.N. Bergantino, J.L. Sonderegger, P.M. Norbeck, and F.A. Schmidt. 1977. Compilation of hydrogeological data for southeastern Montana: Montana Bureau of Mines and Geology Open File Report 026.

Montana Department of State Lands, Division of Forestry, and U.S. Department of Agriculture, Forest Survey, Intermountain Forest and Range Experiment Station, Region 1. 1984. Timber resources of Eastern Montana. Working Circles 4, 5, 6, 7, and 8.

Myers, C.A. 1966. Yield tables for managed stands with special reference to the Black Hills. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station Research Paper RM-RP-21.

O'Brien R.A., and D.C. Collins. 1991. Forest statistics for land outside national forests in Eastern Montana, 1989. U.S. Department of Agriculture, Intermountain Research Station Research Bulletin INT-RB-71.

Pfister, R.D., B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest habitat types of Montana. U.S. Department of Agriculture, Forest Service, Intermountain Research Station General Technical Report INT-GTR-34.

Sauerwein, W.J. 1979. Site index for black cottonwood. Compiled from British Columbia Forest Service data. U.S. Department of Agriculture, Soil Conservation Service, Western Region.

Soil Survey Division Staff. 1962. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 1990. Keys to soil taxonomy. 4th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

United States Department of Agriculture, Natural Resources Conservation Service. Montana Field Office Technical Guide, Section II.

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture, Soil Conservation Service. 1976. National range handbook.

Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular

to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Bouldery soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1962).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in

wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1962). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Naturalized pasture. Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots.

For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the

potential natural plant community for that site. (See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called

ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay

(0.002 millimeters) to the lower limit of very fine sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Similarity index. A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from

saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a

sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.