



UNIVERSITY OF IDAHO  
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# Gem County Soils

Profile Descriptions and Laboratory Data

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**No. 1**

*Idaho Soil Characterization Series*

IDAHO Agricultural  
Experiment Station

Bulletin 360  
May, 1961

*In Cooperation With*  
United States Department of Agriculture  
Soil Conservation Service

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<sup>1</sup>Tentative series.

## Laboratory Methods

### Sample Preparation

All samples for laboratory analysis were air dried, sieved to remove gravel, crushed to pass through a two millimeter screen and thoroughly mixed. All samples were stored in closed containers.

### Chemical Determinations

The percent of water at saturation (6) was determined by measuring the amount of water necessary to bring a known quantity of soil to a saturated paste (method 27b)\*. The mixture was allowed to stand four hours at room temperature.

The resulting soil and water mixture as mentioned above was then filtered in a "Buchner" funnel by means of suction (method 3a). A drop of toluene was added to the extract as a microbial inhibitive. The electrical conductivity of the saturation extract was obtained by means of a semi-micro conductivity cell and direct reading conductivity bridge (method 46b).

The saturation extract was quantitatively analyzed as follows:

Carbonates and bicarbonates by acid titration (method 12); the chlorides by titration with silver nitrate (method 13); the sulfates by precipitation with barium chloride and weighing (2); the calcium by precipitation as the oxalate and titration with hexanitrate cerate (method 8); the magnesium colorimetrically after precipitation as magnesium ammonium phosphate (method 9); the sodium and potassium by use of a Perkin-Elmer flame photometer (methods 10a and 11a).

Cation exchange capacity was determined by a modified Hoskings method (3) as follows: a 10-gram sample of air-dried soil was treated with 35 ml. of ammonium acetate, pH 9. The excess acetate was removed in a "Buchner" funnel by means of suction, the soil was washed with 95% ethanol, and then placed in a Kjeldahl flask. Dilute sodium

hydroxide and a few chunks of zinc metal were added, the ammonia was distilled into 4% boric acid solution and titrated with standard acid. The ammonium acetate extract was made up to 100 ml. and the exchangeable cations were determined by the same methods as those described for the soluble cations. The exchangeable cations were determined by subtracting the water soluble cations from the total extractable in the ammonium acetate extract solution.

Determination of exchangeable hydrogen was made by the triethanolamine method (5).

Organic carbon was determined by the chromic acid method (method 24) and organic matter calculated. Total nitrogen was determined by the Kjeldahl method (1). Alkaline earth carbonates (calcium carbonate equivalent percentage was determined by acid neutralization (method 23c). The pH of the soil paste and hydrolytic pH (1 part soil to 5 parts water) were determined with a Beckman model H-2 pH meter.

The carbon:nitrogen ratio was determined by dividing the total nitrogen by the organic carbon obtained in (method 24). The base saturation percentage was determined by the addition of the exchangeable metallic cations divided by the cation exchange capacity.

### Physical Analysis

Particle size distribution was determined by the pipette method (4).

Textural class was determined by the soil triangle used in U.S.D.A. Handbook No. 18 (7).

Moisture retention at 1/10, 1/3, and 15 atmospheres were determined by methods 29, 30, and 31, respectively, as described in U.S.D.A. Handbook No. 60 (6).

Bulk density was determined by method 38 as described in U.S.D.A. Handbook No. 60 (6).

\*Refers to the method number in the *Agricultural Handbook* No. 60 unless otherwise stated.

# Gem County Soils

## Profile Description and Laboratory Data

M. A. FOSBERG, G. C. LEWIS, W. J. LEIGHTY, J. C. CHUGG<sup>1</sup>

**C**HARACTERIZATION studies are being made to supply basic information on Idaho soils. These data are useful for many types of soils interpretations relating land use and research investigations. They are field and laboratory data that describe the soil series and type in terms of its profile description, chemical and physical characteristics. These data have not been interpreted for a specific use. The studies were made in conjunction with the Gem County Area soil survey, currently in final correlation.

## Description of Area

Gem County (Fig. 2) lies on the edge of the Snake River Plain and the extensive mountains to the north. It is

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mountainous in the north and southeast, grading into alluvial fans and terraces on the west and southwest. Squaw Creek lies in a deep, narrow valley extending north of the Payette River. The Payette River formed a shallow, broader valley, called Emmett Valley, which has a sizable river bottom and low terrace area. This low area has a complex of well-drained to wet, saline and strong alkali soils. The adjacent fans are deep, well-drained soils, and the lower terraces have dominantly Sierozem and Solodized Solonetz (slick spots) soils. The hilly and mountainous areas have soils ranging from Sierozem to Prairie great soil groups. The elevation of this area ranges from 2250 feet at the west county line to 5909 feet on Squaw Butte. The climate varies with changes in elevation. Annual precipitation ranges from about 8 inches near the west county line to 20 inches or more in the mountains. The frost-free period at Emmett is 168 days and 116 at Tripod Mountain.

The lower valleys are used for a wide diversity of irrigated crops, such as sweet and field corn, sugar beets, wheat, hay and pasture, apples, prunes, peaches, and cherries. Some dry land wheat is raised in the hilly areas and higher valleys, but most of the hilly and mountainous areas are used for range land. The range land, including some forest, comprises about 85 percent of the County, irrigation lands 12 percent and dry land 3 percent.

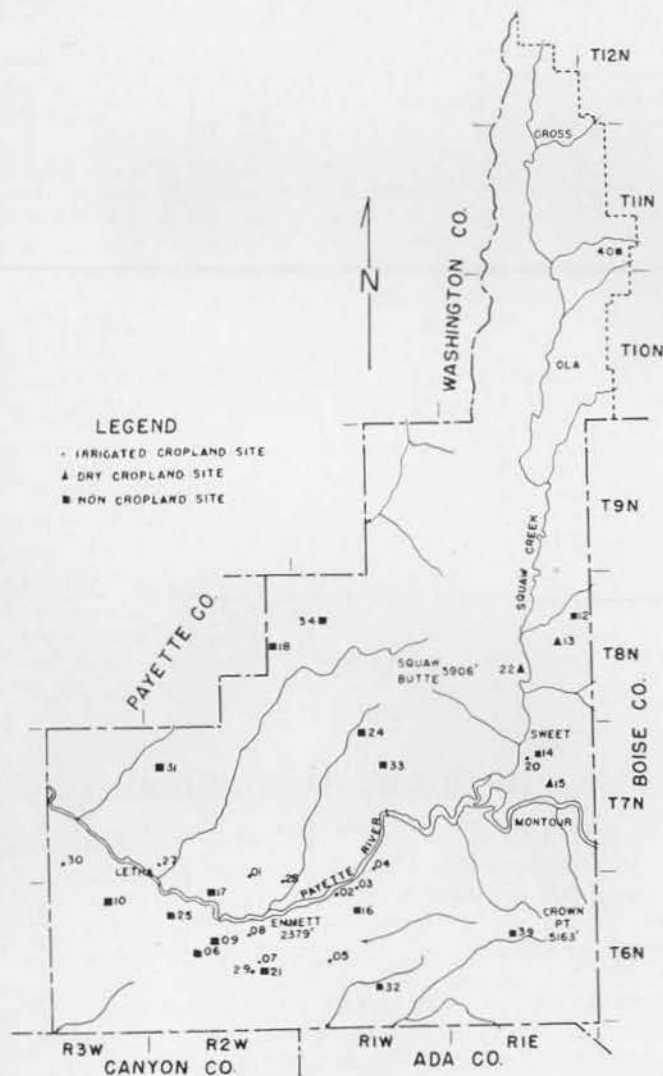


Figure 1. — Sample sites.



Figure 2. — Blackened area shows the part of Gem County represented by the soils in this publication.

## Soil Associations

The soils of the surveyed part of Gem County have been grouped into 14 soil associations defined chiefly in terms of combinations of soil series. These are named for the predominant soil series occurring within them. The distribution and extent of these soil associations are shown in the generalized map in Figure 3. More detailed information about individual soils in the associations can be obtained from the detailed soil descriptions and the Gem County area soil survey report (7).

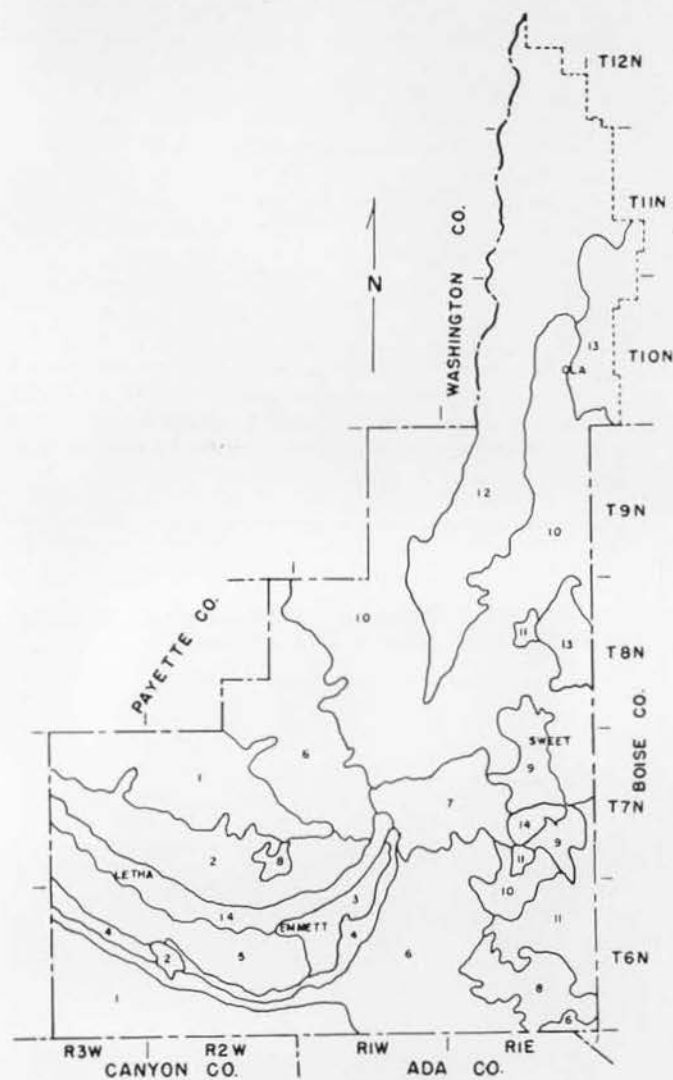


Figure 3. — Soil associations.

Definite distinctions exist between the soil associations, but the lines are not always sharp. Near a line some soils may be in two adjacent soil associations. For example, some soils occur on steep north-facing slopes in one area and steep south-facing slopes in a higher rainfall area. A brief description of each soil association follows:

1. **Chilcott-Lanktree-Lolalita:** light-colored soils of the semiarid high terraces.
2. **Purdam-Power:** light-colored soils of the semiarid high terraces.
3. **Emerson-Wardwell-Quenzer:** light-colored nonsaline soils of the low terraces.
4. **Harpt-Cashmere:** soils of the alluvial fans.

5. **Letha-Baldock-Vanderdasson:** saline, alkali, or dark soils of the low terraces and basins.

6. **Haw-Payette-Van Dusen:** medium-colored soils of the semiarid uplands over sands.

7. **Lickskillett-Tripod:** medium-colored soils of the semiarid uplands over rhyolite.

8. **Pearl-Black Pearl:** medium-colored soils of the semiarid uplands over rhyolite.

9. **Sweet-Kepler:** medium-colored soils of the semiarid high terraces.

10. **Gem-Tripod-Klingback:** medium-colored soils of the semiarid high terraces.

11. **Figart-Rainey:** dark-colored granitic soils of the dry subhumid zone.

12. **Gwin-Mehlhorn-Jackknife:** dark-colored basaltic soils of the moist subhumic zone.

13. **Brownlee-Rainey-Ola:** dark-colored granitic soils of the moist subhumic zone.

14. **Moulton-Falk:** soils of the bottom lands.

## Methods of Investigation

A generalized summary description of the soil series is given in the first paragraph of the soil description, but is not repeated where two profiles of the same series were analysed. Site characteristics are given preceding the detailed profile description and laboratory analyses. Pertinent remarks are given at the end of each description.

Data for 30 soils are included in this issue. A part of these soil descriptions and laboratory analyses may be used in the Gem County Area soil survey report. The location where soil was sampled is given in Figure 1, Gem County Map, by the last two digits of the soil number.

The chemical and bulk density analyses were made by the Agricultural Chemistry Department, University of Idaho Agricultural Experiment Station, under the supervision of G. C. Lewis, Associate Agricultural Chemist, and assisted by William Anderson. The analytical methods used are described on page 2.

The particle size distribution and moisture tension analyses were made by the Soil Survey Laboratory, Soil Conservation Service, Riverside, California, under the supervision of R. E. Nelson.

These soils were collected and described by the following soil survey staff, Soil Conservation Service: J. C. Chugg, V. Coulson, L. Grant, L. Juve, W. J. Leighty, G. H. Logan, R. E. Nelson, C. F. Parrott, R. A. Salzmann and F. R. Troeh; University of Idaho Agricultural Experiment Station: M. A. Fosberg and G. C. Lewis.

## Data and Discussion

### Baldock Series

The Baldock series consists of imperfectly drained, calcareous Alluvial soils that are transitional to Humic Gleys and, to a minor degree, to Solonchaks. They occur in the Sierozem and Brown soil zones and locally within imperfectly drained basin areas. These soils have an  $A_1$ ,  $C_{ca}$ ,  $C_g$  horizon sequence. The surface horizon is medium to moderately fine textured, rather light colored, and moderately calcareous. The subsoil is medium textured and may be underlain at a depth of 2 or more feet by sandy or gravelly alluvium. These soils may range from non-saline to mod-

erately saline or saline-alkali and have a relatively low organic matter content and narrow carbon-nitrogen ratio. The associated soils include the Vanderdasson, Letha and Bowman series.

### Baldock silt loam (57 Ida 2330)<sup>1</sup>

**General site characteristics: Location** — Gem County, Idaho, about 2.3 miles northwest of Letha, 1,200 feet south and 100 feet west of the northeast corner of sec. 33, T. 7 N., R. 3 W. Sample was taken from a pit in a hay field July 24, 1957. **Elevation**—about 2,300 feet. **Topography**—site is in a level, high bottom land or low terrace a few feet above the Payette River. It is in a very shallow basin-like area or swale. The plain slope is less than 0.5 percent. **Drainage**—naturally imperfectly drained; slow surface runoff; permeability is moderate to moderately slow to about 49 inches below which it is very rapid; water table at 60 inches. **Parent material**—medium textured young alluvium of the Payette River and local small intermittent drainages; mostly from granitic, monzonitic, diortic, or other intrusive acid igneous rock sources, but possibly somewhat from basaltic and Idaho-Payette formation sources. **Vegetation**—irrigated alfalfa and grass hay. **Erosion**—nil. **Climate**—mean annual precipitation is about 10.5 or 11 inches; otherwise, it is similar to that in Emmett. **Great soil group**—Alluvial.

#### Profile description:

**A<sub>p</sub>** 0-10 inches. Light-gray to light brownish-gray (1Y6.5/1.5) silt loam; dark grayish brown (1Y4.2/2) when moist; weak thin platy, crushing to weak very fine granular; hard; friable; slightly sticky; slightly plastic; abundant roots; very few reddish-brown soft concretions less than 1 mm. in diameter; moderately calcareous; moist to wet; clear smooth boundary.

**C<sub>1ca</sub>** 10-19 inches. Light-gray (1Y7/1.6) loam or silt loam; grayish brown (1Y4.8/2) when moist; very weak medium platy, crushing to weak fine granular; hard; friable; slightly sticky; slightly plastic; plentiful roots; many fine

pores and few medium ones; calcareous with few fine calcium carbonate veins; moist to wet; clear smooth boundary.

**C<sub>2ca</sub>** 19-27 inches. Light brownish-gray (1Y6/2) loam with few fine faint brown (10YR5/3) mottles; dark grayish brown (1Y4/2) when moist; weak fine granular; few fine nodules of soil material; hard; friable; slightly sticky; slightly plastic; few roots; many very fine and common fine and medium (1-3 mm.) pores; moderately calcareous.

**C<sub>3g</sub>** 27-43 inches. Light yellowish-brown (2Y6/3) loam with few fine distinct dark grayish-brown (10YR4/2) mottles or concretions, dark brown (10YR3/3) when moist; matrix is olive brown (2Y4/3) or dark grayish brown (2Y4/2.5) when moist; very weak fine subangular blocky; hard; friable; slightly sticky; non-plastic; very few roots; many fine and common medium pores; noncalcareous or very slightly calcareous; abrupt smooth boundary.

**D<sub>1g</sub>** 43-49 inches. Light yellowish-brown (2.5Y6/3) fine sandy loam; olive brown (2.5Y4/3) when moist; common fine faint light yellowish-brown (10YR6/4) mottles when dry and exposed to air; when wet in profile, common medium prominent black (N2/0) mottles and lower part has many medium faint olive-brown (2.5Y4/4) and dark yellowish-brown (10YR4/4) mottles; massive; firm; slightly sticky; slightly plastic; very few fine roots; few fine pores; noncalcareous; abrupt smooth boundary.

**D<sub>2g</sub>** 49-67 inches. Light-gray (2.5Y7/2) and pale-yellow (2.5Y7/3) coarse sand; light olive brown (2.5Y5/3) when moist; common medium faint and distinct light yellowish-brown (2.5Y6/4), yellowish-brown (10YR5/4), and dark-gray mottles; when moist, mottles are yellowish brown (10YR5/4); single grain; loose; nonsticky; nonplastic; noncalcareous; abrupt smooth boundary.

**D<sub>3g</sub>** 67 inches plus. Loose gravel.

**Remarks:** This profile is fairly representative of the Baldock soils as mapped in this country. It has a weak A<sub>1</sub>, no B, a moderate strong ca, and mottlings below 20 or 30 inches. If alkali-affected, the sodium decreases with depth. The parent material is less mixed, more acid igneous, and less basaltic than the Baldock soils in the Baker Valley, Oregon. This series was established in Baker, Oregon, 1941.

<sup>1</sup>Sample number.

Table 1. — Chemical characterization and physical analysis of profile Baldock silt loam 57 Ida 2330

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	C1	SO <sub>4</sub>
1	A <sub>p</sub>	0-10	7.65	7.90	1.33	0.29	0.75	0.02	0.00	0.70	0.19	0.38
2	C <sub>1ca</sub>	10-19	7.75	7.95	1.61	0.43	0.79	0.02	0.00	1.21	0.22	0.56
3	C <sub>2ca</sub>	19-27	7.75	7.95	1.03	0.26	0.45	0.01	0.00	1.41	0.13	0.27
4	C <sub>3g</sub>	27-43	7.40	7.50	0.89	0.13	0.38	0.02	0.00	0.91	0.15	0.45
5	D <sub>1g</sub>	43-49	7.45	7.55	1.10	0.66	0.30	0.02	0.00	0.05	0.12	0.17
6	D <sub>2g</sub>	49-67	7.90	7.75	0.77	0.06	0.40	0.01	0.00	0.51	0.09	0.21

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.45	12.81	1.37	1.15	1.27	0.00	20.39	100.0	5.6	10.60	1.91	0.104	10.67
0.45	11.21	1.56	0.71	0.66	0.00	18.49	100.0	3.8	15.83	1.46	0.067	12.69
0.37	11.19	1.17	0.48	0.55	0.00	15.63	100.0	3.1	12.58	0.74	0.037	11.62
0.45	10.30	1.79	0.15	0.39	0.00	13.72	100.0	1.1	1.24	0.21	0.012	10.00
0.35	9.69	1.73	0.16	0.31	0.00	13.25	100.0	1.2	1.16	0.09	0.007	7.14
0.30	2.86	ND	0.02	0.06	0.00	2.76	100.0	0.7	0.44	0.03	0.005	4.00

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.3	5.2	4.5	9.8	9.0	52.7	18.5	sil	ND	ND	12.4	ND
2	0.3	4.7	4.3	10.9	9.4	49.9	20.5	l	41.1	35.2	13.9	
3	0.3	5.5	5.2	13.3	11.5	47.5	16.7	l	36.6	25.7	12.0	
4	0.6	8.4	9.2	18.3	13.3	35.4	14.8	l	28.3	23.0	7.5	
5	0.6	8.4	12.1	23.6	12.4	31.1	11.8	fsl	26.8	ND	6.9	
6	1.5	37.1	34.5	21.5	1.6	2.6	1.2	cos	4.8	3.1	1.2	

<sup>1</sup>Expressed as percent by weight.

### Bowman Series

The Bowman series is a dark-colored, deep, calcareous Humic Gley formed in recent alluvium or lacustrine sediments mostly from granite and related rocks. The horizon sequence is A<sub>1</sub>, G or A<sub>1</sub>, C<sub>g</sub> and/or D<sub>g</sub>. The A horizon is high in organic matter. Mottles are in or immediately below the A<sub>1</sub> horizon. Stratification is common. This series is the poorly drained member of the Jenness-Baldock-Bowman catena. It lies mainly on level stream bottom lands. The modal Bowman loam is nonsaline and has a low amount of exchangeable sodium.

#### Bowman loam (56 Ida 2307)<sup>1</sup>

**General site characteristics:** **Location**—Gem County, Idaho, Gem SCD, 1,230 feet west of the southeast corner of the NE ¼ NE ¼ sec. 23, T. 6 N., R. 2 W.; about 3 miles southwest of Emmett. The sample was taken in a pit from cultivated field July 26, 1959. **Elevation**—about 2,320 feet. **Topography**—sample was taken in a level slope less than 1 percent, slightly concave, low terrace of the Payette River. **Drainage**—naturally poorly drained; very slow surface runoff; permeability of subsoil is moderate and of the underlying material, rapid; water table at 36 inches. **Parent material**—stratified medium and moderately fine-textured young alluvium over sandy alluvium over gravel. Dominantly from intrusive acid igneous rock sources and the quartzic Idaho formation and minor basaltic material. **Vegetation**—irrigated clover and grass. **Erosion**—none. **Climate**—similar to that in Emmett. **Great soil group**—Humic Gley, possibly intergrading to a calcium carbonate Solonchak.

#### Profile description:

A<sub>1p</sub> 0-7 inches. Dark-gray or gray (2.5Y4.5/1) heavy loam; black (2Y2/1) when moist; common fine distinct light-gray (2.5Y6/1) mottles, dark gray (2.5Y4/1) when moist; moderate medium and fine granular; hard friable; slightly sticky; slightly plastic; moderately calcareous; clear, wavy boundary.

A<sub>12ca</sub> 7-10 inches. Dark-gray (2.5Y3.5/1) light clay loam; black (2.5Y1.5/1) when moist; common fine distinct light-gray (2.5Y6/1) mottles, dark gray (2.5Y4/1) when moist; moderate medium and fine subangular blocky; very

<sup>1</sup>The sample number is the identification, date and location of the sample. For example, in the sample number 57 Ida 2330, the 57 refers to the year the sample was collected, e.g. 1957, 23 is the designation for Gem County and 30 denotes sample number within Gem County which corresponds to location numbers in Figure 1.

hard; slightly firm; sticky; plastic; slightly or moderately calcareous; clear, smooth boundary.

C<sub>g</sub> 10-16 inches. Gray (N5.5/0 and 2.5Y5.5/0.5) loam, black (2.5Y2/1) when moist; common fine distinct light olive-brown (2.5Y5/4) and yellowish-brown (10YR 5/4) mottles, dark yellowish brown (10YR3/4) when moist; weak coarse prismatic breaking to moderate thick platy; hard; firm; slightly sticky; slightly plastic; noncalcareous; gradual, wavy boundary.

D<sub>1g</sub> 16-23 inches. Gray (5Y6/1 and 5Y5/1) fine sandy loam; olive gray (5Y5/2 and 5Y4/2) when moist; many medium prominent yellowish-brown (10YR5/4 and 5/6) and strong-brown (7.5YR5/6) mottles, dark yellowish brown (10YR4/4), dark brown (7.5YR4/4), reddish brown (5YR4/4), and dark reddish brown (5YR3/4) when moist; weak very coarse prismatic; very hard; slightly firm; slightly sticky; slightly plastic; noncalcareous; gradual, smooth boundary.

D<sub>2g</sub> 23-28 inches. Light olive-gray (5Y6/2) fine sandy loam; olive gray or olive (5Y4/2.5) when moist; few fine faint olive (5Y6/3) mottles, olive (5Y4/3) when moist; and few fine prominent strong-brown (7.5YR5/6) mottles, dark brown (7.5YR4/4) and dark yellowish brown (10YR 4/4) when moist; weak medium subangular blocky or massive; very hard; slightly firm; slightly sticky; slightly plastic; noncalcareous; clear, smooth boundary.

DG<sub>1</sub> 28-36 inches. Light-gray (N6.5/0) loamy fine sand; bluish gray when moist; massive; hard; firm; non-sticky; nonplastic; noncalcareous; clear, smooth boundary.

DG<sub>2</sub> 36-62 inches. Light-gray (N7/0) sand; gray (N5/0 and 5Y5/0.5) when moist; few fine faint mottles; single grain; loose; nonsticky; nonplastic; noncalcareous; clear, smooth boundary.

D<sub>1</sub> 62 inches plus. Gravel.

**Remarks:** This soil differs from modal Bowman in being less dark in the A<sub>1p</sub> than in the next lower horizon, in having a more mottled subsoil, in not being calcareous deeper, in having moderately coarse-textured material above a depth of 3 feet, and in having extremely acid material below 3 feet. This profile is mildly alkaline except for the extremely acid layer below 3 feet and is 100 per cent base saturated down to this layer. The carbon-nitrogen ratio may be somewhat high. This series was established in Gem County, Idaho, 1960.

Table 2. — Chemical characterization and physical analysis of profile Bowman loam 56 Ida 2307

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1pea</sub>	0-7	7.80	7.65	2.88	0.47	2.59	0.07	0.00	4.03	0.18	1.04
2	A <sub>12pea</sub>	7-10	7.50	7.75	2.49	0.23	3.47	0.04	0.00	4.04	0.11	1.59
3	C <sub>g</sub>	10-16	7.85	7.40	0.89	0.08	2.05	0.01	0.00	1.52	0.07	1.04
4	D <sub>1g</sub>	16-23	7.90	7.30	0.55	0.03	1.25	0.01	0.00	1.05	0.09	0.50
5	D <sub>2g</sub>	23-28	7.40	6.85	2.24	0.14	2.27	0.01	0.00	1.06	0.74	0.44
6	DG <sub>1</sub>	28-36	7.40	7.00	1.71	0.08	1.74	0.02	0.00	0.76	0.12	2.23
7	DG <sub>2</sub>	36-62	3.30	3.50	14.48	5.00	2.30	0.03	0.00	0.00	0.00	21.68

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.81	21.54	0.95	1.91	1.11	0.00	51.15	100.0	3.7	10.60	6.29	.270	13.56
0.91	23.85	0.98	2.22	0.90	0.00	44.56	100.0	5.0	6.64	6.27	.252	14.47
0.75	10.95	0.39	1.05	0.12	0.00	14.19	100.0	7.4	0.97	2.04	.064	18.58
0.50	8.44	0.40	0.32	0.15	0.00	9.29	100.0	3.4	0.00	0.40	.018	13.06
1.29	8.62	0.39	0.08	0.17	0.00	9.49	100.0	0.8	1.06	0.25	.015	9.53
0.97	6.33	0.19	0.00	0.11	0.00	6.49	100.0	0.1	0.64	0.70	0.24	17.04
4.30	1.99	0.10	0.00	0.03	1.28	3.40	62.3	0.0	0.00	0.53	.015	20.40

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.7	2.6	4.0	12.4	5.2	47.9	26.2	1	48.1	38.7	18.5	1.31
2	0.9	2.3	3.9	13.9	7.1	44.3	27.6	cl	53.8	40.7	19.4	1.24
3	0.2	2.4	6.1	25.9	11.8	42.9	10.7	1	36.1	26.8	8.1	1.48
4	0.2	2.4	9.0	44.0	16.1	20.8	7.5	fsl	22.9	13.8	4.7	1.75
5	0.2	1.9	8.1	45.5	17.9	15.4	11.0	fsl	23.3	14.8	4.8	1.73
6	0.1	3.0	11.7	50.8	14.6	13.5	6.3	lfs	21.0	12.9	3.0	1.70
7	0.2	10.7	31.1	49.6	4.0	2.3	2.1	s	6.3	3.9	1.6	1.49

<sup>1</sup>Expressed as percent by weight.

#### Bowman Clay loam (56 Ida 2308)

**General site characteristics:** Location — Gem County, Idaho, Gem SCD, 170 feet east and 930 feet south of the northwest corner of sec. 14, T. 6 N., R. 2 W., about 2 miles west of Emmett. The sample was taken in a pit in a native pasture July 26, 1956. Elevation — about 2,350 feet. **Topography** — sample was taken in a low level terrace of the Payette River where the slope is 1 percent; basin or swale. **Drainage** — naturally poorly drained; very slow surface runoff; permeability of subsoil is moderately slow and of the substratum, rapid. **Parent material** — medium and moderately fine textured young alluvium of the Payette River, mostly from intrusive acid-igneous rock sources and some Idaho or Payette formation wash; it probably includes minor basaltic material. **Vegetation** — timothy hay. **Erosion** — none to very slight. **Climate** — at the Emmett station about 4 miles east of the site, elevation 2,500 feet; has an average annual precipitation of 11.5 inches; the average January temperature is 29.1° F.; the average July temperature is 75° F.; the average annual temperature is 51.4° F.; and the average growing season is 168 days. **Great soil group** — Humic Gley.

#### Profile description:

A<sub>1pea</sub> 0-6 inches. Gray (2Y5.8/1) light clay loam; very dark gray (1Y3.2/1) when moist; weak medium platy, breaking to moderate medium granular; very hard; friable; slightly sticky; plastic; strongly calcareous; clear, wavy boundary.

A<sub>12</sub> 6-10 inches. Dark-gray (1Y4.2/1) light clay loam; black (1Y2.2/1) when moist; few fine faint gray (1Y6/1)

specks, dark gray (1Y4/1) when moist; weak coarse prismatic or massive; very hard; firm; sticky; plastic; moderately calcareous; clear, wavy boundary.

A<sub>13</sub> 10-14 inches. Dark-gray (2.5Y4.4/1) heavy loam; very dark gray (2Y2.8/1) when moist; weak coarse prismatic, breaking to weak medium angular blocky; possibly thin continuous clay films in root channels and pores; very hard; firm; sticky; plastic; noncalcareous; gradual, smooth boundary.

D<sub>1g</sub> 14-24 inches. Light brownish-gray (3Y6/2) and light gray (3Y6/1.4) heavy fine sandy loam; dark grayish brown (3Y4/2) when moist; common fine prominent dark-gray (10YR3/1 and 2.5Y3/1), dark yellowish-brown (10YR 4/4), and yellowish-brown (10YR5/4) mottles, black (2.5 Y2/1) and dark yellowish brown (10YR3/4) and 4/4) when moist; also many medium distinct gray (5Y5/1) and dark-gray (N4/ ) (moist) mottles; few hard black 2 and 3 mm. concretions; very weak coarse prismatic; possibly thin patchy clay films in root channels and pores; many fine soft manganese and iron concretions in lower part; hard to very hard; firm; slightly sticky; plastic; noncalcareous; clear, smooth boundary.

D<sub>2g</sub> 24-27 inches. Yellowish-brown (10YR5/6) and light brownish-gray (3Y6/2) sandy clay loam; dark yellowish brown (10YR4/6) and gray (3Y5/1) when moist; common medium distinct strong-brown (7.5YR5/6) mottles, strong brown (7.5YR4/6) when moist; common fine distinct dark-gray (2.5Y3/1) mottles, black (2.5Y2/1) when moist; massive; hard or very hard; firm; sticky; plastic; clear, smooth boundary.

G<sub>3</sub> 27-34 inches. Light grayish-green (5GY6/1) sandy clay loam; dark grayish green (10GY4/1) when moist; massive; very hard; slightly firm; slightly sticky; plastic; non-calcareous; gradual, smooth boundary.

G<sub>4</sub> 34-39 inches. Gray (5Y5/1 and 6/1) loamy fine sand; dark grayish green (10GY4/1) when moist; massive; hard; very friable; nonsticky; nonplastic; noncalcareous; gradual, smooth boundary.

DG<sub>3</sub> 39-44 inches. Gray (5Y6/1) coarse sand; dark

greenish gray (10Y4/1) when moist; massive; slightly hard; friable; non-sticky; nonplastic; noncalcareous.

**Remarks:** This soil is not modal for the Bowman series because of its lighter colored A<sub>1pen</sub>; its shallow calcareous material; and its acid, highly mottled layer of iron concentration. Its A<sub>1pen</sub> approaches the Baldock series. It compares to the modal in being nonsaline and has low exchangeable sodium percentage and high organic matter in the A<sub>1pen</sub> and A<sub>12ca</sub> horizons.

**Table 3. — Chemical characterization and physical analysis of profile Bowman clay loam 56 Ida 2308**

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1pen</sub>	0-6	7.70	8.10	2.58	0.78	6.27	0.16	0.00	7.10	0.13	0.85
2	A <sub>12ca</sub>	6-10	7.50	7.90	0.90	0.25	3.49	0.03	0.00	3.57	0.12	0.44
3	A <sub>13</sub>	10-14	7.20	7.40	0.37	0.10	1.70	0.03	0.00	1.69	0.10	0.42
4	D <sub>1g</sub>	14-24	6.80	7.20	0.26	0.08	1.05	0.02	0.00	0.86	0.26	0.35
5	D <sub>2g</sub>	24-27	5.90	6.50	0.62	0.10	0.74	0.00	0.00	0.58	0.46	0.28
6	DG <sub>1</sub>	27-34	6.40	7.00	0.30	0.00	0.90	0.02	0.00	0.79	0.32	0.36
7	DG <sub>2</sub>	34-39	7.60	7.60	0.29	0.00	0.94	0.06	0.00	0.56	0.22	0.78
8	DG <sub>3</sub>	39-44	7.75	7.30	0.12	0.00	0.64	0.04	0.00	0.53	0.06	0.36

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.20	15.34	2.12	2.74	1.18	0.00	29.37	100.0	9.3	23.24	6.80	.297	13.30
0.60	17.68	0.97	2.21	0.69	0.00	28.87	100.0	7.7	7.95	4.02	.203	11.53
0.37	13.50	1.39	1.52	0.35	0.00	22.18	100.0	6.9	3.09	1.83	.098	10.92
0.30	11.19	0.99	1.06	0.21	3.83	17.28	77.8	6.1	ND	0.46	.024	11.25
0.21	10.50	0.40	0.87	0.17	11.34	23.28	51.3	3.7	ND	0.85	.031	15.94
0.20	13.73	1.00	0.97	0.22	4.56	20.48	77.7	4.7	ND	0.51	.021	14.24
0.35	5.82	0.40	0.56	0.09	0.00	6.49	100.0	8.6	0.83	0.89	.027	19.26
0.24	3.03	0.40	0.19	0.04	0.00	3.60	100.0	5.3	0.44	0.59	.020	17.25

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.3	1.6	3.0	12.5	8.4	45.4	27.8	cl	51.4	39.6	18.7	1.44
2	0.2	1.1	2.9	16.7	12.4	38.9	27.8	cl	54.8	37.3	17.2	1.36
3	0.1	1.2	4.2	22.9	16.6	29.4	25.6	l	43.5	29.0	12.9	1.55
4	0.4	2.0	4.9	27.5	19.0	28.3	17.9	fsl	31.6	20.7	7.6	1.73
5	0.4	3.1	5.6	26.1	14.0	25.0	25.8	scl	42.7	30.1	13.9	1.66
6	0.1	3.1	4.2	31.6	18.6	19.4	23.0	scl	38.8	24.9	9.8	1.73
7	0.4	6.8	14.3	46.2	14.4	11.8	6.1	lfs	19.6	10.3	3.5	1.67
8	1.5	26.6	28.4	28.4	6.9	4.9	3.3	s	8.8	4.8	2.2	1.63

<sup>1</sup>Expressed as percent by weight.

### Bramwell Series

The Bramwell series comprises light or very light-colored, imperfectly drained, Solodized-Solonetz. The soils have a weak A<sub>2</sub>, B<sub>2ca</sub>, C horizon sequence. They are formed in more or less laminated, calcareous, silt loam or light silty clay loam lake-laid sediments which may be mixed with or include strata of alluvium. They occur in a level or gently undulating low terrace. The series is a member of the Greenleaf-Bramwell catena and is related to the Delco series.

#### Bramwell silt loam (56 Ida 2310)

**General site characteristics:** Location—100 feet south and 500 feet east of the northwest corner of the NE ¼ SW ¼ sec. 2, T. 6 N., R. 3 W., about 8 miles west of Emmett, from a pit, July 27, 1956, in Gem County, Idaho.

**Elevation**—about 2,300 feet. **Topography**—level on a medium terrace. **Drainage**—imperfect with surface runoff slow, subsoil permeability is slow, water table at 48 inches. **Parent material**—silty lacustrine sediments mostly from intrusive acid-igneous rock sources. **Vegetation**—greasewood, *Sarcobatus Vermiculatus*; few saltgrass, *Distichlis stricta*; and foxtail barley, *Hordium jubatum*. **Climate**—has a mean annual precipitation approximately 10 inches and the mean annual temperature about 51° F.

#### Profile description:

A<sub>21</sub> 0-5 inches. Light-gray (2.5Y6.2/1) silt loam; dark gray to dark grayish brown (2Y4/1.5) when moist; moderate thin platy; slightly hard; friable; slightly sticky; slightly plastic; slightly calcareous.

A<sub>22</sub> 5-10 inches. Light-gray (2.5Y6/1) silt loam; dark gray to dark grayish brown (2Y4/1.5) when moist; strong



medium platy; hard; friable; slightly sticky; slightly plastic; moderately calcareous.

B<sub>21ca</sub> 10-19 inches. Light brownish-gray (1Y6.3/2) light silty clay loam; dark grayish brown (1Y4/2.2) when moist; some darker coatings; non-prismatic to weak coarse prismatic, breaking to weak to moderate fine angular blocky; hard to very hard; slightly firm; sticky; plastic; moderately calcareous.

B<sub>22ca</sub> 19-29 inches. Light-gray (2Y6.8/2) light silty clay loam; dark grayish brown (1Y4/2) when moist; common medium and coarse distinct pale-brown (10YR6/3) staining, dark brown (10YR4/3) when moist; common fine and medium distinct white (10YR8/2) lime spots and splotches; light brownish gray when moist; weak fine sub-angular blocky; possibly very weak medium laminated; very hard; slightly firm; sticky; plastic; strongly calcareous. Moderate ca horizon.

C<sub>1ca</sub> 29-39 inches. Light-gray (2Y7.2/2) light silty

clay loam; light olive brown (2.5Y5/3) when moist; common medium and coarse distinct pale brown to very pale brown (10YR6.5/3) staining, brown (10YR5/3) when moist; weak medium laminated, breaking to moderate very fine angular fragments; very hard; firm, sticky, plastic; strongly calcareous.

C<sub>2</sub> 39-60 inches. Light gray (2Y7/1.8) silt loam; grayish brown to light olive brown (2Y5/2.5) when moist; few fine faint pale-brown to very pale brown (10YR6.5/3) stains, brown (10YR5/3) when moist; moderate fine laminated, breaking to moderate very fine angular blocky fragments; very hard; friable; sticky; plastic; moderately calcareous.

D 60 inches plus. Massive silty clay loam.

**Remarks:** This series was established in the Emmett Valley area of Gem County, Idaho, 1949. These are strong alkaline soils due to the high amounts of exchangeable sodium and soluble sodium, carbonates and bicarbonates.

Table 4. — Chemical characterization and physical analysis of profile Bramwell silt loam 56 Ida 2310

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>21</sub>	0-5	8.80	9.40	0.34	0.20	7.76	0.14	0.00	8.32	0.00	1.01
2	A <sub>22</sub>	5-10	9.30	9.70	0.55	0.29	10.62	0.14	2.02	10.88	0.00	1.06
3	B <sub>21ca</sub>	10-19	9.30	9.70	0.77	0.22	15.02	0.28	2.59	11.17	0.00	2.12
4	B <sub>22ca</sub>	19-29	9.10	9.70	0.55	0.15	15.41	0.15	2.33	9.70	1.17	2.06
5	C <sub>1ca</sub>	29-39	8.70	9.60	0.25	0.00	8.18	0.13	1.11	6.08	0.46	1.14
6	C <sub>2</sub>	39-60	8.40	9.25	0.31	0.10	7.95	0.17	0.42	3.11	1.18	0.86

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.32	6.35	1.18	9.63	0.49	0.00	22.38	100.0	43.0	3.55*	1.92	.115	9.70
1.80	2.59	0.57	15.02	0.43	0.00	21.38	100.0	70.3	8.34	0.96	.053	10.53
2.70	2.57	0.98	18.91	0.42	0.00	25.67	100.0	73.7	10.51	0.64	.042	8.86
1.98	2.96	1.18	18.87	0.57	0.00	26.47	100.0	71.3	12.99	0.54	.036	8.78
1.30	4.26	2.20	12.17	0.73	0.00	21.08	100.0	57.7	26.01	0.41	.025	9.44
1.60	6.34	2.59	7.52	0.54	0.00	18.68	100.0	40.3	8.65	0.31	.022	8.09

\*The C<sub>a</sub>CO<sub>3</sub> equivalent on this soil is in error due to the presence of large amounts of Na<sub>2</sub>CO<sub>3</sub>.

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.7	0.7	0.7	3.8	5.2	76.2	12.7	sil	38.3	32.6	11.8	1.64
2	0.2	0.2	0.4	3.0	4.6	73.2	18.4	sil	38.7	32.8	12.9	1.56
3	0.4	0.3	0.4	1.7	3.3	66.9	27.0	sicl	50.9	40.2	18.7	1.80
4	0.1	0.1	0.3	1.9	2.3	66.7	28.6	sicl	61.9	60.4	22.9	1.74
5	0.1	0.1	0.2	0.7	0.5	71.1	27.3	sicl	51.8	39.4	16.7	1.77
6	2.1	3.0	1.2	1.4	1.1	70.6	20.6	sil	40.0	33.1	11.8	

<sup>1</sup>Expressed as percent by weight.

### Brownlee Series

The Brownlee series comprises well-drained, medial Prairie soil developed in residuum from coarse grained granitic type rock. These soils have an A<sub>1</sub>, A<sub>3</sub>, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, C, and D<sub>r</sub> horizon sequence. The textural B horizon contains nearly twice as much clay as the A<sub>1</sub>. They are associated with the Rainey and Ola soils and are related to the Figart and Marsters soils.

#### Brownlee coarse sandy loam (56 Ida 2312)

**General site characteristics:** Location — Gem County, Idaho. The sample was taken from a pit September 24, 1956, along road right-of-way, in natural range area, 65 feet east of fence corner, 900 feet north and 945 feet east of the

south corner of the NW ¼ SW ¼ of sec. 12, T. 8 N., R. 1 E., about 5 miles northeast of Sweet. **Elevation** — about 3,500 feet. **Topography** — narrow ridge top about 100 feet wide and having a gently undulating slope of about 2-5 percent. The sample site has a 3 percent convex slope. A break to a 30-50 percent slope is about 50 feet to the north. A few feet to the south and southwest, the slope breaks to a 12 to 18 percent slope. **Drainage** — good, with surface runoff medium. The permeability of the sub-soil is moderately slow and of the underlying material, moderate to very slow. **Parent material** — residuum from granite or rather similar intrusive acid igneous bedrock. **Vegetation** — comprises mostly cheatgrass, *Bromus tectorum*, and annual weeds. Site has evidence of numerous burns.

Table 6. — Chemical characterization and physical analysis of profile Brownlee loam 56 Ida 2313

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1p</sub>	0-9	6.45	ND	0.80	0.26	0.09	0.21	0.00	1.09	0.13	0.16
2	A <sub>1u</sub>	9-9.1	Not enough sample									
3	A <sub>12</sub>	9.1-13	5.90	ND	0.32	0.19	0.07	0.03	0.00	0.51	0.03	0.03
4	B <sub>1</sub>	13-16	6.00	ND	0.34	0.20	0.07	0.04	0.00	0.52	0.03	0.07
5	B <sub>21</sub>	16-23	5.90	ND	0.52	0.31	0.14	0.09	0.00	0.56	0.04	0.10
6	B <sub>22</sub>	23-35	5.90	ND	0.34	0.15	0.07	0.04	0.00	0.56	0.04	0.0
7	B <sub>23</sub>	35-47	5.55	ND	0.41	0.16	0.12	0.02	0.00	0.57	0.04	0.05
8	B <sub>3</sub> C <sub>1</sub>	47-52										

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N = 1
	Ca	Mg	Na	K	H							
0.44	8.74	1.77	0.08	1.05	1.70	13.34	87.3	0.6	0.00	2.48	.105	13.75
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0.20	8.46	2.18	0.08	0.73	4.85	16.30	70.2	0.5	0.00	1.74	.080	12.61
0.20	7.85	2.58	0.28	0.78	3.38	14.87	77.3	1.9	0.00	0.87	.067	7.52
0.27	8.42	3.17	0.13	0.85	3.82	16.39	76.7	0.8	0.00	0.84	.063	7.71
0.15	9.15	3.78	0.11	0.70	18.28	32.02	42.9	0.3	0.00	0.82	.057	8.40
0.20	8.90	3.18	0.10	0.39	13.92	26.49	47.5	0.4	0.00	0.37	.039	5.46

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	4.3	10.1	5.6	8.0	5.3	50.9	1.58	sil	29.6	28.8	8.1	1.74
2	6.3	10.0	5.2	7.4	5.2	46.0	19.9	l	30.3	ND	ND	1.96
3	3.9	9.1	5.2	7.7	6.1	47.4	20.6	l	31.7	21.7	9.2	1.64
4	6.6	8.2	4.5	6.8	6.0	46.6	21.3	l	29.9	21.4	9.5	1.67
5	4.5	7.9	4.5	6.3	5.1	47.5	24.2	l	31.5	22.2	10.7	1.72
6	6.9	12.0	6.3	8.0	4.7	30.7	31.4	cl	31.7	22.2	12.6	1.90
7	7.2	13.5	7.8	11.7	5.0	27.6	27.2	scl	28.8	19.7	11.2	1.88
8	27.8	28.4	9.3	13.0	2.5	7.8	11.2	cosl	15.7	10.5	5.7	ND

<sup>1</sup>Expressed as percent by weight.

### Chilcote Series

The Chilcote soils are strongly developed Sierozems derived from silty old alluvium or loess-like sediments. They have an A<sub>2</sub>, B<sub>2</sub>, B<sub>3en</sub>, M<sub>en</sub> horizon sequence with a strong increase of clay in the B<sub>2</sub>. These soils are associated with Sebree as a complex, Lanktree and Jenness series and are related to the Power, Purdum, Rekow (slick-spot) and Phyllis series.

#### Chilcote silt loam (57 Ida 2331)

**General site characteristics:** **Location** — sampled July 24, 1957, 8 miles northwest of Emmett, Gem County, Idaho, 300 feet east and 60 feet north of the center of the east half of sec. 7, T. 7 N., R. 2 W. **Elevation** — approximately 2,900 feet. **Topography** — sampling was in a pit in a 200-300 feet wide, lower spur of a broad ridge in a well dissected, rolling upland; total relief in the vicinity is around 100 feet and the site has convex slope to the west of 2 or 3 percent. **Drainage** — good; surface runoff medium; permeability of the B<sub>2</sub> is slow; of the hardpan, very slow; and of the substratum, very rapid with no water table. **Parent material** — possibly the upper few inches are influenced by loess with the rest derived from unconsolidated feldspathic quartzic sands of the Idaho formation, dominantly from quartz monzonite, granodiorite, quartz diorite, and granite sources. **Vegetation** — cheatgrass, *Bromus tectorum* and Medusa-head wild rye, *Elymus caput-medusae*. This area has not been tilled. **Erosion** — slight. **Climate** — annual pre-

cipitation is about 10.5 or 11 inches; otherwise the climate is similar to Emmett.

#### Profile description:

A<sub>1</sub> 0-0.25 inch. Surface has a microrelief of one inch. Vertical cracks as in A<sub>21</sub>. Gray (10YR5/1) silt loam; very dark gray (10YR3/1) when moist; weak very fine granular; slightly hard; very friable; slightly sticky; slightly plastic; very abundant roots; dry when sampled; abrupt irregular boundary. This horizon is not continuous over all barren places and was not sampled.

A<sub>21</sub> 0.25-3.5 inches. Light brownish-gray (10YR6/2.2) silt loam; dark grayish brown (10YR3.6/2.2) when moist; occasional pebble; vertical cracks 0.25 inch wide and 3 to 6 inches apart extend from the surface of the A<sub>1</sub> through this horizon, forming blocky 4 to 6 sided, very thick plates, which break to weak very thin platy, then to very weak very fine granular; slightly hard; friable; slightly sticky; slightly plastic; abundant roots; moderately fine vesicular; some of the vertical cracks are filled with material from the A<sub>1</sub>; few very fine iron and manganese concretions, which are more common in the lower part and which effervesce slightly with hydrogen peroxide; dry when sampled; clear smooth boundary.

A<sub>22</sub> 3.5-7 inches. Light brownish-gray (10YR6.2/2.2) silt loam; dark grayish brown (10YR3.8/2.2) when moist; vertical cracks from the surface of the A<sub>1</sub> extend through this horizon, forming blocky 4 to 6 sided very thick plates, which break to weak thin platy, then to very weak very

fine granular; slightly hard; friable; slightly sticky; slightly plastic; plentiful roots; slightly very fine vesicular; common very fine reddish-brown and black iron and manganese concretions, which effervesce moderately with  $H_2O_2$ ; non-calcareous; dry when sampled; abrupt wavy boundary.

B<sub>1</sub> 7-9 inches. Dominantly grayish-brown (10YR 5.4/2.4) silt loam containing some fine and few medium pebbles; dark brown (10YR3.2/2.8) when moist; some coatings, pockets, and lenses of light brownish-gray (10YR 6/2.2) A<sub>2</sub> material; dark grayish brown (10YR3.8/2.2) when moist; weak medium prismatic, breaking to very weak thin platy; slightly hard; slightly firm; slightly sticky; slightly plastic; plentiful roots; common fine pores; moderate patchy clay films on pore surfaces and thin clay films on vertical and horizontal surfaces; common fine and very fine iron and manganese concretions, which effervesce moderately with  $H_2O_2$ ; non-calcareous; slightly moist when sampled; abrupt wavy boundary.

B<sub>21</sub> 9-17 inches. Brown (10YR4.8/3) heavy silty clay loam; brown (10YR4.2/3) when moist; few very fine pebbles; moderate medium prismatic, breaking to strong medium angular blocky; very hard; firm; very sticky; very plastic; few roots; very few micro pores; moderate continuous dark-brown (10YR3.2/3) clay films on peds; dark brown (10YR3/3.4) when moist; abundant soft fine iron and manganese concretions, which effervesce moderately with  $H_2O_2$ ; non-calcareous; top of horizon has abundant quartz sand grains; slightly moist when sampled; clear wavy boundary.

B<sub>22en</sub> 17-24 inches. Brown (10YR4.8/3) clay containing few very coarse sand and very fine gravel particles; brown (10YR4.2/3) when moist; weak medium prismatic, breaking to moderate medium angular blocky; very hard; firm; sticky; plastic; few roots; very few very fine pores; moderate nearly continuous brown to dark-brown, (10YR4/3) clay films on peds, dark brown (10YR3.5/3) when moist; scattered white large calcium carbonate splotches on peds; light gray (10YR7/2) when moist; moist when sampled; clear wavy boundary.

B<sub>31en</sub> 24-28 inches. Pale-brown (10YR6/3) heavy silt loam; brown (10YR5/3) when moist; weak medium sub-angular blocky; slightly hard; friable; slightly sticky; slightly plastic; few roots; very few micro pores; thin patchy clay

films on pore surfaces; very much white (10YR8/2) calcium carbonate; pale brown (10YR6/3) when moist; moist when sampled; abrupt wavy boundary.

B<sub>32en</sub> 28-30 inches. Pale-brown (10YR6.2/3) loam containing few very fine pebbles; brown (10YR5/3) when moist; moderate fine subangular blocky; hard; firm; slightly sticky; slightly plastic; in places, thick dark-gray (N4/ ) manganese staining on peds, which strongly effervesces with  $H_2O_2$ ; much white (10YR8/2) calcium carbonate; pale brown (10YR6/3) when moist; slightly moist when sampled; abrupt wavy boundary.

M<sub>1en</sub> 30-47 inches. Very pale brown (10YR7/3) indurated calcium carbonate and silica cemented hardpan; yellowish brown (10YR5/4) when moist; contains softer material between the indurated plates, including soil material similar to that in horizon above; no roots; light gray (10YR7.5/2); calcium carbonate lenses light brownish gray (10YR6/2) when moist; dry when sampled; clear wavy boundary. Top of hardpan is glazed with pinkish color, probably from root decomposition.

M<sub>2en</sub> 47-61 inches. Pinkish-gray (7.5YR7/2) and light-gray (10YR7/2) strongly cemented calcium carbonate and silica hardpan; light brown (7.5YR6/3) and grayish brown (10YR5/2.4) when moist; very thick platy and contains a series of 1- to 3-inch thick layers of brown (1Y5/3), friable; strongly calcareous; very faintly cemented coarse sandy loam; no roots; clear wavy boundary.

M<sub>3en</sub> 61-67 inches. Light-gray (10YR7/2) weakly cemented sand and gravel; pale brown (10YR6/3) when moist; cemented by calcium carbonate and silica; many granitic cobbles and pebbles are well disintegrated, and some basaltic ones are partly disintegrated; abrupt wavy boundary.

D<sub>1</sub> 67-76 inches. Loose sand and gravel strongly coated with iron oxides; slightly calcareous with calcium carbonate on lower sides of gravel and possibly some silica.

D<sub>2</sub> 76 inches plus. Loose sand and gravel that is less iron stained than above; noncalcareous.

**Remarks:** This site is fairly representative of the series except for having calcium carbonate in the B<sub>22</sub>. This soil shows evidence of intergrading to a solodized-Solonetz and the same horizons are continuous with the Chilcott and the Sebree.

Table 7. — Chemical characterization and physical analysis of profile Chilcott silt loam 57 Ida 2331

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	C1	SO <sub>4</sub>
1	A <sub>1</sub>	0-0.25	6.10	ND	Not enough sample							
2	A <sub>21</sub>	0.25-3.5	7.00	ND	2.63	1.39	1.19	0.40	0.00	2.68	0.59	2.69
3	A <sub>22</sub>	3.5-7	6.80	ND	0.41	0.39	1.09	0.11	0.00	1.37	0.33	0.20
4	B <sub>1</sub>	7-9	7.40	ND	0.54	0.50	3.51	0.05	0.00	3.79	0.75	0.08
5	B <sub>21</sub>	9-17	7.60	ND	0.61	0.75	7.54	0.04	0.00	2.23	7.61	0.68
6	B <sub>22ca</sub>	17-24	7.80	ND	3.49	2.62	25.61	0.10	0.00	2.11	20.82	9.06
7	B <sub>31ea</sub>	24-28	7.50	ND	18.70	8.13	45.60	0.14	0.00	2.78	31.87	41.21
8	B <sub>32ea</sub>	28-30	7.70	ND	8.12	4.76	32.02	0.05	0.00	2.15	28.26	17.00
9	M <sub>1ea</sub>	30-47	8.10	ND	4.97	2.42	20.24	0.05	0.00	0.98	19.22	8.20
10	M <sub>2ca</sub>	47-61	8.00	ND	2.51	1.74	15.54	0.05	0.00	0.99	14.70	4.14

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.49	.427	12.93
1.40	6.12	2.26	0.02	1.04	ND	15.99	ND	0.1	0.00	1.13	.069	9.57
0.60	6.05	2.36	0.30	0.82	ND	14.81	ND	2.0	0.00	0.64	.038	9.74
1.00	8.14	2.95	1.63	0.57	0.00	21.91	ND	7.4	0.97	0.69	.044	9.09
1.40	18.51	6.12	6.30	0.69	0.00	45.50	100.0	13.9	1.98	0.76	.039	11.28
4.00	20.29	6.94	7.69	0.64	0.00	50.04	100.0	15.4	5.76	0.60	.028	12.50
11.00	35.67	4.39	6.34	0.49	0.00	40.17	100.0	15.8	19.45	0.69	.028	14.29
9.80	16.34	5.12	8.05	0.49	0.00	42.05	100.0	19.1	7.74	0.45	.020	13.50
6.50	9.47	2.76	3.86	0.24	0.00	22.90	100.0	16.9	44.74	ND	.047	ND
4.70	9.57	3.03	4.40	0.14	0.00	27.14	100.0	16.2	30.75	0.55	.025	12.80

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.4	3.0	1.8	5.6	8.2	64.6	15.4	sil	58.8	41.0	13.8	
2	1.5	2.1	1.0	3.7	10.3	69.4	12.0	sil	30.5	28.7	6.9	
3	0.1	3.3	1.2	3.9	11.3	70.9	9.3	sil	27.6	25.9	6.4	
4	1.1	2.1	1.0	3.5	10.1	66.6	15.6	sil	32.5	28.5	9.5	
5	1.2	2.0	1.0	2.5	6.7	47.7	38.9	siel	51.2	43.5	21.6	
6	1.9	3.5	1.6	3.0	5.4	33.9	50.7	c	55.5	50.8	28.2	
7	1.1	3.2	1.8	4.9	8.3	54.2	26.5	sil	52.7	45.9	21.4	
8	4.2	12.0	5.9	12.0	11.9	44.1	9.9	l	41.4	33.1	17.2	
9	19.9	20.4	8.0	14.1	6.5	25.1	6.0	cosl	37.0	28.1	14.8	
10	15.1	19.7	7.5	13.3	11.7	28.2	4.5	cosl	37.6	27.6	13.1	

<sup>1</sup>Expressed as percent by weight.

### Emerson Series

The Emerson series consists of moderately deep and deep, well drained, alluvial soils. It is derived from fairly recent alluvium originating from the Idaho Batholith and Idaho-Payette formations and minor quantities of basalt and rhyolite materials. The alluvium is noncalcareous and micaceous. The series has a weak A<sub>1</sub> or A<sub>p</sub>, C, and D horizon sequence. The subsoil is dominantly moderately coarse textured. This series is the well drained member of the Emerson-Falk-Moulton-Chance catena. In places it is associated with the Wardwell series and is related to the Jenness, Wasatch, Cashmere, and Harpt series.

#### Emerson fine sandy loam (56 Ida 2304)

**General site characteristics:** Location — Gem County, Idaho, 70 feet east and 730 feet south of the northwest corner of the SW<sup>1</sup>/<sub>4</sub>, sec. 34, T. 7 N., R. 1 W.; about 3 miles northeast of Emmett. Elevation — about 2,400 feet. Topography — sample was taken in a level low terrace of the Payette River, July 24, 1956. Drainage — good; permeability of the subsoil is moderately rapid and of the underlying material, very rapid. Parent material — moderately coarse-textured young alluvium of the Payette River and

probably some local alluvium from the Idaho-Payette formations. **Vegetation** — clean-cultivated orchard. **Erosion** — slight. **Climate** — annual precipitation approximately 11 inches.

#### Profile description:

A<sub>p</sub> 0-7 inches. Brown (10YR5.4/2.7) fine sandy loam; very dark grayish brown to dark brown (10YR3/2.5) when moist; weak very fine granular; slightly hard; friable; slightly sticky; nonplastic; noncalcareous; clear smooth boundary.

C<sub>1</sub> 7-15 inches. Brown (10YR5.4/2.7) fine sandy loam; dark brown (10YR3.2/3) when moist; very weak medium and coarse subangular blocky; hard; friable; slightly sticky; nonplastic; noncalcareous; gradual smooth boundary.

C<sub>2</sub> 15-28 inches. Pale-brown to brown (10YR5.5/3.2) fine sandy loam; dark brown (10YR3.5/3) when moist; very weak coarse subangular blocky; hard; friable; non-sticky; nonplastic; noncalcareous; gradual smooth boundary.

D 28 inches plus. Sand and gravel.

**Remarks:** This profile shows slight B development which may be due to stratification. The Emerson series does not have a textural B. Series established in Ada and Elmore Counties, Idaho, 1944.

Table 8. — Chemical characterization and physical analysis of profile Emerson fine sandy loam 56 Ida 2304

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p</sub>	0-7	5.55	5.90	4.80	1.48	0.58	0.28	0.00	0.30	0.14	0.29
2	C <sub>1</sub>	7-15	5.75	6.00	1.96	0.68	0.46	0.14	0.00	0.51	0.15	0.41
3	C <sub>2</sub>	15-28	6.15	6.35	1.82	0.95	0.42	0.07	0.00	0.74	0.14	0.40

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
2.30	5.17	1.25	0.08	0.49	0.66	7.65	91.4	1.1	0.00	1.21	.073	9.64
1.10	5.44	1.33	0.09	0.45	0.70	8.01	91.1	1.1	0.00	1.23	.060	11.90
1.07	6.44	2.11	0.05	0.28	0.00	8.55	100.0	0.6	0.00	0.44	.031	8.16

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.3	11.1	9.1	20.4	14.9	31.7	11.5	fsl	27.2	14.5	5.0	1.44
2	1.9	12.4	9.1	18.7	13.9	31.3	12.7	fsl	28.0	14.7	5.7	1.69
3	0.7	6.4	7.5	24.5	20.4	29.6	10.9	fsl	27.6	12.8	5.3	1.53

<sup>1</sup>Expressed as percent by weight.

#### Emerson fine sandy loam (56 Ida 2316)

**General site characteristics:** Location — Gem County, Idaho, 970 feet south and 520 feet west of the northeast corner of NW ¼ of sec. 9, T. 6 N., R. 1 W., about 1 mile east of Emmett. The sample was taken from a pit in an uncultivated area, September 27, 1956. Elevation — about 2,450 feet. Topography — sample was taken in a level medium river terrace about 40 feet from the terrace edge having a 5 percent slope. Drainage — good. Surface runoff and the permeability of the subsoil is moderately rapid and of the underlying gravel, very rapid. Parent material — moderately coarse-textured over gravel, young to moderately old river alluvium, dominantly from granitic and quartz monzonitic sources and some Idaho-Payette formation materials; possibly includes minor basaltic materials. Vegetation — big sagebrush, *Artemisia tridentata*; rubber rabbitbrush, *Chrysothamnus nauseosus*; and cheatgrass, *Bromus tectorum*. Erosion — slight. Climate — average annual precipitation is 11.5 inches.

#### Profile description:

A<sub>1</sub> 0-0.5 inches. Grayish brown (10YR5.2/2) fine sandy loam; very dark grayish brown (10YR3/2) when moist; weak very thin platy, breaking to weak very fine granular; hard; friable; slightly sticky; nonplastic; very abundant roots; some insect workings; dry when sampled; abrupt smooth boundary.

C<sub>1</sub> 0.5-5 inches. Pale-brown to light brownish-gray (1Y5.5/2.5) fine sandy loam very dark grayish brown to dark grayish brown (10 YR3.4/2.2) when moist; moderate very thin platy, breaking to weak very fine granular; degree of platinness decreases with increase in depth; top of plates are pale brown (1Y5.8/2.8) when dry and dark brown (10YR3.2/3) when moist; bottom of plates are brown (10YR5.2/3) when dry and dark brown (10YR3/3) when moist; hard; friable; slightly sticky; nonplastic; upper inch is slightly vesicular; some moderately large pores; plentiful roots; dry when sampled; clear wavy boundary ranges from 4 to 5 inches in depth.

C<sub>2</sub> 5-12 inches. Brown (1Y5.2/2.8) fine sandy loam; dark brown (10YR3.5/3) when moist; slightly more clay

than above; massive or very weak coarse subangular blocky; hard; friable; slightly sticky; slightly plastic; plentiful roots; slightly moist when sampled; clear wavy boundary. The horizon includes two or more bands ¼ to ¼ inch thick, which are wavy but more or less parallel. In places the two join together. These bands are finer textured, firm, and have moderate continuous clay films. There is no evident A<sub>2</sub> above the bands. In places there seems to be a mass of material similar to the bands occurring in block-like or nodule forms. The material between the bands has many fine and very fine pores but no evident clay films except possibly thin occasional ones in the pores.

C<sub>3</sub> 12-22 inches. Light olive-brown (1.5 2Y5.2/3) fine sandy loam; dark brown (1Y3.8/3) when moist; massive or very weak coarse subangular blocky; friable; slightly sticky; nonplastic; few firm rounded nodules of soil material ¾ to 1 inch in diameter; no clay films except thin occasional ones in pores; many fine and very fine pores; few roots; slightly moist when sampled; clear wavy boundary.

C<sub>4</sub> 22-26 inches. Light olive-brown (2Y5.3/3) fine sandy loam; dark brown (1Y3.8/3) when moist; massive; friable; slightly sticky; nonplastic; few roots; many fine and very fine pores; slightly moist when sampled; abrupt wavy boundary.

D<sub>1ca</sub> 26-35 inches. Brown to pale-brown (10YR5.5/3) cobbly very gravelly sandy loam; dark brown (10YR3.5/3) when moist; massive; very friable; nonsticky; nonplastic; plentiful roots; noncalcareous, except the pebbles are coated with lime on the underside; slightly moist when sampled; abrupt wavy boundary.

D<sub>2</sub> 35 inches plus. Very pale brown (10YR7/3) cobbly very gravelly coarse sand; brown (10YR4/3) when moist; single grain; loose when dry and moist; nonsticky; nonplastic; roots extend to about 40 inches; noncalcareous except pebbles are faintly lime coated on the underside; very slightly moist when sampled.

**Remarks:** This soil has a very weakly to weakly developed textural B horizon in the form of very thin, clayey bands and a very weak ca horizon. Series established in Ada and Elmore Counties, Idaho, 1944.

Table 9. — Chemical characterization and physical analysis of profile Emerson fine sandy loam 56 Ida 2316

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil								
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>2</sub>	Cl	SO <sub>4</sub>	
1	A <sub>1</sub>	0-5	Not enough sample										
2	C <sub>1</sub>	.5-5	6.50	6.60	0.35	0.29	0.08	0.25	0.00	0.41	0.06	0.11	
3	C <sub>2</sub>	5-12	6.70	6.70	0.23	0.48	0.08	0.11	0.00	0.46	0.05	0.08	
4	C <sub>3</sub>	12-22	7.00	7.00	0.21	0.32	0.34	0.03	0.00	0.52	0.06	0.09	
5	C <sub>4</sub>	22-26	7.70	7.30	0.21	0.45	0.78	0.02	0.00	0.90	0.06	0.18	

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.18	.214	14.07
0.32	5.21	2.57	0.51	1.09	0.00	9.59	100.0	5.3	0.00	0.87	.052	9.71
0.20	5.87	3.15	0.25	0.83	0.00	10.69	100.0	2.3	0.00	0.54	.038	8.29
0.20	6.38	3.17	0.55	0.49	0.00	10.49	100.0	5.2	0.61	0.40	.028	8.36
0.35	5.90	2.76	0.60	0.34	0.00	9.89	100.0	6.1	0.71	0.35	.028	7.18

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	3.5	11.5	7.2	25.7	12.0	33.7	6.4	fsl	34.1	16.2	7.2	
2	2.2	10.1	6.1	26.4	14.3	34.2	6.7	fsl	22.9	14.0	4.7	1.45
3	2.8	9.6	5.8	26.7	14.1	32.4	8.6	fsl	23.6	12.8	5.2	1.56
4	2.2	8.1	5.3	28.9	16.0	32.3	7.2	fsl	26.5	12.9	4.9	1.44
5	2.2	8.6	5.8	31.0	16.5	30.8	5.1	fsl	24.4	12.4	4.2	1.48

<sup>1</sup>Expressed as percent by weight.

### Falk Series

The Falk series consists of light-colored, deep, moderately well drained Alluvial soils. These soils are from alluvium derived principally from intrusive acid igneous rocks and the Idaho-Payette formations. The soils have an A<sub>1</sub> or A<sub>p</sub>, C, C<sub>g</sub>, or D horizon sequence. The soils have mottles below 20 inches but have no appreciable textural, structural, or reaction profile. They are commonly stratified, micaceous, noncalcareous, nonsaline, and about neutral in reaction. Between depths of 6 and 20 inches, dominantly the soils are moderately coarse textured. These soils occur in level to very gently undulating bottom lands or very low terraces, and some areas are infrequently overflowed. The series is the imperfectly to moderately well drained member of the Emerson-Falk-Moulton-Chance catena. It is associated with these series and with the Letha and Wardwell series and is related to the Jenness and Notus series.

#### Falk fine sandy loam (56 Ida 2303)

**General site characteristics:** Location — 380 feet north and 120 feet west of the center of sec. 4, T. 6 N., R. 1 W, in Gem County, Idaho. Sampled from pit July 24, 1956. **Elevation** — about 2,350 feet. **Topography** — level on the low terrace of the Payette River. **Drainage** — imperfectly to moderately good; surface runoff slow; permeability of the subsoil is moderately rapid and of the gravel, very rapid; a water table at 3 feet. **Parent material** — young alluvium of

the Payette River. See samples of Emerson. **Vegetation** — irrigated alfalfa, clover, and grass hay. **Erosion** — slight. **Climate** — mean annual precipitation approximately 11 inches and mean annual temperature 51° F.

#### Profile description:

A<sub>p</sub> 0-8 inches. Grayish-brown (1Y5.2/2.2) fine sandy loam; very dark grayish brown (1Y3.2/2) when moist; very weak very fine granular; very friable; nonsticky; nonplastic; abrupt smooth boundary.

C<sub>1</sub> 8-14 inches. Grayish-brown to light brownish-gray (1Y5.5/2) fine sandy loam; dark grayish brown to dark brown or very dark grayish brown (10YR3.5/2.5) when moist; very weak medium and coarse subangular blocky; thin patchy, faintly darker clay films on pores and vertical surfaces; hard; friable; nonsticky; nonplastic; clear smooth boundary.

C<sub>2</sub> 14-25 inches. Light olive-brown (2Y5.2/3) fine sandy loam; dark brown (1Y3.5/3) when moist; very weak coarse subangular blocky; friable; nonsticky; nonplastic; gradual smooth boundary.

C<sub>3g</sub> 25-35 inches. Light yellowish-brown (2.5Y5.7/3) fine sandy loam; olive brown (2.5Y4/3) when moist; many medium distinct light-gray (2.5Y6.5/1) and brown (10YR 5.3) mottles, dark gray (5Y4.5/1) and dark brown (10YR 3/3) when moist; massive; friable; nonsticky; nonplastic.

D<sub>g</sub> 35 inches plus. Sand and gravel.

**Remarks:** This series was established in Gem County, Idaho, 1949.

Table 10. — Chemical characterization and physical analysis of profile Falk fine sandy loam (maximal plus) 56 Ida 2303

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p</sub>	0-8	6.35	6.55	1.06	0.34	0.51	0.11	0.00	0.79	0.11	0.46
2	C <sub>1</sub>	8-14	6.35	6.50	1.70	0.70	0.74	0.14	0.00	0.36	0.37	0.41
3	C <sub>2</sub>	14-25	6.75	6.80	1.81	0.87	0.98	0.10	0.00	0.84	0.48	0.55
4	C <sub>3g</sub>	25-35	6.85	6.85	0.96	0.76	1.32	0.05	0.00	0.59	0.32	0.79

ECx10 <sup>7</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.60	4.12	1.17	0.11	0.36	0.18	5.94	97.0	1.9	0.00	1.26	.070	10.43
1.25	5.31	1.53	0.18	0.55	0.00	7.56	100.0	2.4	0.00	0.52	.041	7.41
1.32	4.53	1.71	0.15	0.31	0.00	6.08	100.0	2.5	0.00	0.38	.029	7.62
1.10	3.47	1.52	0.28	0.17	0.00	4.86	100.0	5.8	0.00	0.24	.018	7.67

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
												1.73
												1.67
												1.72
												1.66

<sup>1</sup>Expressed as percent by weight.

### Figart Series

The Figart series consists of dark-colored, deep, well-drained, Chestnut soils having a medial degree of profile development. The soils are derived from residuum from coarse-grained acid-igneous intrusive rocks of the Idaho Batholith. They have a A<sub>1</sub>, AB, B<sub>2</sub>, B<sub>3</sub>, C<sub>1</sub> and D<sub>7</sub> horizon sequence. The B<sub>2</sub> has about twice as much clay as the A<sub>1</sub> horizon. The soils are related to the Marster, Brownlee, and North Powder series and are associated with the Ola and Rainey series.

#### Figart gravelly coarse sandy loam (57 Ida 2339)

**General site characteristics:** **Location**—sampled from pit September 28, 1957, about 4 miles south of Montour, Gem County, Idaho, 17 feet south of the southwest corner of the Pearl cemetery, 600 feet south and 430 feet west of the southeast corner of the NW ¼ NE ¼, sec. 16, T. 6 N, R. 1 E. **Elevation**—4,500 feet. **Topography**—broad ridge top in hilly uplands with a 7 percent convex slope to the southeast. **Drainage**—good; surface runoff medium; permeability of the B<sub>2</sub> is moderately slow and of the C, moderately rapid to moderate. **Parent material**—residuum from coarse grained quartz monzonite, granodiorite, quartz diorite, or granite. **Stoniness**—none. **Vegetation**—big sagebrush, *Artemisia tridentata*; sandberg bluegrass, *Poa secunda*; and lupine, *Lupinus spp.* **Erosion**—slight. **Climate**—approximately 14 inches of annual precipitation.

#### Profile description:

A<sub>11</sub> 0-5 inches. Grayish-brown (10YR5/1.6) gravelly coarse sandy loam; very dark brown (10YR2/1.6) when moist; weak, thin to very thin platy, breaking to weak to moderate fine and very fine granular; slightly hard; very friable; slightly sticky; nonplastic; abundant fine roots; many very fine pores; dry when sampled; clear smooth boundary.

A<sub>12</sub> 5-9 inches. Grayish-brown (10YR4.6/1.7) coarse sandy loam to slightly fine gravelly loam; very dark grayish brown (10YR2.7/1.7) when moist; very weak coarse sub-angular blocky, breaking to weak fine and very fine granular; slightly hard; friable; slightly sticky; slightly plastic; plentiful fine roots; many very fine pores; dry when sampled; gradual wavy boundary.

B<sub>1</sub> 9-15 inches. Dark grayish-brown (10YR4.4/1.8) heavy coarse sandy loam to slightly fine gravelly loam; very dark grayish brown (10YR3/2) when moist; weak coarse prismatic, breaking to weak to moderate medium angular blocky; very hard; friable; sticky; slightly plastic; plentiful fine roots; many very fine pores; thin nearly continuous clay films on ped and pore surfaces; moist when sampled; clear wavy boundary.

B<sub>21</sub> 15-21 inches. Brown (10YR4.8/3) light coarse sandy clay loam; yellowish brown (10YR4.6/4) when moist; moderate medium prismatic, breaking to moderate medium angular and subangular blocky; extremely hard; firm; sticky; plastic; plentiful roots, most of which follow ped surfaces; few very fine pores; thick continuous brown (10YR5/3) clay films, dark yellowish brown (10YR4/4) when moist; moist when sampled; gradual wavy boundary.

B<sub>22</sub> 21-28 inches. Brown (10YR4.8/3) light coarse sandy clay loam; brown (10YR5/3) when moist; weak very coarse prismatic, breaking to weak medium and coarse sub-angular blocky; extremely hard; firm; sticky; plastic; few fine roots; few very fine pores; moderate continuous brown (10YR5/3) clay films on ped and pore surfaces, dark brown to brown (10YR4/3) when moist; a 0.25 inch band of darker, browner, finer material; moist when sampled; gradual wavy boundary.

B<sub>3</sub> 28-36 inches. Pale-brown (10YR6/3) coarse sandy loam containing splotches or pockets of brown (10YR5/3) loam; when moist, brown (10YR5/3) with splotches of dark brown to brown (10YR4/3); very weak coarse sub-angular blocky to massive; thin patchy clay films; moist when sampled; gradual wavy boundary.

C<sub>1</sub> 36-41 inches. Light yellowish-brown (10YR6/4) light coarse sandy loam containing some light-gray (10YR 7/2) unstained minerals; when moist, yellowish-brown (10YR5/4) with light brownish-gray uncoated minerals; massive; hard; firm; slightly sticky; nonplastic; iron staining; thin patchy clay films on pore surfaces and some sand grains; moist when sampled; gradual wavy boundary.

C<sub>2</sub> 41-50 inches. Pale-brown (10YR6/3) very coarse sandy loam containing much light-gray (10YR7/2) uncoated sand grains and splotches; when moist, brown (10YR5/3) with light brownish-gray (10YR6/2) uncoated

minerals; massive; hard; firm; slightly sticky; nonplastic; moist when sampled; gradual boundary.

C<sub>3</sub> 50-62 inches. Similar to C<sub>2</sub> but heavy loamy coarse sand; more white and light-gray unstained sand grains in pockets; moderately weathered quartz monzonite, granodiorite, quartz diorite, or granite.

D<sub>r</sub> At undetermined depth, bedrock of one of the above named kinds.

**Remarks:** This is modal Figart. This series was proposed in Gem County, Idaho, 1957.

Table 11. — Chemical characterization and physical analysis of profile Figart gravelly coarse sandy loam 57 Ida 2339

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>11</sub>	0-5	6.22	ND	0.86	ND	0.09	0.17	ND	ND	ND	ND
2	A <sub>12</sub>	5-9	6.20	ND	0.68	ND	0.09	0.12	ND	ND	ND	ND
3	B <sub>1</sub>	9-15	6.12	ND	0.73	ND	0.14	0.04	ND	ND	ND	ND
4	B <sub>21</sub>	15-21	6.20	ND	0.67	ND	0.09	0.03	ND	ND	ND	ND
5	B <sub>22</sub>	21-28	6.20	ND	ND	ND	0.28	0.04	ND	ND	ND	ND
6	B <sub>3</sub>	28-36	6.05	ND	0.58	ND	0.09	0.01	ND	ND	ND	ND
7	C <sub>1</sub>	36-41	6.55	ND	0.48	ND	0.10	0.01	ND	ND	ND	ND
8	C <sub>2</sub>	41-50	7.00	ND	0.38	ND	0.13	0.01	ND	ND	ND	ND
9	C <sub>3</sub>	50-62	6.75	ND	0.45	ND	0.17	0.01	ND	ND	ND	ND

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.30	12.43	1.13	0.12	0.91	1.90	16.49	88.5	0.8	0.00	3.47	.164	12.32
0.25	11.91	0.37	0.15	0.95	5.96	19.34	69.2	0.8	0.00	1.86	.098	11.02
0.30	13.33	0.93	0.19	0.84	11.08	26.37	58.0	0.8	0.00	1.10	.080	8.00
0.26	17.22	4.26	0.19	0.72	13.02	35.41	63.2	0.6	0.00	0.74	.070	6.14
0.50	ND	6.45	0.17	0.65	6.92	31.90	78.3	0.6	0.00	0.71	.054	7.59
0.25	16.93	6.24	0.19	0.54	6.57	30.47	78.4	0.7	0.00	0.52	.046	6.52
0.20	17.29	6.87	0.15	0.30	5.53	30.14	81.7	0.5	0.00	0.19	.007	15.71
0.20	19.96	2.32	0.08	0.40	3.93	16.33	75.9	0.6	0.00	ND	ND	ND
0.25	14.02	3.01	0.18	0.12	0.00	15.91	100.0	1.3	0.00	ND	ND	ND

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	14.2	20.2	8.4	13.0	6.1	26.7	11.4	gcosl	22.1	15.9	5.9	
2	12.2	18.3	7.9	13.1	6.8	27.3	14.4	cosl	20.9	14.6	ND	
3	14.6	14.0	7.1	14.2	7.4	23.7	19.0	cosl	22.9	16.7	8.6	
4	17.7	17.0	7.4	13.8	6.1	15.1	22.9	coscl	25.8	19.8	10.7	
5	14.2	16.2	8.3	15.8	7.1	15.4	23.0	coscl	24.5	16.2	10.7	
6	18.9	18.7	8.1	15.9	6.6	14.6	17.2	cosl	23.8	16.5	9.4	
7	18.9	23.7	10.3	17.9	6.0	13.2	10.0	cosl	16.2	11.3	6.9	
8	26.7	24.2	9.3	14.1	5.0	9.0	11.7	cosl	15.4	11.6	5.8	
9	20.3	22.1	10.3	18.0	7.1	15.0	7.2	lcos	14.8	10.9	5.9	

<sup>1</sup>Expressed as percent by weight.

### Gem Series

The Gem series comprises very dark-colored, moderately deep, well-drained Chestnut soils developed in residuum from basalt. These soils have a moderate to strong degree of profile development and have a dark A<sub>1</sub>, AB, moderate to strong textural B<sub>2</sub>, B<sub>3</sub> (or B<sub>3ca</sub>), and a weak or moderate ca over or in a bedrock. The associated or related soil series derived wholly or partly from basalt or other basic igneous residuum are Tripod, Gwin, Bickleton, Morrow, Lorella, Lassen, Ruckles, Waha, Mehlhorn, and Gross.

#### Gem silt loam (57 Ida 2333)

**General site characteristics: Location** — about 6.5 miles

northeast of Emmett, Gem County, Idaho; 400 feet east and 700 feet south of the center of the NE ¼ sec. 10, T. 7 N., R. 1 W. **Elevation** — about 3,500 feet. **Topography** — sampled July 25, 1957, from the bank of a new road toward the upper part of a fairly long moderately steep to steep slope in a hilly upland. The 25 percent slope faces toward the east. **Drainage** — well drained; medium to moderately rapid surface runoff; permeability of the B<sub>2</sub> is slow to moderately slow; of the bedrock, very slow to none. No water table. **Parent material** — residuum from Columbia River basalt bedrock. **Stoniness** — few basalt stones and angular cobbles. **Vegetation** — Medusahead wild rye, *Elymus caput-medusa*; cheatgrass, *Bromus tectorum*; lupine, *Lupinus*



*spp.*; and big sagebrush, *Artemisia tridentata*. **Erosion**—slight. **Climate**—about 13 or 14 inches of precipitation.

**Great soil group**—Chestnut.

**Profile description:**

A<sub>11</sub> 0-0.5 inches. Dark grayish brown (10YR3.6/1.8) silt loam containing a few angular basalt pebbles; very dark brown (10YR2/2) when moist; vertical cracks as in A<sub>12</sub> horizon; moderate very fine granular; hard; friable; slightly sticky; slightly plastic; plentiful roots; few fine pores; dry when sampled; abrupt wavy boundary.

A<sub>12</sub> 0.5-3.5 inches. Dark grayish-brown (10YR4/2) silt loam containing few angular basalt pebbles; very dark brown (9YR2/2) when moist; vertical cracks 0.25 inch wide forming to 6-sided very thick blocky plates 4 to 7 inches across, which break to moderate thin platy, then to moderate fine granular; very hard; friable; sticky; plastic; plentiful very fine roots; few very fine pores; dry when sampled; abrupt wavy boundary.

A<sub>13</sub> 3.5-6 inches. Dark-brown (9YR3.4/2.8) silty clay loam containing few angular basalt pebbles; very dark brown (8.5YR2.2/2.4 to 9YR2.2/2.8) when moist; main vertical cracks from above extend through this horizon and also some secondary vertical cracks 2 inches apart; weak medium platy, breaking to moderate fine subangular blocky, then to moderate very fine subangular blocky or medium granular; hard; firm; sticky; plastic; plentiful fine roots; few very fine pores; dry when sampled; abrupt wavy boundary.

B<sub>1</sub> 6-9 inches. Dark-brown (8.5YR3.7/2) silty clay loam containing few angular basalt pebbles; dark brown (7.5YR3.2/2) when moist; vertical cracks, 0.25 to 0.5 inch wide, form moderate coarse prisms, which break to weak medium, fine, and very fine angular blocky; very hard; very firm; sticky; very plastic; plentiful very fine roots; few micro pores; thin to moderate nearly continuous dark-brown (8YR3.6/2.4) clay films on peds, which are dark brown (7.5YR3/2) when moist; contains streaks and tongues of material similar to that in A<sub>13</sub> extending into this horizon; slightly moist when sampled; clear wavy boundary. Ranges from 0.5 to 4 inches in thickness.

B<sub>21</sub> 9-15 inches. Brown (8.5YR4.2/2.4) heavy silty clay loam containing moderate fine soft pebbles and very coarse sand; dark brown (8YR3.4/3) when moist; vertical cracks as in B<sub>1</sub> horizon form moderate coarse prisms, which

break to moderate fine and very fine angular blocky; very hard; very firm; sticky; very plastic; few very fine roots; very few micro pores; dense; moderate continuous dark-brown (7.5YR3.8/2.3) clay films, dark brown (7.5YR3/3) when moist; slightly moist when sampled; clear wavy boundary.

B<sub>22</sub> 15-20 inches. Brown (9YR4.8/3) heavy clay loam containing moderate angular fine gravel and very coarse sand; dark brown (8YR3.8/3) when moist; weak medium prismatic, breaking to moderate fine angular blocky; very hard; firm; sticky; very plastic; few very fine roots; few micro pores; moderate continuous brown (7.5YR4.2/3) clay films, dark brown (7.5YR3.5/3) when moist; one krotovina of darker material 2 inches in diameter; slight effervescence with hydrogen peroxide; slightly moist when sampled; clear wavy boundary.

B<sub>31</sub> 20-23 inches. Brown (9YR4.5/3) light clay loam containing few fine basalt fragments; dark brown (7.5YR3.8/3.2) when moist; weak medium prismatic, breaking to moderate fine angular blocky; very hard; firm; sticky; plastic; few very fine roots; common very fine pores; thin continuous brown (8.5YR4.2/3) clay films, dark brown (7.5YR3.5/3) when moist; noncalcareous; slightly moist when sampled; abrupt wavy boundary.

B<sub>32ca</sub> 23-29 inches. Brown (9YR4.6/3) loam containing moderate basalt fragments; dark brown (7.5YR3.5/3) when moist; weak medium angular blocky; firm; slightly sticky; slightly plastic; few very fine roots; many very fine pores; thin patchy brown (9YR4.5/3) clay films on peds, dark brown (7.5YR3.5/3) when moist; noncalcareous except moderate calcium carbonate veins; abrupt wavy boundary.

D<sub>rea</sub> 29-34 inches plus. Brown (10YR5/3), olive (5Y5/4), and reddish-brown (5YR4/4) slightly decomposed, slightly disintegrated basalt bedrock; very dark grayish brown (2.5Y3/2), dark grayish brown (2.5Y4/2), olive (5Y4/3), reddish brown (5YR4/4), and black (7.5YR2/1) when moist; some fractures are coated with much calcium carbonate.

**Remarks:** This is modal for the series. This profile is slightly acid down to 20 inches and is 61 to 89 percent base saturated, which increases with increasing depth. The organic matter percentage is high in the surface one-half inch but becomes normal for the series below this depth. The carbon:nitrogen ratio is high. The series was established in Gem County, Idaho, 1939.

**Table 12. — Chemical characterization and physical analysis of profile Gem silt loam 57 Ida 2333**

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	C1	SO <sub>4</sub>
1	A <sub>11</sub>	0-5	6.60	6.80	2.98	1.70	0.65	0.29	0.00	4.12	0.68	1.09
2	A <sub>12</sub>	.5-3.5	6.60	6.90	1.58	0.85	0.21	0.11	0.00	2.67	0.17	0.13
3	A <sub>13</sub>	3.5-6	6.40	7.00	0.62	0.28	0.09	0.03	0.00	0.96	0.09	0.16
4	B <sub>1</sub>	6-9	6.50	7.10	0.58	0.30	0.06	0.03	0.00	1.02	0.08	0.16
5	B <sub>21</sub>	9-15	6.60	7.30	0.70	0.33	0.10	0.02	0.00	1.13	0.09	0.12
6	B <sub>22</sub>	15-20	6.70	7.30	0.51	0.19	0.11	0.00	0.00	0.98	0.09	0.15
7	B <sub>31</sub>	20-23	6.90	7.30	0.51	0.27	0.12	0.00	0.00	0.92	0.09	0.08
8	B <sub>32ca</sub>	23-29	7.40	8.00	0.83	0.22	0.15	0.00	0.00	1.15	0.10	0.05

ECx10 <sup>4</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.01	14.97	4.03	0.06	1.32	13.17	33.55	60.7	0.2	0.00	8.26	.320	15.00
0.61	15.66	4.72	0.73	0.93	11.51	33.55	65.7	2.2	0.00	3.27	.125	15.20
0.24	22.01	6.17	0.11	0.75	10.89	39.93	72.2	0.3	2.07	2.10	.085	14.35
0.24	24.24	6.59	0.11	0.72	11.80	43.46	72.8	0.3	2.11	2.29	.081	16.42
0.24	26.19	6.99	0.13	0.49	11.28	45.08	75.0	0.3	2.27	1.38	.067	11.94
0.20	26.61	6.38	0.11	0.32	8.70	42.12	79.3	0.3	2.28	0.76	.041	10.73
0.20	25.04	5.17	0.15	0.27	5.68	36.31	84.4	0.4	2.23	0.58	.035	9.71
0.31	23.82	4.58	0.06	0.25	3.60	32.31	88.9	0.2	3.55	0.53	.027	11.48

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	4.5	4.7	2.4	8.7	8.6	52.0	19.1	sil	46.5	36.9	15.9	ND
2	2.8	3.2	2.0	8.9	9.5	49.7	23.9	sil	36.0	28.3	14.0	ND
3	1.8	3.1	1.3	5.6	7.9	45.4	34.9	siel	39.6	33.2	19.3	ND
4	1.4	1.9	1.2	6.5	8.3	45.6	35.1	siel	42.5	33.5	18.8	ND
5	2.3	2.0	1.0	4.0	7.3	44.2	39.2	siel	48.7	37.3	20.8	ND
6	2.0	2.3	1.2	5.6	9.8	40.1	39.0	cl	43.2	34.0	17.5	ND
7	2.2	3.1	1.8	7.7	11.8	46.2	27.2	cl	39.7	30.4	15.7	ND
8	3.2	4.2	2.6	11.0	12.8	46.2	20.0	l	37.3	26.7	13.7	ND

<sup>1</sup>Expressed as percent by weight.

#### Gem very stony clay loam (57 Ida 2334)

**General site characteristics:** Location — 11.5 miles north of Emmett, Gem County, Idaho; 2,000 feet north and 1,600 feet east of the southwest corner of sec. 8, T. 8 N., R. 1 W., and sampled July 26, 1957, from a fresh road cut along a new road. Elevation — approximately 3,500 feet. Topography — the site is half way up a moderately steep hill where the total relief is about 200 feet; the slope faces east-southeast. Drainage — good; surface runoff is medium; permeability of the B<sub>2</sub> is slow to moderately slow and of the bedrock, none to very slow; no water table. Parent material — residuum from basalt bedrock. Stoniness — Class 2 of stoniness. Vegetation — mostly Medusa-head wild rye, *Elymus caput-medusa*. Erosion — moderate sheet erosion. Climate — approximately 15 inches of precipitation.

#### Profile description:

Surface has a 2-inch microrelief. In places there is a 0.25 to 0.5 inch horizon of dark-gray A<sub>1</sub>.

A<sub>1</sub> 0-3 inches. Grayish-brown to dark grayish-brown (10YR4.5/1.6) cobbly, gravelly clay loam; very dark grayish brown to very dark brown (10YR2.5/1.8) when moist; vertical cracks, 0.25 inch wide and 2.5 to 6 inches apart, form very thick blocky plates, which break to weak thin platy, then to moderate to strong fine and very fine granular; hard; friable; sticky; plastic; abundant roots; dry when sampled; abrupt wavy boundary.

B<sub>1</sub> 3-5 inches. Dark-brown (9YR3.4/3) cobbly, gravelly clay; similarly colored (10YR3/3) when moist; vertical cracks from A<sub>1</sub> extend through this horizon, forming weak coarse prisms, which break to weak to moderate medium and fine angular blocky; extremely hard; firm; sticky; very plastic; abundant roots; dense; thin patchy clay film on ped and pore surfaces, which are very dark grayish brown to dark brown (9YR3/2) when moist; nearly dry when sampled; abrupt wavy boundary.

B<sub>21</sub> 5-14 inches. Dark-brown (9YR3.5/3) clay containing moderate fine angular gravel; dark brown (10YR 3.2/3) when moist; weak very coarse prismatic, breaking to moderate very coarse angular blocky, then to moderate fine angular blocky; extremely hard; very firm; sticky; very plastic; few fine roots; very dense; moderate continuous dark-brown (8YR3.5/3) clay films on ped and pore surfaces; dark brown (8YR3/3) when moist; upper 2 inches have

more darker brown coatings; moist when sampled; clear wavy boundary.

B<sub>22</sub> 14-20 inches. Similar to B<sub>21</sub> but dark brown (10 YR3/3) inside of peds when moist; contains angular cobbles as well as pebbles; noncalcareous; clear smooth boundary.

B<sub>23</sub> 20-24 inches. Brown (10YR4.4/3) clay containing moderate angular fine gravel and angular cobbles; dark brown to brown (10YR4/3) when moist; strong to moderate medium and coarse angular blocky; extremely hard; very firm; sticky; very plastic; very few fine roots; very dense; moderate continuous dark brown to brown (10YR 4/3) clay films on ped and pore surfaces; dark brown (10YR3.8/3) when moist; noncalcareous; moist when sampled; clear smooth boundary.

B<sub>24ca</sub> 24-27 inches. Brown (10YR4.6/3) clay containing moderate angular fine gravel and angular cobbles; dark brown to brown (10YR4/3) when moist; moderate medium and fine angular blocky; very hard; firm; sticky; plastic; very few fine roots; dense; thin nearly continuous brown (10YR4.4/3) clay films on ped and pore surfaces; dark brown (10YR3.8/3) when moist; slightly calcareous with moderate calcium carbonate veins; moist when sampled; clear irregular boundary.

B<sub>3ca</sub> 27-33 inches. Brown (10YR4.8/3.5) gritty clay loam containing many angular cobbles and stones; dark brown to brown (10YR4/3) when moist; very weak fine subangular blocky; hard; friable; slightly sticky; plastic; very few fine roots; common very fine pores; thin occasional clay films moderately calcareous with many light-gray (10 YR7/2) calcium carbonate veins and splotches; pale brown (10YR6/3) when moist; moist when sampled.

CD<sub>rea</sub> 33-39 inches. Pale-brown (10YR6/3) and light yellowish-brown (2.5Y6/3) moderately well decomposed basalt bedrock; very dark gray (10YR3/1) and yellowish brown (10YR5/4) when moist; some of basalt can be crushed in the hand; slight calcium carbonate in a few cracks in basalt.

**Remarks:** This profile represents much stronger textural development than sample 57 Ida 2333, and has more clay throughout the profile. It also has a higher per cent of cobbly, gravelly material in the upper horizons, and the A<sub>1</sub> is thinner than for the modal soil.

Table 13. — Chemical characterization and physical analysis of profile Gem very stony clay loam 57 Ida 2334

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1</sub>	0-3	7.55	6.50	5.24	0.63	0.12	0.13	0.00	1.68	1.67	0.23
2	B <sub>1</sub>	3-5	6.60	7.45	3.95	0.65	0.16	0.09	0.00	1.07	1.01	0.34
3	B <sub>21</sub>	5-14	7.00	7.40	6.03	1.02	0.32	0.09	0.00	1.66	1.57	0.36
4	B <sub>22</sub>	14-20	7.25	8.00	5.74	0.50	0.53	0.09	0.00	2.45	1.54	0.29
5	B <sub>23</sub>	20-24	7.45	8.30	5.70	0.67	0.60	0.08	0.00	2.14	1.55	0.52
6	B <sub>34ca</sub>	24-27	7.55	8.25	5.49	0.48	0.67	0.07	0.00	2.37	1.49	0.33
7	B <sub>3ca</sub>	27-33	7.45	8.35	2.74	0.11	0.70	0.04	0.00	1.69	2.98	0.73
8	CD <sub>rea</sub>	33-39	7.50	8.35	1.83	0.05	0.98	0.03	0.00	1.71	1.01	0.52

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.25	23.34	1.34	0.13	1.34	3.61	38.73	90.7	0.3	0.00	5.68	.188	17.55
0.35	23.54	1.34	0.11	1.39	2.39	54.42	95.6	0.2	1.91	2.08	.083	14.58
0.20	34.07	1.30	0.21	1.39	3.72	71.86	94.8	0.3	2.30	1.48	.065	13.23
0.30	26.71	1.15	0.40	1.04	2.70	66.71	96.0	0.6	2.39	0.86	.039	12.82
0.30	25.97	0.93	0.39	0.87	2.49	65.28	96.2	0.6	5.29	0.76	.032	13.75
0.30	33.90	0.95	0.48	0.85	2.95	63.56	95.4	0.8	7.63	0.77	.037	12.16
0.45	27.01	0.59	0.72	0.60	2.29	63.47	96.4	1.1	6.87	0.46	.021	12.86
0.40	36.28	0.59	1.34	0.60	2.39	83.10	97.1	1.6	8.13	0.24	.005	28.00

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density	
	VCS	CS		MS		FS	VFS		Si	Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	C		1/10 Atm	1/3 Atm	15 Atm		
1	8.9	5.9	3.2	7.5	6.0	38.6	29.9	gcl	44.9	37.0	18.0	ND	
2	4.2	3.8	2.5	6.2	5.1	32.1	46.1	gc	56.6	45.8	24.8	ND	
3	4.2	2.6	1.4	3.5	3.6	25.6	59.1	c	77.8	59.3	33.3	ND	
4	4.1	2.4	1.4	4.0	4.2	30.3	53.6	c	68.6	56.3	32.0	ND	
5	1.9	1.5	1.1	3.5	4.1	30.2	57.7	c	72.3	57.4	34.0	ND	
6	4.5	2.8	1.3	3.4	4.0	30.3	53.7	c	67.0	54.4	31.0	ND	
7	6.3	8.2	4.2	8.7	8.5	32.8	31.3	cl	56.5	ND	28.0	ND	
8	20.2	19.8	7.6	15.3	9.1	16.3	11.7	grcosl	51.9	42.2	34.5	ND	

<sup>1</sup>Expressed as percent by weight.

### Haw Series

The Haw series comprises moderately dark, deep, well drained, Brown soils derived from unconsolidated coarse sandy fluviatile sediments of the Idaho-Payette formations. In places a thin cover of loess appears to have influenced the upper part of the soil. The soils have an A<sub>1</sub>, A<sub>3</sub>, B<sub>1</sub>, B<sub>2</sub>, B<sub>3ca</sub>, C horizon sequence. The B<sub>2</sub> contains about twice as much clay as the A<sub>1</sub> horizon. The Haw series is associated with the Van Dusen, Payette, Lolalita, and Montour series and related to the Lanktree, Sweet, and Power series.

#### Haw silt loam (57 Ida 2332)

**General site characteristics:** Location—about 4 miles southeast of Emmett, Gem County, Idaho, 1,600 feet south and 1,320 feet east of the northwest corner of sec. 27, T. 6 N., R. 1 W. Elevation—approximately 3,000 feet. Topography—the soil was sampled July 26, 1957, from a pit in a rolling ridge top in a well dissected upland and has a convex slope of 8 percent toward the northwest. Drainage—good; surface runoff medium; permeability of the B<sub>2</sub> is moderately slow, and of the C and D, very rapid. Parent material—unconsolidated coarse sands fluviatile sediments of the Idaho-Payette formations, derived mostly from quartz monzonite, granodiorite, quartz diorite, and granite sources. Vegetation—cheatgrass, *Bromus tectorum*; Sandberg bluegrass, *Poa secunda*; and annual weeds. Erosion—slight. Climate—about 12-13 inches of annual precipitation.

### Profile description:

A<sub>11</sub> 0-1 inch. Grayish-brown (1Y4.8/1.8) silt loam; very dark brown to very dark grayish brown (1Y2.4/1.8) when moist; moderate very fine granular; slightly hard; friable; slightly sticky; non-plastic; very abundant roots; few very fine pores; dry when sampled; abrupt wavy boundary.

A<sub>12</sub> 1-4 inches. Grayish-brown (1Y5/2) silt loam; very dark-grayish brown (1Y2.6/1.8) when moist; weak thin platy, breaking to weak very fine granular; slightly hard; friable; slightly sticky; nonplastic; plentiful roots; few very fine pores; dry when sampled; clear wavy boundary.

A<sub>13</sub> 4-8 inches. Grayish-brown (10YR5/2) silt loam; very dark grayish brown or very dark brown (10YR2.5/1.8) when moist; very weak fine subangular blocky, breaking to moderate fine granular; slightly hard; friable; slightly sticky; slightly plastic; plentiful roots; few very fine pores; dry when sampled; clear wavy boundary.

A<sub>3</sub> 8-12 inches. Grayish-brown (10YR4.8/2) silt loam; very dark grayish-brown (10YR2.6/2.2) when moist; very weak medium prismatic, breaking to weak medium subangular blocky; slightly hard; friable; slightly sticky; slightly plastic; plentiful roots; few very fine and common fine pores; dry when sampled; clear wavy boundary.

B<sub>11</sub> 12-15 inches. Grayish-brown (10YR4.6/2.2; 10YR5/2 crushed) loam; dark brown (10YR2.8/2.7) when moist; very weak medium prismatic, breaking to weak me-

dium subangular blocky; hard; firm; slightly sticky; slightly plastic; few fine roots; many very fine pores; moderate grayish-brown (10YR5.2/2) bleached silt and sand grains on peds, very dark grayish brown (10YR3.2/2) when moist; moist when sampled; clear wavy boundary.

B<sub>12</sub> 15-18 inches. Grayish-brown (10YR4.7/2.4) loam; dark brown (10YR3/2.7) when moist; moderate medium prismatic, breaking to moderate medium subangular blocky; very hard; firm; sticky; slightly plastic; few fine roots; many very fine pores; thin nearly continuous clay films in the channels and thin patchy ones on the ped surfaces; moderate bleached grayish-brown to light brownish-gray (10YR 5.4/2) silt and sand grains on ped surfaces, very dark grayish brown (10YR3.2/2.3) when moist; moist when sampled; clear wavy boundary.

B<sub>21</sub> 18-25 inches. Brown (10YR5/3) light clay loam; dark brown to dark grayish brown (10YR3.8/2.6) when moist; moderate fine prismatic, breaking to weak coarse angular blocky; extremely hard; very firm; sticky; very plastic; few fine roots; few very fine pores; medium nearly continuous clay films on vertical and horizontal surfaces of peds, brown (1Y4.8/2.8) when dry and dark brown (10YR 3.2/2.8) when moist; slight bleached specking on peds; moist when sampled; gradual wavy boundary.

B<sub>22</sub> 25-30 inches. Brown (1Y5.2/3) heavy loam; dark brown to brown (1Y4/2.8) when moist; weak coarse pris-

matic, breaking to very weak coarse angular blocky; very hard; firm; sticky; plastic; very few fine roots; thin nearly continuous brown (10YR5/3) clay films on peds, dark brown (1Y3.8/2.8) when moist; noncalcareous; moist when sampled; gradual wavy boundary.

B<sub>31ea</sub> 30-39 inches. Brown (1Y5.2/3) coarse sandy loam; dark brown to olive brown (1-2Y4/3) when moist; massive; very hard; friable; slightly sticky; slightly plastic; very few fine roots; few very fine pores; slightly calcareous with white (10YR8/1) calcium carbonate veins; moist when sampled; gradual wavy boundary.

B<sub>32ea</sub> 39-49 inches. Light yellowish-brown (2Y6/3) coarse sandy loam; olive brown to light olive brown (2Y 4.5/3) when moist; massive; slightly hard; friable; slightly sticky; nonplastic; very few fine roots; common very fine and fine pores; no visible clay films; slightly calcareous; moist when sampled; clear irregular boundary. Contains pockets of coarser material.

C<sub>1</sub> 49-75 inches. Pale-yellow (2.5Y7/3) coarse sand; light yellowish brown (2.5Y6/3) when moist; single grain; loose; nonsticky; nonplastic; contains very thin, more clayey bands; noncalcareous; clear irregular boundary.

D 75 inches plus. Rounded gravel; coated with calcium carbonate on under side.

**Remarks:** This is modal Haw. Series proposed in Gem County, Idaho, 1957.

Table 14. — Chemical characterization and physical analysis of profile Haw silt loam 57 Ida 2332

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>11</sub>	0-1	6.70	6.85	2.76	1.23	0.16	0.73	0.00	2.94	0.45	0.30
2	A <sub>12</sub>	1-4	6.90	6.95	1.26	0.44	0.18	0.35	0.00	2.06	0.10	0.06
3	A <sub>13</sub>	4-8	6.90	6.90	0.79	0.34	0.34	0.26	0.00	1.24	0.05	0.10
4	A <sub>3</sub>	8-12	6.55	6.80	0.30	0.07	0.18	0.09	0.00	0.45	0.05	0.17
5	B <sub>11</sub>	12-15	6.30	6.60	0.26	0.38	0.28	0.07	0.00	0.43	0.06	0.15
6	B <sub>12</sub>	15-18	6.40	6.65	0.40	0.19	0.45	0.06	0.00	0.69	0.06	0.25
7	B <sub>21</sub>	18-25	6.70	6.90	0.24	0.00	0.62	0.03	0.00	1.03	0.10	0.29
8	B <sub>22</sub>	25-30	6.70	7.00	0.26	0.15	0.65	0.02	0.00	0.63	0.11	0.45
9	B <sub>31ea</sub>	30-39	7.70	8.15	0.18	0.06	0.78	0.01	0.00	0.72	0.16	0.33
10	B <sub>32ea</sub>	39-49	7.90	8.35	0.18	0.15	0.79	0.02	0.00	0.96	0.09	0.12
11	C <sub>1</sub>	49-75	8.30	8.20	0.13	0.05	0.73	0.02	0.00	0.64	0.08	0.19

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.68	9.79	1.88	0.07	1.20	6.41	19.35	66.9	0.4	0.00	5.53	.228	14.12
0.60	7.12	1.76	0.04	1.17	4.59	14.68	68.7	0.3	0.00	1.72	.091	10.99
0.50	6.58	1.97	0.03	1.19	4.62	14.39	67.9	0.2	0.00	1.24	.063	11.43
0.20	7.32	2.19	0.04	1.04	4.09	14.68	72.1	0.3	0.00	0.89	.052	10.00
0.20	7.03	2.56	0.09	0.83	4.07	14.58	72.1	0.6	0.00	0.67	.045	8.67
0.30	6.64	2.18	0.25	0.60	2.62	12.29	78.7	2.0	0.00	0.55	.037	8.65
0.25	11.41	4.00	0.63	0.70	2.32	19.06	87.8	3.3	1.08	0.50	.039	7.44
0.25	9.85	3.79	0.60	0.57	6.25	21.06	70.3	2.9	1.16	0.46	.029	9.31
0.40	7.94	3.59	0.78	0.40	0.00	14.68	100.0	5.3	1.38	0.29	.023	7.39
0.45	5.15	2.19	0.78	0.24	0.00	9.24	100.0	8.4	1.41	0.12	.015	4.67
0.40	3.20	1.00	0.09	0.09	0.00	3.62	100.0	2.5	0.29	0.03	.005	4.00

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	2.2	7.4	4.4	10.4	9.0	53.6	13.0	sil	47.1	30.8	10.1	
2	1.7	8.3	4.0	8.6	10.1	53.5	13.8	sil	31.8	26.4	7.2	
3	1.9	7.1	3.9	8.4	10.6	53.6	14.5	sil	31.7	25.1	7.4	
4	2.0	7.8	3.8	8.0	8.5	55.3	14.6	sil	31.4	23.3	8.5	
5	2.5	9.0	4.7	8.5	9.1	46.9	19.3	l	29.5	22.6	8.7	
6	2.5	9.5	5.2	9.8	10.3	44.9	17.8	l	28.3	21.9	8.1	
7	2.8	9.4	5.5	9.7	8.8	34.6	29.2	cl	35.0	27.6	15.0	
8	3.3	12.1	7.6	11.1	7.8	33.0	25.1	l	31.8	24.1	11.4	
9	7.0	29.5	13.7	11.6	4.5	19.2	14.5	cosl	22.2	17.0	7.1	
10	4.4	31.7	19.2	15.5	4.3	15.4	9.5	cosl	13.8	9.8	4.3	
11	10.3	56.5	20.5	6.9	0.4	2.6	2.8	cos	5.4	4.0	2.2	

<sup>1</sup>Expressed as percent by weight.

### Klingback Series

The Klingback series comprises dark-colored, very deep, well drained, medial Chestnut soils developed from local alluvium and colluvium from basalt and related basic lava rocks. The soils have A<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, and C or (and) D horizon sequence with a textural B-horizon containing about 25 percent more clay as the A<sub>11</sub>. This series occurs on nearly level to moderately steep convex alluvial and colluvial fans. The series is associated with the Gem, Tripod, Squaw, and Gross series and is related to the Jacknife and Newell series.

#### Klingback loam (56 Ida 2322)

**General site characteristics:** **Location**—in Gem County, Idaho, 360 feet north and 100 feet west of the center of the SW $\frac{1}{4}$  sec. 22, T. 8 N., R. 1 E. **Elevation**—about 2,700 feet. **Topography**—sampled in a pit May 2, 1956, in an alfalfa field in the upper part of a high colluvial, local, alluvial fan. The slope was 9 percent, convex, and facing east. **Drainage**—good; surface runoff medium; permeability of B<sub>2</sub> is moderately slow and of C<sub>1</sub>, moderate; no water table influence. **Parent material**—medium-textured local alluvium and colluvium from basaltic sources, although a very few reddish rhyolite cobbles and pebbles are in the lower part along with basalt cobbles and pebbles. **Vegetation**—dryland alfalfa with the steep slope above the alfalfa field having a cover of grass, forbs, and a moderate stand of bitterbrush, *Purshia tridentata*. **Erosion**—slight. **Climate**—approximately 15 inches of annual precipitation.

#### Profile description:

A<sub>1p</sub> 0-5 inches. Very dark grayish-brown to dark grayish-brown (10YR3.5/1.8) heavy loam; very dark brown (10YR1.8/1.8) when moist; upper 2 inches is very weak medium platy, all breaking to moderate fine and very fine granular; hard; friable; sticky; plastic; very abundant roots; clear smooth boundary.

A<sub>12</sub> 5-11 inches. Very dark grayish-brown (10YR 3.2/1.8) heavy loam; very dark brown (10YR1.8/1.8) when moist; strong fine and very fine granular; hard; friable; sticky; plastic; abundant roots; gradual wavy boundary.

B<sub>21</sub> 11-14.5 inches. Brown to dark-brown (8YR4/2.5) clay loam; dark brown (9YR3/3) when moist; very few fine basalt pebbles; very weak medium prismatic, breaking to moderate fine and very fine subangular blocky; thick continuous dark brown (8YR3/2.2) clay films on vertical, horizontal and pore surfaces; very dark brown to dark brown (8YR2.5/2) when moist; upper part has more coatings than the lower part; very hard; firm; sticky; plastic; abundant roots; clear wavy boundary. Moderate tongues of material

similar to that in above horizon extend into this one.

B<sub>22</sub> 14.5-21 inches. Brown to dark-brown (8YR4/2.5) clay loam; dark brown (8YR3/3) when moist; few very fine basalt pebbles; weak medium prismatic, breaking to moderate medium subangular blocky, then to weak fine angular blocky; very hard; firm; sticky; plastic; plentiful roots; few pores up to 1 mm.; thick continuous dark-brown (7.5YR3.2/3) clay films on vertical, horizontal, and pore surfaces; dark brown (7.5YR2.8/2) when moist; few very dark krotovinas; gradual smooth boundary.

B<sub>23</sub> 21-32 inches. Brown (9YR4.5/3) loam; dark brown (8YR3/2.5 to 9YR3/3) when moist; few very fine basalt pebbles; weak very coarse prismatic breaking to moderate medium and coarse subangular blocky; very hard; firm; slightly sticky; plastic; plentiful roots; common pores up to 1.5 mm.; thick continuous brown to dark-brown (9-8YR4/3) clay films on vertical, horizontal, and pore surfaces; dark brown (7.5YR3/2) when moist; gradual smooth boundary.

B<sub>32</sub> 32-41 inches. Brown (10YR4.5/3) loam; dark brown (10YR3.5/3) when moist; few very fine basalt pebbles; weak medium and coarse subangular blocky; hard; friable; slightly sticky; slightly plastic; plentiful roots; common very fine pores; thin continuous brown (10YR4.2/3) clay films on vertical and horizontal surfaces of peds and moderate ones on pore surfaces; dark brown (9YR3/3) when moist; gradual smooth boundary.

B<sub>33</sub> 41-48 inches. Brown (10YR4.6/3) coarse sandy loam; dark brown to dark yellowish brown (10YR3/3.5) when moist; few fine basalt pebbles; weak to very weak very coarse prismatic, breaking to weak coarse subangular blocky; slightly hard; friable; slightly sticky; slightly plastic; plentiful fine roots; moderate pores up to 1 mm.; thin continuous brown (10YR4.4/3) clay films on vertical and horizontal surfaces of peds; dark brown to dark yellowish brown (10YR3/3.5) when moist; clear smooth boundary.

C<sub>1</sub> 48-72 inches. Brown (10YR5/3.2) fine sandy loam containing few cobbles and larger pebbles and moderate fine gravel; dark yellowish brown (10YR3/3.8) when moist; massive; slightly hard; friable; slightly sticky; slightly plastic; few roots; moderate fine pores; no clay films; non-calcareous; clear boundary.

B<sub>2cab</sub> 72-96 inches plus. Brown (10YR5/3) loam; dark yellowish brown (10YR3/3.8) when moist; moderate fine subangular blocky; hard; slightly sticky; slightly plastic; thin clay films on vertical and horizontal surfaces of peds; noncalcareous except for few scattered lime veins.

**Remarks:** This is a modal Klingback except that the ca horizon is too deep. It should begin at a depth of 30 to 36 inches. It has a moderately developed textural and structural B<sub>2</sub>. This series is a tentative series in Gem County, Idaho, 1956.

Table 15. — Chemical characterization and physical analysis of profile Klingback loam 56 Ida 2322

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1p</sub>	0-5	6.05	6.85	0.77	0.14	0.34	0.13	0.00	1.12	0.18	0.02
2	A <sub>12</sub>	5-11	6.25	6.00	0.74	0.14	0.25	0.01	0.00	0.70	0.11	0.30
3	B <sub>21</sub>	11-14.5	6.45	7.60	2.82	0.44	0.47	0.06	0.00	3.60	0.32	0.09
4	B <sub>22</sub>	14.5-21	6.10	6.50	0.88	0.22	0.47	0.00	0.00	0.93	0.12	1.08
5	B <sub>31</sub>	21-32	6.35	6.35	0.92	0.12	0.28	0.03	0.00	0.48	0.24	0.72
6	B <sub>32</sub>	32-41	6.80	7.10	0.31	0.07	0.24	0.03	0.00	0.53	0.18	0.26
7	B <sub>33</sub>	41-48	6.80	7.00	0.52	0.11	0.20	0.02	0.00	0.56	0.14	0.27
8	C <sub>1</sub>	48-72	6.80	6.90	0.24	0.03	0.23	0.03	0.00	0.46	0.17	0.02
9	B <sub>2eab</sub>	72-96	7.20	7.00	0.59	0.09	0.17	0.01	0.00	0.49	0.19	0.07

ECx10	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.30	16.14	2.19	0.26	0.70	10.41	29.70	64.9	0.9	0.00	2.73	.106	15.00
0.25	18.23	0.99	0.78	0.63	12.77	33.40	61.8	2.3	0.00	2.22	.076	16.97
0.70	25.10	0.96	0.21	0.52	15.51	37.30	58.4	0.6	0.00	1.47	.074	11.49
0.25	25.10	3.09	0.45	0.45	3.11	32.20	90.3	1.4	0.00	0.96	.059	9.49
0.15	31.03	3.59	0.91	0.30	11.67	47.50	75.4	1.9	0.00	0.69	.046	8.70
0.20	14.49	1.10	0.24	0.19	3.03	34.80	91.3	0.7	0.00	0.46	.016	15.88
0.25	23.27	2.49	0.48	0.21	0	22.20	100.0	2.2	0.00	0.12	.020	3.50
0.30	21.16	1.90	0.39	0.16	1.10	30.30	77.9	1.3	0.00	0.19	.013	8.46
0.15	24.80	0.09	0.39	0.15	0	35.50	100.0	1.1	2.10	0.60	.016	18.75

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	3.5	6.2	3.7	7.3	8.2	46.5	24.6	l	36.5	27.4	13.2	ND
2	2.0	6.3	4.2	8.5	7.4	46.7	24.9	l	38.4	28.3	15.4	
3	1.9	4.6	3.1	7.5	9.7	41.0	32.2	cl	44.1	34.9	19.5	
4	2.1	5.4	3.9	8.4	10.1	38.0	32.1	cl	46.4		20.8	
5	5.1	8.2	5.0	11.0	12.7	37.0	21.0	l	37.9	23.1	14.5	
6	6.6	9.9	5.6	12.9	14.0	35.9	15.1	l	34.4	24.0	12.2	
7	10.0	16.3	7.2	13.5	13.2	29.8	10.0	cosl	27.1	18.5	9.9	
8	9.6	12.0	6.5	15.2	15.6	32.4	8.7	fsl	27.5	18.0	9.4	

<sup>1</sup>Expressed as percent by weight.

#### Klingback loam (57 Ida 2324)

**General site characteristics:** Location—1,320 feet west and 300 feet south of the northeast corner of sec. 4, T. 7 N., R. 1 W., located south of curve in road to Squaw Butte. Elevation—about 3,000 feet. Topography—sampled May 6, 1957, from a pit in an alluvial fan and colluvial footslope in a mountainous area. The slope of the immediate vicinity of the pit ranges from 7 to 16 percent, facing the southwest. Drainage—good; surface runoff medium; permeability of the B<sub>2</sub> is moderately slow, and of the C<sub>ca1</sub> moderately rapid; no water table influence. Parent material—medium-textured local alluvium and colluvium from basaltic sources. Vegetation—big sagebrush, *Artemisia tridentata*; larkspur, *Delphinium spp*; Medusa-head wild rye, *Elymus caput-medusae*; annual weeds, Sandberg bluegrass, *Poa secunda*; lupine, *Lupinus spp*; and Phlox, *Phlox spp*. Erosion—slight. Climate—approximately 13 to 15 inches of annual precipitation.

#### Profile description:

A<sub>11</sub> 0-2 inches. Dark-gray to dark grayish-brown (10 YR4/1.5) loam; very dark brown (10YR2.2/2) when moist; weak medium platy, breaking to moderate fine granular; very hard; friable; slightly sticky; slightly plastic; abundant roots; abrupt smooth boundary.

A<sub>12</sub> 2-9 inches. Dark-gray to dark grayish-brown (10 YR3.8/1.5) light clay loam; very dark brown (10YR2/2) when moist; strong fine granular; very hard; friable; slightly sticky; slightly plastic; abundant roots; clear smooth boundary.

A<sub>3</sub> 9-14 inches. Very dark grayish brown (10YR 3.4/1.8) clay loam; very dark brown (10YR2/2) when moist; few fine basaltic pebbles and few quartz grains; weak medium prismatic, breaking to moderate medium angular blocky, then to moderate fine granular; very hard; friable; sticky; plastic; abundant roots; clear wavy boundary. Bottom of horizon ranges from 12 to 19 inches.

B<sub>1</sub> 14-20 inches. Brown (9YR5/3) clay loam; dark brown (10YR3.2/3.5) when moist; many fine basalt pebbles and few basalt subangular cobbles; few quartz grains; very weak coarse prismatic, breaking to moderate medium and fine angular blocky; thin continuous dark-brown (9YR 3.5/3) clay films, which are dark brown (9YR3/3) when moist; extremely hard; very firm; sticky; plastic; abundant roots; nonclarcareous; clear smooth boundary. Ranges from 1 to 8 inches thick.

B<sub>21</sub> 20-33 inches. Grayish-brown (9YR5.4/2.3) clay loam; dark brown (10YR3.5/3) when moist; few quartz grains; moderate medium prismatic, breaking to moderate medium angular blocky, then to moderate fine angular

blocky; extremely hard; very firm; very sticky; very plastic; plentiful roots; thick continuous dark grayish-brown (9YR 4/2.4) clay films on vertical and horizontal surfaces of peds; dark brown (10YR3.2/2.8) when moist; noncalcareous; gradual smooth boundary.

B<sub>22</sub> 33-51 inches. Light brownish-gray (9YR6/2) light clay; dark brown (9YR3.4/3) when moist; weak coarse prismatic, breaking to moderate medium, and fine angular blocky; extremely hard; very firm; very sticky; very plastic; thick continuous brown to dark-brown (8YR4/2) clay films on peds, dark brown (9YR3.2/3) when moist; few small lime splotches and veins; plentiful roots; gradual smooth boundary.

B<sub>23ca</sub> 51-61 inches. Light brownish-gray (9YR6/2) clay; dark grayish brown to dark brown (9YR4/2.5) when moist; few fine quartz grains; moderate medium and fine angular blocky; extremely hard; firm; sticky; plastic; few roots; moderate continuous brown to dark-brown (8YR 4/2.5) clay films on peds, dark brown (9YR3.5/3) when moist; many large lime splotches; clear wavy boundary.

B<sub>3ca</sub> 61-82 inches. Light-gray (10YR7/2) and brown

(10YR5/3) clay loam, brown (10YR5/3) and dark brown (10YR4/3) when moist; few fine basalt pebbles and few quartz grains; weak very fine angular blocky; hard; friable; slightly sticky; plastic; very few roots; appears to have thin patchy clay films; abundant lime veins and splotches; abrupt wavy boundary.

C<sub>ca</sub> 82-89 inches. White (10YR8/2) gritty loam, containing a little brown (10YR5/3); pale brown (10YR6/3) and a little dark brown (10YR3/3) when moist; few fine basalt pebbles; massive; friable; slightly sticky; slightly plastic; no roots; abundant lime veins and splotches (strongest lime concentration); gradual wavy boundary.

D<sub>ca</sub> 89-96 inches. Brown (10YR5/3) cobbly and stony loam, dark brown (10YR3/3) when moist; numerous sub-angular cobbles and stones, which are coated with lime 0.5 inch thick; massive; friable; slightly sticky; slightly plastic.

**Remarks:** This profile is similar to 56 Ida 2322 except it has a slightly stronger textural and structural B<sub>2</sub> and a stronger ca horizon than is modal for the series. The ca horizon is at about the common depth.

Table 16. — Chemical characterization and physical analysis of profile Klingback loam 57 Ida 2324

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>11</sub>	0-2	6.15	6.90	0.85	0.15	0.78	0.12	0.00	0.90	0.08	0.29
2	A <sub>12</sub>	2-9	6.60	7.00	2.91	0.41	0.80	0.12	0.00	2.20	0.64	1.51
3	A <sub>2</sub>	9-14	6.35	6.70	2.40	0.40	0.94	0.08	0.00	0.62	0.27	3.13
4	B <sub>1</sub>	14-20	6.55	7.10	1.83	0.27	0.18	0.01	0.00	0.76	0.29	1.13
5	B <sub>21</sub>	20-33	6.80	7.40	1.41	0.21	0.50	0.04	0.00	1.08	0.40	0.16
6	B <sub>22</sub>	33-51	7.50	7.75	0.67	0.13	2.01	0.04	0.00	1.69	0.52	1.91
7	B <sub>23ca</sub>	51-61	7.65	8.50	6.00	1.20	1.82	0.10	0.00	2.36	0.51	5.27
8	B <sub>3ca</sub>	61-82	7.55	8.25	2.21	0.35	4.03	0.05	0.00	1.77	0.66	4.11
9	C <sub>ca</sub>	82-89	7.60	8.00	5.65	0.87	4.59	0.01	0.00	1.37	4.97	4.60
10	D <sub>ca</sub>	89-96	7.40	7.80			Not enough sample					

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.30	15.16	0.07	0.98	1.22	4.70	27.79	83.1	3.5	0.00	2.98	.121	14.30
0.90	12.14	3.66	0.47	1.14	2.30	30.97	92.6	1.5	0.00	1.98	.093	12.37
0.80	14.60	2.06	0.82	0.77	5.60	33.65	83.4	2.4	0.00	1.71	.077	12.99
0.60	14.29	0.67	0.64	0.53	5.70	38.59	85.2	1.7	0.00	0.95	.047	11.91
0.35	23.48	4.88	1.00	0.53	3.90	34.50	88.7	2.9	0.00	0.66	.030	13.33
0.50	15.85	4.39	1.90	0.68	0.00	40.39	100.0	4.7	2.95	0.44	.029	8.97
0.45	17.27	5.28	.57	0.53	0.00	47.71	100.0	5.4	4.91	0.45	.019	13.68
1.40	13.70	2.86	3.05	0.48	0.00	38.42	100.0	7.9	17.61	0.36	.011	19.09
2.20	16.52	1.00	1.10	0.33	0.00	32.00	100.0	3.4	23.36	0.62	.021	17.14
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.33	.015	12.67

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	4.8	6.7	4.2	10.1	9.5	43.0	21.7	l	33.3	30.9	13.4	ND
2	4.8	5.8	3.9	8.5	8.2	41.0	27.8	cl	35.7	33.9	15.6	ND
3	3.0	4.5	3.2	7.2	7.9	42.7	31.5	cl	39.0	36.0	18.6	ND
4	4.5	5.8	3.9	8.1	8.0	35.9	33.8	cl	41.1	37.9	20.0	ND
5	4.5	5.1	3.0	7.0	6.5	38.3	35.6	cl	43.6	38.9	21.9	ND
6	2.4	3.1	2.3	5.5	6.2	38.0	42.5	c	49.6	45.3	25.4	ND
7	1.4	2.6	2.1	5.2	6.2	39.0	43.5	c	51.1	44.2	27.3	ND
8	1.4	4.9	3.7	8.2	6.9	38.1	36.8	cl	45.1	39.0	20.6	ND
9	6.8	11.0	5.4	9.4	7.9	36.0	23.5	l	45.0	40.7	20.9	ND
10	8.4	12.5	6.0	10.3	9.1	36.6	17.1	l	29.1	25.9	17.0	ND

<sup>1</sup>Expressed as percent by weight.

## Letha Series

The Letha series is comprised of light-colored, moderately deep and deep, imperfectly drained, calcareous saline-alkali alluvial soils. These soils are derived from young, micaceous alluvium principally from the Idaho Batholith, Idaho-Payette and related formations. Minor quantities of basaltic and rhyolitic material may be included. The soils have a weak A<sub>1</sub> and A<sub>2</sub>, or A<sub>sp</sub>, B<sub>1</sub>, B<sub>2ca</sub>, C, and D horizon sequence; a fluctuating water table occurs between 20 and 45 inches; a very slight increase of clay as coatings is in the B<sub>2</sub>. The lower substratum may contain coarse sand or gravel at a depth of 20 to 50 inches. These soils occur on level to very gently undulating low terraces and are associated with the Vanderdassen and Baldock soils.

### Letha fine sandy loam (57 Ida 2323)

**General site characteristics:** **Location** — Gem County, Idaho, 500 feet north and 60 feet east of the southwest corner of the NW ¼ sec. 8, T. 6 N., R. 2 W. **Elevation** — about 2,300 feet. **Topography** — the sample was taken May 2, 1957, in a pit in a virgin area in the level, low terrace of the Payette River. The slope is 0.5 percent and mounds up to 6 inches high occur around the greasewood plants. **Drainage** — imperfect; surface runoff slow or very slow; permeability of subsoil is moderately slow and the substratum very rapid; water table at 41 inches. **Parent material** — moderately coarse textured, somewhat old river alluvium, mostly of extrusive acid igneous rock sources, but possibly including some alluvium from basaltic and Idaho-Payette formation sources. **Vegetation** — saltgrass, *Distichlis stricta*; and greasewood, *Sarcobatus vermiculatus*. **Erosion** — slight. **Climate** — approximately 10.5 inches of annual precipitation.

#### Profile description:

A<sub>1</sub> 0-0.5 inches. Light brownish-gray to light yellowish-brown (2.5Y6/2.5) fine sandy loam, dark grayish brown (2.5Y4/2) when moist; weak thin platy, breaking to weak very fine granular; very friable; slightly sticky; nonplastic; slightly calcareous; abrupt wavy boundary.

A<sub>2</sub> 0.5-6 inches. Light gray to pale-yellow (2.5Y 6.6/2.5) fine sandy loam, light olive brown (2.5Y5/3) when moist; very few pebbles; moderate very thin platy, breaking to weak very fine granular; friable; slightly sticky; nonplastic; very abundant roots; slightly calcareous; clear smooth boundary.

B<sub>1ca</sub> 6-11 inches. Light yellowish-brown (2.5Y6/3)

fine sandy loam containing very few pebbles; light olive brown (2.5Y5/3) when moist; weak coarse and medium subangular blocky; hard; friable; slightly sticky; nonplastic; plentiful roots; moderate pores less than 1 mm. in diameter; thin patchy clay films in pores and possibly occasional ones on vertical surfaces; moderately calcareous; clear smooth boundary.

B<sub>2ca</sub> 11-22 inches. Light yellowish-brown (2.5Y6/3) fine sandy loam, very light olive brown (2.5Y5.2/3) when moist; moderate medium subangular blocky; structure is weaker in some places than in others; very hard; firm; slightly sticky; slightly plastic to nonplastic; plentiful roots; few very fine pores; thin continuous dark grayish-brown (1Y 4.2/2.4) moist) clay films or organic coatings on peds and pore surfaces; moderately calcareous; gradual smooth boundary.

B<sub>3ca</sub> 22-27 inches. Similar to B<sub>2</sub> but slightly less clayey and very weak to weak medium subangular blocky.

C<sub>1ca</sub> 27-35 inches. Light yellowish-brown (2.5Y6/3) fine sandy loam, light olive brown (2.5Y5.2/3) when moist; massive; very hard; very friable; slightly sticky; nonplastic; plentiful roots; few very fine pores; slightly calcareous; abrupt smooth boundary.

C<sub>2ca</sub> 35-43 inches. Pale-yellow (2.5Y7/3) fine sandy loam, dark grayish brown to olive brown (2.5Y4/2.5) and grayish brown (3Y4.8/2) when moist; when moist, few medium faint light olive-brown (2.5Y5/3) and dark grayish-brown (10YR4/2) mottles; few very dark olive-gray (7.5Y4/1) streaks around roots; very weak coarse subangular blocky; friable; slightly sticky; slightly plastic; few roots; very slightly calcareous to noncalcareous; abrupt smooth boundary.

D 43-58 inches. Very gravelly very coarse sand; single grain; loose; nonsticky; nonplastic; noncalcareous to very slightly calcareous; between 47 and 50 inches the gravel is strongly coated with manganese oxide. This loose sand and gravelly alluvium consists mostly of intrusive acid igneous rock material but includes possibly some basalt, rhyolite, and sandstone.

**Remarks:** Sample was taken under saltgrass cover 2 to 3 feet from greasewood plants. Entire profile is moderate micaceous. This profile is modal for the series. It is a saline-alkali soil having a weakly developed profile, including a weak A<sub>1</sub>, a weak textural B, and a weak ca. Typically the B<sub>2</sub> is not prismatic. Series was established near Letha, Gem County, Idaho, 1949.

Table 17. — Chemical characterization and physical analysis of profile Letha fine sandy loam 57 Ida 2323

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>1</sub>	0-½	9.10	9.85	0.40	0.10	8.71	0.10	*	*	0.27	0.21
2	A <sub>2</sub>	½-6	9.35	9.60	0.30	0.06	4.81	0.07	*	*	0.23	1.49
3	B <sub>1ca</sub>	6-11	9.65	10.00	0.21	0.03	5.67	0.07	*	*	0.32	0.72
4	B <sub>2ca</sub>	11-22	10.35	9.90	0.12	0.02	23.08	0.13	*	*	1.24	2.00
5	B <sub>3ca</sub> sa	22-27	10.20	10.00	0.31	0.07	62.93	0.01	*	*	2.51	3.47
6	C <sub>1ca</sub> sa	27-35	ND	9.85	0.20	0.05	11.10	0.12	*	*	0.80	2.64

\*Carbonates and bicarbonates were not run due to the dark color of the extract.

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.45	3.52	0.10	7.38	2.74	0.00	9.10	100.0	81.1	0.00	1.08	.075	8.27
1.50	3.21	0.19	6.92	2.24	0.00	9.60	100.0	72.1	1.48	0.33	.025	7.60
1.70	3.12	0.10	10.23	0.88	0.00	11.40	100.0	89.7	2.72	0.25	.027	5.19
4.00	2.59	0.10	11.49	0.25	0.00	13.81	100.0	83.2	2.38	0.17	.025	4.00
3.00	9.19	0.10	14.46	0.16	0.00	12.20	100.0	99.0	2.09	0.02	.012	1.67
0.40	2.96	0.10	11.29	0.13	0.00	12.20	100.0	92.5	1.64	ND	ND	ND



No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.1	6.1	10.4	24.6	13.7	39.1	5.0	fsl	27.7	12.7	4.3	
2	0.5	5.3	10.1	24.9	14.0	38.4	6.8	fsl	24.6	11.0	3.8	
3	0.5	5.8	11.2	25.2	23.0	28.5	5.8	fsl	23.6	16.3	4.2	
4	0.4	6.7	13.5	27.6	12.0	31.8	8.0	fsl	25.4	17.4	5.1	
5	0.6	8.8	17.3	32.2	11.0	24.4	5.7	fsl	24.2	15.6	4.5	
6	0.9	7.7	16.1	26.9	9.7	31.4	7.3	fsl	29.3	20.4	5.5	
7	44.7	43.5	4.8	3.1	0.7	1.9	1.3	vgvcos	ND	ND	ND	

<sup>1</sup>Expressed as percent by weight.

#### Letha fine sandy loam (56 Ida 2309)

**General site characteristics:** **Location**—320 feet west and 1,050 feet north of the southeast corner of NE ¼ sec. 16, T. 6 N., R. 2 W., about 3.5 miles southwest of Emmett in Gem County, Idaho. **Elevation**—about 2,300 feet. **Topography**—sampled July 26, 1956, from pit in a level low terrace of the Payette River. **Drainage**—imperfect; slow surface runoff; permeability of the subsoil and of the substratum is very rapid. **Parent material**—moderately coarse textured gravel of young alluvium from the Payette River, derived mostly from intrusive acid igneous rock sources and minor basaltic material. **Vegetation**—greasewood, *Sarcobatus vermiculatus*; saltgrass, *Distichlis stricta*. **Erosion**—slight. **Climate**—approximately 11 inches of annual precipitation.

#### Profile description:

**A<sub>1</sub>** 0-6 inches. Grayish-brown (2Y5.4/2) fine sandy loam; very dark grayish brown (1Y3.2/2) when moist; very weak very thin platy or massive; slightly hard; friable; slightly sticky; nonplastic; plentiful roots; noncalcareous; gradual, smooth boundary.

**B<sub>1</sub>** 6-11 inches. Light brownish-gray (1Y5.7/2) fine sandy loam containing few gravels; dark grayish brown to dark brown, very dark grayish brown, or olive brown (1Y 3.5/2.5) when moist; massive; slightly hard; friable; slightly

sticky; nonplastic; plentiful roots; very slightly calcareous; abrupt, smooth boundary.

**B<sub>21ca</sub>** 11-13 inches. Light yellowish-brown to light olive-brown (2Y5.5/3) fine sandy loam containing very few pebbles; olive brown (2Y3.8/3) when moist; very weak medium and fine prismatic, breaking to weak to moderate medium angular blocky; very hard; friable; slightly sticky; nonplastic; plentiful roots; slightly darker thin clay films; slightly calcareous; clear smooth boundary.

**B<sub>22cngsa</sub>** 13-19 inches. Pale-brown (1Y6/3) fine sandy loam, brown (1Y4.2/3) when moist; common large faint light brownish-gray to light yellowish-brown (2Y6/2.5 dry) mottles; weak medium and coarse subangular blocky; very hard; friable; slightly sticky; nonplastic; plentiful roots; moderately calcareous; smooth boundary.

**B<sub>3ca</sub>** 19-24 inches. Light yellowish-brown (2Y6/3) light fine sandy loam; olive brown (2Y4/3) when moist; weak coarse subangular blocky; very hard; very friable; nonsticky; nonplastic; few roots; slightly calcareous; gradual smooth boundary.

**D** 24 inches plus. Clean quartz sand and granitic gravel. Very few pebbles to 24 inches.

**Remarks:** This soil is not representative of the Letha series. It is more nearly like the Wardwell series. It differs from the Letha series in having a darker, noncalcareous A<sub>1</sub> and a stronger textural B. However the parent material was stratified. The B<sub>1</sub> has many characteristics of an A<sub>2</sub>.

Table 18. — Chemical characterization and physical analysis of profile Letha fine sandy loam 56 Ida 2309

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>2</sub>	Cl	SO <sub>4</sub>
1	A <sub>1</sub>	0-6	8.95	9.20	0.37	0.06	3.71	0.08	0.24	3.40		0.56
2	B <sub>1</sub>	6-11	9.80	9.65	0.29	0.38	8.83	tr	1.23	7.10		1.08
3	B <sub>21ca</sub> sa	11-13	10.30	10.00	0.22	0.37	29.52	tr	16.71	13.01		2.15
4	B <sub>22cng</sub> sa	13-19	10.30	9.95	0.29	0.06	24.22	tr	16.00	9.31		1.34
5	B <sub>3ca</sub> sa	19-24	10.20	9.90	0.27	0.06	22.52	tr	12.81	9.88		1.64

<sup>1</sup>Chlorides were not determined on profile due to highly colored extract.

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.22	3.49	0.39	3.88	1.79	0.00	8.89	100.0	43.6	0.85	0.82	.046	10.41
2.80	1.62	0.06	6.92	0.81	0.00	8.29	100.0	83.5	0.96	0.34	.021	9.29
8.20	0.88	0.56	11.80	0.47	0.00	13.79	100.0	85.6	1.35	0.35	.020	10.15
7.50	1.49	0.19	8.58	0.27	0.00	10.89	100.0	78.8	5.01	0.31	.018	10.11
7.00	1.72	0.19	9.55	0.17	0.00	9.09	100.0	99.0	2.76	0.16	.010	9.10

No.	VCS	Particle size distribution (mm) (percent)					C	Texture	Moisture properties <sup>1</sup>			Bulk Density
		CS	MS	FS	VFS	Si			Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	2.7	6.4	7.6	24.0	14.0	41.9	3.4	fsl	25.9	14.2	3.8	1.64
2	4.9	6.3	8.2	26.6	16.0	29.6	8.4	fsl	25.0	13.6	3.5	1.56
3	2.9	4.9	8.2	28.9	14.4	29.5	11.2	fsl	26.7	16.3	6.9	1.80
4	2.4	4.9	9.9	34.8	16.5	19.2	12.3	fsl	27.4	15.9	6.0	1.74
5	2.6	6.2	13.6	39.3	15.5	11.4	11.4	fsl	21.9	12.7	4.6	1.77

<sup>1</sup>Expressed as percent by weight.

### Marsters Series

The Marsters series consists of dark-colored, deep, well-drained, Prairie soils formed in residuum of coarse-grained intrusive acid-igneous rocks of the Idaho Batholith. The soils have an A<sub>1</sub>, AB, B<sub>2</sub>, BC and D<sub>r</sub> horizon sequence with nearly twice as much clay in the B<sub>2</sub> horizon as in the A<sub>1</sub>. They are associated with the Ola and Rainey series and related to the Brownlee, Moscow and Figart soils.

#### Marsters gravelly loam (57 Ida 2340)

**General site characteristics:** **Location**—about 6 miles northeast of Ola in Gem County, Idaho, 840 feet north and 20 feet west of the center of the NW¼ sec. 32, T. 11 N., R. 2 E., on west side of road and 155 feet south of gate into field. **Elevation**—about 4,100 feet. **Topography**—the soil was sampled October 8, 1957, near the top of a 14 percent east-facing convex slope in a rolling to hilly upland with total relief of the vicinity being about 100 feet. **Drainage**—good; medium to moderately rapid surface runoff; permeability of the B<sub>2</sub> is moderately slow and of the C, rapid. **Parent material**—residuum from coarse-grained intrusive rocks of the Idaho Batholith; probably of quartz monzonite or granodiorite and possibly quartz diorite or granite. **Stoniness**—few stones. **Vegetation**—Bulbous bluegrass, *Poa bulbosa*; arrowleaf balsamroot, *Balsamorhiza sagittata*. **Erosion**—Slight to moderate. **Climate**—approximately 21 or 22 inches of annual precipitation.

#### Profile description:

A<sub>1</sub> 0-5 inches. Dark grayish-brown (10YR4.4/2.4) fine gravelly loam; very dark grayish brown (8YR2.8/2.2) when moist; moderate thin platy, breaking to moderate fine and very fine granular; slightly hard; friable; slightly sticky; slightly plastic; abundant fine roots; many very fine pores; moist when sampled; clear smooth boundary.

A<sub>3</sub> 5-9 inches. Brown (10YR5/3) loam that is slightly gritty; dark brown (8YR3.2/2.5) when moist; weak medium and fine subangular blocky, breaking to moderate fine granular; hard; friable; slightly sticky; slightly plastic; abundant fine roots; many very fine pores; thin patchy brown (10YR4.8/2.8) clay films on ped and pore surfaces, dark brown (7.5YR2.8/2) when moist; slight light-gray (bleached) silty specking on vertical surfaces in lower part; dry when sampled; clear smooth boundary.

B<sub>1</sub> 9-16 inches. Brown to yellowish-brown (8-9YR 5/4) loam that is slightly gritty; reddish brown to dark brown (6YR3.4/4) when moist; weak medium prismatic, breaking to weak to moderate medium subangular blocky; hard; friable; sticky; plastic; plentiful fine roots; many very fine pores and common fine pores; moderate, nearly continuous brown (8YR4.8/3) clay films on ped and pore surfaces, which are dark brown to dark reddish brown (6.5YR3.4/3.2) when moist; slight to moderate light-gray (bleached) silty specking on vertical surfaces; two krotovinas 3 to 5 inches across of darker material; dry when sampled; clear smooth boundary.

B<sub>21</sub> 16-21 inches. Brown (7.5YR5.2/4) light clay loam that is slightly gritty; reddish brown to dark reddish brown to dark brown (6YR3.5/4) when moist; weak medium prismatic, breaking to moderate fine angular and subangular blocky; very hard; sticky; plastic; few fine roots; common very fine pores and few fine pores; moderate to thick, continuous, brown (7.5YR4.8/3.8) clay films on ped and pore surfaces, which are dark reddish brown (5YR3.2/3.8) when moist; slight to moderate light-gray (bleached) silty specking on vertical surfaces; krotovinas as in B<sub>1</sub>; dry when sampled; clear wavy boundary.

B<sub>22</sub> 21-25 inches. Brown (7YR4.8/4) sandy clay loam marginal to loam; reddish brown to dark reddish brown to dark brown (6YR3.5/4) when moist; moderate medium angular and subangular blocky; very hard; sticky; plastic; few fine roots; firm; common very fine pores; moderate to thick, continuous, brown to reddish brown (6.5YR4.5/3.5) clay films on ped and pore surfaces, which are dark reddish brown (5YR3.2/3.8) when moist; very slight light-gray (bleached) silty specking on vertical surfaces; slightly moist when sampled; clear wavy boundary.

B<sub>3</sub> 25-36 inches. Reddish-brown to brown (6YR5/4) gravelly coarse sandy loam; reddish brown (6.5YR4/4) when moist; weak coarse angular blocky; firm; slightly sticky; slightly plastic; few fine roots; few very fine pores; thick, continuous, reddish-brown to brown (6YR4.8/4) clay films on vertical ped and pore surfaces and moderate, continuous ones on horizontal ped surfaces, which are dark reddish brown (5YR3.2/3.8) when moist; in places, much very dark gray manganese coating on peds; many medium and coarse spots of pink (7.5YR7/4 moist) and very pale brown (10YR7/4 moist) well decomposed granitic fragments; slightly moist when sampled; clear smooth boundary.

BC 36-55 inches. Brown to strong-brown (7YR4.5/5) coarse sandy loam, mostly well decomposed granite or related rock with clay films running down the principal vertical cracks; brown to strong brown (7.5YR5/5 and 4/5) when moist; massive or very weak very coarse angular blocky; firm; slightly sticky; slightly plastic; no roots; few very fine pores; thin to moderate continuous reddish-brown to yellowish-red (5YR4.5/5) clay films on main vertical and channel surfaces, which are slightly darker (5YR4/5) when moist; slightly moist when sampled; gradual smooth boundary.

C<sub>1</sub> 55-65 inches. Brown to light-brown to reddish-yellow (7.5YR5.5/5) stained coarse sandy loam, strongly weathered, unconsolidated, disintegrated granite or related rock; brock to strong brown (7.5YR5/5) when moist; few unstained or faintly stained pink sand (feldspar) grains; massive or very weak very coarse angular blocky; hard; firm; slightly sticky; slightly plastic; no roots; common very fine pores; moderate continuous dark reddish-brown (5YR 3/4 moist) clay films on main vertical ped surfaces and thick continuous ones in channels; slightly moist when sampled; diffuse boundary.

C<sub>2</sub> 65-72 inches. Light-brown (7.5YR6/4 and 6/5) stained loamy coarse loam containing moderate pinkish-white (7.5YR8/2) unstained feldspar and quartz grains, moderately weathered disintegrated granite or related rock; when moist, brown to strong-brown (7.5YR5/5) stained sand grains and pinkish-gray (7.5YR7/2) unstained sand grains; massive; firm; slightly sticky; nonplastic; moderate patchy clay films in some channels; slightly moist when sampled; diffuse boundary. Auger sample.

C<sub>3</sub> 72-80 inches. Similar to C<sub>12</sub>. Auger sample.

C<sub>4</sub> 80-90 inches. Light-brown (7.5YR6/4) stained loamy coarse sand containing moderate pinkish-white (7.5YR8/2) unstained sand grains, moderately weathered disintegrated granite or related rock; brown to strong brown (7.5YR5/5) when moist, with pinkish-gray unstained sand grains; moderate mica (muscovite); massive. Auger sample.

D<sub>r</sub> Bedrock at undetermined depth.

**Remarks:** This is modal Marsters. Series proposed in Gem County, Idaho, 1957.

Table 19. — Chemical characterization and physical analysis of profile Marsters gravelly loam 57 Ida 2340

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>2</sub>	Cl	SO <sub>4</sub>
1	A <sub>1</sub>	0-5	5.85	ND	1.11	ND	0.20	0.22	ND	ND	ND	ND
2	A <sub>3</sub>	5-9	6.05	ND	0.93	ND	0.06	0.13	ND	ND	ND	ND
3	B <sub>1</sub>	9-16	6.05	ND	0.73	ND	0.05	0.04	ND	ND	ND	ND
4	B <sub>21</sub>	16-21	5.80	ND	0.76	ND	0.08	0.01	ND	ND	ND	ND
5	B <sub>22</sub>	21-25	6.00	ND	0.42	ND	0.16	0.01	ND	ND	ND	ND
6	B <sub>31</sub>	25-36	5.90	ND	0.37	ND	0.09	0.01	ND	ND	ND	ND
7	BC	36-55	5.90	ND	0.41	ND	0.17	0.01	ND	ND	ND	ND
8	C <sub>1</sub>	55-65	5.90	ND	0.38	ND	0.21	0.01	ND	ND	ND	ND
9	C <sub>2</sub>	65-72	6.05	ND	0.39	ND	0.27	0.01	ND	ND	ND	ND
10	C <sub>3</sub>	72-80	6.15	ND	0.34	ND	0.22	0.01	ND	ND	ND	ND
11	C <sub>4</sub>	80-90		ND								

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.35	6.86	0.27	0.11	0.72	11.71	19.67	40.5	0.7	0.00	3.65	.158	13.42
0.25	8.35	1.45	0.19	0.77	7.32	18.08	59.5	1.1	0.00	1.74	.096	10.52
0.20	8.47	2.42	0.08	0.49	7.25	18.71	61.3	0.5	0.00	1.22	.071	10.00
0.20	13.43	0.03	0.08	0.37	11.61	25.53	54.5	0.4	0.00	0.93	.056	9.64
0.15	13.78	0.48	0.11	0.17	7.39	21.93	66.3	0.6	0.00	0.62	.043	8.37
0.15	14.46	2.87	0.28	0.12	6.21	23.94	74.1	1.2	0.00	0.71	.030	13.67
0.15	16.88	2.72	0.27	0.05	0	18.17	100.0	1.6	0.00	0.55	.023	13.91
0.20	7.41	1.10	0.24	0.05	2.17	10.97	80.2	2.4	0.00	0.34	.022	9.09
0.20	6.14	0.79	0.11	0.13	3.71	10.88	65.9	1.3	0.00	0.22	.014	9.29
0.15	4.82	0.82	0.02	0.13	1.95	7.74	74.8	1.7	0.00	0.14	.011	7.27

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	6.2	12.1	8.3	15.0	7.6	35.4	16.4	gl	30.2	22.0	7.8	ND
2	5.8	11.2	6.5	13.5	7.5	35.1	20.4	l	25.2	18.3	8.5	
3	6.8	9.9	6.5	13.0	7.5	34.0	22.3	l	25.4	18.7	9.3	
4	6.2	9.5	5.6	11.5	6.5	32.2	28.5	cl	26.0	21.0	11.9	
5	7.1	13.9	6.8	13.8	6.4	27.6	24.4	scl	22.9	20.9	11.3	
6	9.8	20.9	10.6	23.0	7.0	13.9	14.8	gcsl	21.9	17.6	11.6	
7	8.0	25.6	13.1	22.8	6.9	12.9	10.7	cosl	20.4	13.8	7.9	

<sup>1</sup>Expressed as percent by weight.

### Montour Series

The Montour series is a dark-colored, deep, well drained, clayey grumusolic Chestnut soils developed in rolling uplands over stratified sediments of the Payette Idaho formation. It is not definitely known if the high clay content is formed from these sediments or if they have been influenced by volcanic ash and tuff. When dry, one-half to one inch cracks form which receive sluffed material from above; but evidence of churning is slight. This soil is associated with the Sweet and Haw series, but has a more clayey surface soil and cracks open more than in either of them. It is also related to the reddish colored clayey Aikman series.

### Montour clay loam (56 Ida 2314)

**General site characteristics:** **Location** — in Gem County, Idaho, 800 feet west and 200 feet north of the southeast corner of NE ¼ of sec. 10, T. 7 N., R. 1 E, about 2 miles southeast of Sweet. **Elevation** — about 2,800 feet. **Topography** — sampled September 26, 1956, in undulating convex ridge top, near the center of the lowest flat on a spur ridge about 75 feet above the drainage way. The slope on the ridge top is about 5 percent, and that on the side slopes is 22 percent. The ridge top is approximately 100 feet wide. **Drainage** — good; surface runoff medium; permeability of the subsoil is slow and of the underlying material, moderate to rapid. **Parent material** — granitic or other ex-

trusive acid igneous rock fluvial sediments of the Payette or Idaho formation. **Vegetation**—cheatgrass, *Bromus tectorum*; Medusahead wild rye, *Elymus caput-medusae*; wild sunflower, *Helianthus spp*; ragweed, *Ambrosia artemisiifolia*. **Erosion**—slight. **Climate**—average annual precipitation about 13 inches. **Great soil group**—grumusolic Chestnut.

#### Profile description:

A<sub>11</sub> 0-1 inches. Dark-gray (10YR3.8/1 or 3.5/1) heavy gritty clay loam, very dark gray (10YR2.6/1) when moist; weak to very weak medium platy, breaking to strong fine and very fine granular; very hard; sticky; very plastic; plentiful roots; dry when sampled.

A<sub>12</sub> 1-6 inches. Dark-gray (10YR3.8/1) heavy gritty clay loam, very dark gray to black (10YR2.5/1.2) when moist; primary vertical cracks 3/4 inch wide form very coarse prisms 5 to 7 inches across in which secondary smaller cracks form prisms 1.5 to 3 inches across; prisms break into very thick plates, which break into weak to very weak medium plates; granules, sand, and fine gravel from horizon above fall into the larger cracks; extremely hard; very sticky; very plastic; dense; few roots; dry when sampled; clear wavy boundary.

A<sub>3</sub>B<sub>1</sub> 6-13 inches. Dark-gray (10YR3.8/1) gritty clay, very dark gray (10YR3/1) when moist; primary vertical cracks up to 1 inch wide form very coarse prisms 6 to 10 inches across and contain granular material probably some from above and some squeezed up from below (includes some fine gravel and some calcareous spots); secondary vertical cracks form strong prisms 1 to 2 inches across; vertical surfaces are glossy and appear to have thick continuous dark-gray (10YR4/1) clay films, black to very dark brown (10YR2/1.5) when moist; clay films may be slickensides; extremely firm; very sticky; very plastic; very dense; few fine roots; mostly in cracks; slightly moist when sampled; gradual irregular boundary. Lower part grades into olive-brown (2.5YR3/3 to 3/4) interiors with very dark brown to very dark gray coatings.

B<sub>2</sub> 13-29 inches. Olive-brown (2.5Y4/3) fine gravelly clay, olive brown (2.5Y3/3 to 3/4) when moist; strong prismatic 1 to 2 inches across, breaking to moderate to strong coarse and medium angular blocky; some of prisms have nearly perfect rectangular cross section; extremely firm; very sticky; very plastic; very dense; few very fine

roots in cracks and very few penetrate the interiors of peds; no larger roots; thick continuous dark-gray (10YR4/1) clay films (or slickensides), very dark gray (10YR3/1) when moist, grading downward to dark grayish-brown (2.5Y4/2), very dark gray (2.5Y3/1) when moist; noncalcareous; very few dark krotovinas up to 2 inches across; there are large (up to 6 inch) pockets of very coarse sandy clay and clay loam, which may be due to rodent activity; in the other side of the pit, the lower 2 inches of this horizon are silty and appear to be lacustrine, volcanic ash, or diatomite material; lower boundary ranges from 22 to 30 inches and is dominantly abrupt and irregular, but in some places there is 1 to 2 inches of material that are lower in clay and higher in sand, which appear to be a mixture of the two horizons possibly due to rodent activity; moist when sampled.

C<sub>1ca</sub> 29-32 inches. Light-gray (5Y7/2) stratified material consisting mostly of coarse sandy loam, loamy sand, and sand and a few thin strata of lacustrine (or diatomite or volcanic ash) silty material; olive gray (5Y4/2) when moist; friable to firm; very few very fine roots; considerable iron staining; few yellowish-brown bands; 2-3 mm. thick layers of very high calcium carbonate content between some strata, calcium carbonate splotches elsewhere; slightly moist when sampled; very abrupt and wavy boundary. In places the top of this horizon is weakly cemented.

C<sub>2ca</sub> 32-38 inches. Light-gray (2.5Y6/1) coarse sandy loam, dark grayish brown (2.5Y4/2) when moist; common medium distinct light yellowish-brown (10YR6/4) mottles, yellowish brown (10YR5/4) when moist; massive; firm; upper few inches moderately calcareous; lower part non-calcareous; slight root mat on top; upper few mm. faintly cemented; much rodent workings just above this layer.

Although stratified, the C<sub>2ca</sub> layer may be similar to the material from which the solum developed. There is much muscovite in the lowest layer.

**Remarks:** This soil modal for the series. The A<sub>1</sub> horizon has a slightly high carbon:nitrogen ratio and a moderately high organic matter content. The base saturation percent ranges from 72 percent at the surface to 63 percent in the B<sub>2</sub> horizon and 100 percent in the C horizon. It was slightly acid in reaction in the surface and becomes more alkaline with depth. The series was established in Gem County, Idaho, 1938.

Table 20. — Chemical characterization and physical analysis of profile Montour clay loam 56 Ida 2314

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>11</sub>	0-1	6.50	ND	1.71	0.37	0.22	0.25	0.00	1.78	0.42	0.24
2	A <sub>12</sub>	1-6	6.50	ND	0.78	tr	0.11	0.08	0.00	1.03	0.11	0.19
3	A <sub>3</sub> B <sub>1</sub>	6-13	6.70	ND	1.20	tr	0.15	0.06	0.00	1.08	0.12	0.24
4	B <sub>2</sub>	13-29	7.00	ND	1.31	0.37	0.15	0.04	0.00	1.52	0.07	0.16
5	C <sub>1ca</sub>	29-32	7.50	ND	0.95	tr	0.22	0.02	0.00	1.18	0.04	0.12
6	C <sub>2ca</sub>	32-38	7.50	ND	0.63	tr	0.25	0.01	0.00	0.57	0.03	0.24

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.52	20.44	4.36	0.28	1.34	10.27	36.69	72.0	0.8	0.00	3.70	.133	16.18
0.25	20.33	3.60	0.79	0.89	10.22	35.83	71.5	2.2	0.00	2.78	.101	15.99
0.30	23.64	3.60	0.04	0.64	15.34	43.26	64.5	0.1	0.00	1.76	.070	14.59
0.27	30.15	4.56	0.05	0.62	20.85	56.23	62.9	0.1	1.58	1.26	.049	14.96
0.34	21.37	3.20	0.04	0.25	0.00	20.20	100.0	0.2	8.35	0.52	.025	12.00
0.34	11.64	1.80	0.03	0.12	0.00	10.20	100.0	0.3	0.95	0.07	.003	12.67

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 A/m	15 Atm	
1	6.1	10.7	7.7	10.2	3.8	24.5	37.0	cl	37.6	29.2	16.8	1.72
2	4.3	7.8	5.7	10.8	4.9	27.4	39.1	cl	39.7	29.2	16.6	1.82
3	7.5	9.1	6.1	9.0	3.9	22.2	42.2	c	42.3	32.0	18.2	1.83
4	9.9	7.5	4.4	5.9	2.5	19.5	50.3	gc	50.4	38.5	25.0	1.92
5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.86
6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.93

<sup>1</sup>Expressed as percent by weight.

#### Montour coarse sandy clay loam (56 Ida 2315)

**General site characteristics:** **Location** — Gem County, Idaho; sampled September 26, 1956, from a pit, 300 feet south and 165 feet east of the center of NW ¼ of sec. 14, T. 7 N., R. 1 E., about 3 miles southeast of Sweet. **Elevation** — approximately 2,800 feet. **Topography** — hilly uplands with an 18 percent northeast facing slope, about 10 feet lower than top of ridge. **Drainage** — good; surface runoff medium; permeability of the subsoil is slow and of the underlying material, moderate to rapid. **Parent material** — granitic or other extrusive acid-igneous rock fluvial sediments of the Payette or Idaho formation. **Vegetation** — dryland alfalfa. **Erosion** — slight. **Climate** — the average annual precipitation is estimated to be about 13 inches at this site.

#### Profile description:

$A_{p1}$  0-1.5 inches. This sample consists of  $A_{p1}$  and  $A_{p2}$  composite. Dark-gray (10YR3.6/1) coarse sandy clay loam, very dark gray to black (10YR2.5/1) when moist; vertical cracks are as wide as 1 inch and range from 5 to 8 inches apart; weak thin platy, breaking to strong fine granular; very hard; sticky; plastic; very abundant roots; dry when sampled; clear smooth boundary.

$A_{p2}$  1.5-6 inches. Similar to  $A_{p1}$  but very weak medium platy, breaking to very weak medium granular; abundant roots; when dry, granular soil from above fills the primary cracks in this horizon; abrupt smooth boundary.

$B_{21}$  6-12 inches. Dark grayish-brown (10YR4/2) gritty clay, very dark grayish brown to very dark brown (10YR2.5/2) when moist; primary cracks 0.5 to 0.75 inch wide form very coarse prisms 5 to 8 inches across; secondary cracks form moderate coarse prisms 2 to 3 inches across, which break into very weak coarse subangular blocks; extremely hard; extremely firm; very sticky; very plastic; very dense; few roots, mainly in vertical cracks; appears to have thick continuous dark-gray (10YR4/1.2) clay films on vertical and horizontal surfaces, very dark brown to black (10YR2/1.5) when moist; (may be slickensides); lower part contains less coating; slightly moist; gradual smooth boundary.

$B_{22}$  12-25 inches. Dark grayish-brown to brown (10YR4.4/2.5) gritty clay, dark brown (10YR3/3) when moist; primary and secondary cracks form prisms as in the above  $B_{21}$ ; the moderate coarse prisms break into moderate medium angular blocks; extremely hard; extremely firm; very

sticky; very plastic; very dense; very few roots; appears to have thick continuous dark grayish-brown to brown (10YR4/2.5) clay films, dark brown (10YR3/2.8) when moist; (may be slickensides); some vertical surfaces have a dark-gray (dry) coating; very slightly moist when sampled; clear smooth boundary.

$B_{31ca}$  25-33 inches. Dark grayish-brown to grayish-brown (10YR4.5/2) gritty clay loam, dark brown (10YR3.2/3) when moist; very weak medium prismatic, breaking to moderate coarse and medium angular blocky; extremely hard; extremely firm; very sticky; very plastic; very dense; very few roots; moderate continuous dark grayish-brown to brown (9YR4/2.5) clay films on vertical and horizontal surfaces, dark brown (9YR3/3) when moist; (possibly slickensides); moderate large white (10YR8/2) calcium carbonate splotches, mostly on ped surfaces; very slightly moist when sampled; gradual wavy boundary.

$B_{32}$  33-56 inches. Brown (10YR4.8/3) gritty clay loam, dark brown (10YR3.2/3) when moist; very weak medium prismatic, breaking to moderate coarse angular blocky; extremely firm; very sticky; very plastic; very few roots, mainly in vertical cracks; very dense; moderate continuous dark-brown (10YR3/3) clay films on vertical and horizontal surfaces; moderate very dark gray manganese stainings on ped surfaces; noncalcareous; slightly moist when sampled; abrupt wavy boundary. All of the above horizons contain moderate quantities of very coarse and coarse sand and very fine gravel, mostly quartz.

$B_{33ca}$  56-62 inches. Brown (10YR5/3) gritty clay loam, dark brown to brown (10YR4/3) when moist; weak medium angular blocky; thin clay films; moderate veins of calcium carbonate.

$C_{1ca}$  62-70 inches. Coarse sandy loam; massive; friable; slightly sticky; nonplastic; contains thin very weakly cemented (lime) layers; very strongly calcareous.

$C_2$  70-86 inches. Brown (10YR5/3) sandy loam, dark brown (10YR3/3) when moist; massive; very hard; possibly faintly cemented; noncalcareous except for few lime veins.

**Remarks:** This profile of Montour differs from 56 Ida 2314 in having 15 percent less clay in the  $A_1$  horizon (lower organic matter content and narrower carbon:nitrogen ratio); more coarse sand and fine gravel throughout the profile; deeper to the Idaho-Payette formation material; less representative of a Grumsol.

Table 21. — Chemical characterization and physical analysis of profile Montour sandy clay loam 56 Ida 2315

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p1</sub>	0-6	6.30	6.30	0.87	0.84	0.15	0.12	0.00	0.75	0.19	0.16
2	B <sub>21</sub>	6-12	6.10	6.50	0.88	0.59	0.37	0.07	0.00	1.23	0.26	0.11
3	B <sub>22</sub>	12-25	6.60	6.90	0.56	0.50	0.54	0.05	0.00	1.12	0.12	0.16
4	B <sub>31ea</sub>	25-33	7.30	8.10	0.52	0.51	0.82	0.03	0.00	1.36	0.25	0.18
5	B <sub>32</sub>	33-56	7.30	7.80	6.20	2.40	4.12	0.06	0.00	0.76	5.65	6.18
6	B <sub>33ea</sub>	56-62	7.50	8.20	6.50	2.59	4.17	0.06	0.00	0.85	6.27	5.90

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.46	10.37	3.92	0.11	0.63	5.05	20.08	74.9	0.6	0.00	1.49	.091	9.74
0.24	24.07	9.14	0.43	0.89	10.22	44.75	77.2	1.0	0.00	1.08	.050	12.60
0.20	22.15	7.75	0.61	0.79	20.55	51.85	60.4	1.2	0.00	1.09	.038	16.66
0.37	16.37	5.75	0.78	0.51	0.00	29.77	100.0	2.6	1.60	0.63	.025	14.64
3.00	17.89	5.16	1.19	0.50	0.00	31.97	100.0	3.7	1.40	0.39	.024	9.46
3.00	16.37	4.94	1.02	0.36	0.00	24.28	100.0	4.2	11.08	0.31	.018	10.17

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	8.8	11.2	8.2	16.7	7.7	24.5	22.9	scl	26.8	19.5	10.5	1.81
2	7.9	10.1	4.9	8.2	4.1	18.5	46.3	c	48.2	38.4	24.0	1.83
3	10.3	9.6	4.6	7.7	4.2	19.0	44.6	c	49.7	38.3	24.0	1.90
4	12.2	10.4	5.7	9.1	5.3	24.6	32.7	cl	41.2	27.3	15.6	1.86
5	6.8	7.0	4.0	8.2	6.3	34.6	33.1	cl	41.2	29.7	16.5	1.79

<sup>1</sup>Expressed as percent by weight.

### Mountainview Series

The Mountainview series consists of black muck, very poorly drained, shallow bog soils derived dominantly from sedges, reeds, rushes and cattails. The soils have an O<sub>3</sub> horizon sequence. They are associated with the Black Canyon and Vanderdassen series.

#### Mountainview muck (56 Ida 2321)

**General site characteristics:** Location—Gem County, Idaho, about 1,150 feet north and 200 feet west of the southeast corner of SW ¼ of sec. 23, T. 6 N., R. 2 W. Elevation—approximately 2,300 feet. Topography—sampled April 29, 1957, in a pit in a slight knoll 300 feet across and 3 to 5 feet high in a large basin (back bottom) in the low terrace of the Payette River. Drainage—naturally very poor but altered artificially to imperfect; no surface runoff; moderately rapid permeability; water table is at 25 inches. Parent material—mostly sedges, *Carex* spp; cattails, *Typha* spp; rushes, *Juncus* spp; and grasses with minor alluvial mineral strata. Vegetation—natural sedge-grass pasture. Erosion—not evident. Climate—approximately 11 inches of annual precipitation.

#### Profile description:

O<sub>1</sub> 0-4 inches. Dark grayish-brown to very dark grayish-brown (10YR3.5/2) muck peat; very dark brown (10YR 2/2) when moist; strong very fine granular; soft; very friable; sticky; plastic; root mat; pH 7.2 (bromthymol blue); abrupt wavy boundary.

O<sub>2</sub> 4-18 inches. Dark-gray (N4/0) muck; black (10YR 1/1) when moist; very weak medium platy to weak medium subangular blocky, breaking to weak fine granular; hard; firm; slightly sticky; slightly plastic; very abundant roots; pH 6.6 (bromthymol blue); gradual smooth boundary.

O<sub>3</sub> 18-38 inches. Dark-gray (N4/0) muck; black (10 YR1/1) when moist; contains yellowish-brown (10YR5/4 moist) slightly decomposed dead roots; weak medium granular; hard; friable; slightly sticky; nonplastic; very abundant roots; pH 7.2 (bromthymol blue); abrupt smooth boundary.

G<sub>1</sub> 38-41 inches. When moist, light-gray (5Y7/1) loam with common fine prominent dark yellowish-brown (10YR4/4) mottles, few medium prominent very dark gray (10YR3/1) mottles, and few medium distinct pale brown (10YR7/3) mottles; very weak very thin platy or massive; firm; slightly sticky; slightly plastic; plentiful roots; moderate number of dark yellowish-brown (10YR4/4) slightly decomposed roots; noncalcareous; pH 7.4 (bromthymol blue); abrupt smooth boundary. Probably diatomaceous material.

O<sub>4</sub> 41-57 inches. Dark-gray and very dark gray (N4/0 and N3/0) peaty muck; black (10YR1/1) when moist; weak very fine granular; very hard; friable; slightly sticky; nonplastic; abundant roots; 20 percent slightly decomposed sedge roots; noncalcareous; pH 7.4 (bromthymol blue); gradual smooth boundary. Between 46 and 47 inches, there is a 1-inch layer of gray (2.5Y/1 moist), massive, sticky, plastic silty clay loam containing common fine prominent very dark brown (10YR2/2) and dark yellowish-brown (10YR 3/4) mottles and many partially decayed roots.

O<sub>5</sub> 57-72 inches. Black (N2/0) mucky peat; consists of 75 percent dark brown (7.5YR3/2 moist) very slightly decomposed broad-leaved, coarsely fibrous sedges and 25 percent black (10YR2/1 moist) well decomposed muck; noncalcareous; pH 7.8 (cresal red); clear smooth boundary.

O<sub>6</sub> 72-86 inches. When moist, dark reddish-brown (2.5YR2/3 and 5YR2/2) and black (5YR2/1) peat consisting of fibrous, slightly decomposed sedge and cattail roots; noncalcareous; pH 8.0 (cresal red); abrupt smooth boundary.

G<sub>2</sub> 86-88 inches. When moist, dark-gray (5Y4/1) and gray (5Y5/1) very fine sandy loam with common medium prominent very dark brown (10YR2/2) mottles in the upper half inch; massive; friable; noncalcareous; few pockets of peat and many partly decomposed roots; pH 7.6 (cresal red); abrupt smooth boundary.

O<sub>7</sub> 88-95 inches. When moist, dark reddish brown (5YR2/2) changing to black (10YR2/1) upon drying; fibrous peat; slightly decomposed sedges and possibly minor woody material; some pockets of black (5YR2/1 moist)

moderately decomposed sedges; noncalcareous; pH 8.2 (cresal red); abrupt smooth boundary.

G<sub>3</sub> 95-103 inches. Light-gray (2.5Y7/1 and 5Y6/1) loam; few coarse prominent dark-brown (7.5YR4/2) and dark reddish-brown (5YR3/2) mottles around roots; few decayed roots; massive; slightly sticky; noncalcareous; pH 7.6 (cresal red).

G<sub>4</sub> 103-106 inches. Similarly colored as G<sub>3</sub>; sand.

G<sub>5</sub> 106 inches plus. Similar to G<sub>3</sub>.

**Remarks:** This is modal for the series. Series established in Emmett Valley, Gem County, Idaho, 1949.

Table 22. — Chemical characterization and physical analysis of profile Mountainview muck 56 Ida 2321

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil								
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	C1	SO <sub>4</sub>	
1	O <sub>1</sub>	0-4	2.95										
2	O <sub>2</sub>	4-18	0.80										
3	O <sub>3</sub>	18-38	2.60										
4	G <sub>1</sub>	38-41	2.80										
5	O <sub>4</sub>	41-57	2.15										
6	O <sub>5</sub>	57-72	3.10										
7	O <sub>6</sub>	72-86	4.00										
8	G <sub>2</sub>	86-88	ND										
9	O <sub>7</sub>	88-95	2.90										

\*These are pH values obtained after the samples were dried.

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.				C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K							
									50.75	1.475	20.01
									79.64	0.620	74.68
									56.29	0.330	99.18
									7.53	0.164	26.71
									61.53	1.113	32.14
									37.67	1.410	15.53
									19.18	1.495	7.49
									ND	ND	ND
									38.27	1.155	19.26
									3.53	0.055	37.09

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>2</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
	1.0	0.50	0.25	0.10	0.05	0.002			123.5	103.5	72.8	
									115.7	96.9	34.2	
									107.0	83.1	43.6	

<sup>2</sup>Expressed as percent by weight.

### Power Series

The Power series are moderately developed Sierozem derived from silty old alluvium or loess-like sediments. They have an A<sub>2</sub>, B<sub>2</sub>, B<sub>3ca</sub>, C<sub>en</sub> or D<sub>en</sub> horizon sequence with a definite increase of clay in the B<sub>2</sub>. These soils are associated with Purdum, Phyllis, and the "slick-spot" Rekow series and are related to the Chilcott, Sebree, Lanktree, and Jenness series.

#### Power silt loam (56 Ida 2317)

**General site characteristics:** **Location**—Gem County, Idaho, 850 feet east and 200 feet south of the center of sec. 4, T. 6 N., R. 2 W. **Elevation**—approximately 2,450 feet. **Topography**—the sample was taken September 27, 1956, in a level (slope of 0.75 percent), slightly convex broad ridge in a moderately dissected high terrace of the Payette

River, the terrace being about 50 feet above the river. **Drainage**—good; surface runoff, slow; subsoil has slow permeability, whereas substratum is moderate with no water table. **Parent material**—probably loess in the upper part and medium-textured old alluvium in the lower part. The alluvium is derived principally from granitic, quartz monzonitic, and other intrusive acid-igneous rock sources but includes some material from the Idaho or Payette formation and minor basaltic material. **Vegetation**—big sagebrush, *Artemisia tridentata* (3 feet tall and moderately dense); cheatgrass, *Bromus tectorum*; and annual weeds. **Erosion**—not evident. **Climate**—at the Emmett station about 6 miles to the east, elevation 2,500 feet, the average annual precipitation is 11.5 inches; the average January temperature is 29.1° F.; the average July temperature is 75.0° F.; the average annual temperature is 51.4° F.; and the average frost-free period is 168 days.

**Profile description:**

A<sub>1</sub> 0-0.5 inches. Grayish-brown (1.5Y5/2) silt loam; very dark grayish brown (10YR2.8/2) when moist; weak very thin platy, breaking to moderate very fine granular; slightly hard; friable; slightly sticky; slightly plastic; very abundant roots; dry when sampled; abrupt wavy boundary. Ranges from 0 to ½ inch in thickness.

A<sub>21</sub> 0.5-2.5 inches. Light brownish-gray (1Y6/2.2 crushed) silt loam; dark grayish brown to very dark grayish brown (10YR3.5/2) crushed) when moist; weak very thin platy, breaking to weak very fine granular; top of plates are light brownish gray (1Y6/2); dark grayish brown (10YR4/2) when moist; bottom of plates are light brownish gray to pale brown (10YR6/2.5), dark grayish brown (10YR3.8/2) when moist; hard; friable; slightly sticky; slightly plastic; slightly vesicular; very abundant roots; dry when sampled; abrupt smooth boundary.

A<sub>22</sub> 2.5-8 inches. Light brownish-gray (1Y6.4/2.3 crushed) silt loam; dark grayish brown to very dark grayish brown (10YR3.5/2) when moist; moderate thin platy, breaking to very weak very fine granular; top of plates is light brownish gray to light gray to pale yellow (2Y6.5/2.5), and bottom of plates is light brownish gray to pale brown (10YR6/2.5); both top and bottom are dark grayish brown (10YR4/2) when moist; hard; friable; slightly sticky; slightly plastic; slightly vesicular; few roots; very few very fine dark (manganese and iron) concretions; dry when sampled; clear smooth boundary.

A<sub>23</sub> 8-11 inches. Light-gray to light brownish-gray (1.5Y6.5/2.2 crushed) silt loam which is high in coarse silt; dark grayish brown (1Y4/2) when moist; massive to very weak thick platy; strongly very fine vesicular; hard; friable; slightly sticky; slightly plastic; few roots; few very fine very dark (manganese and iron) concretions; dry when sampled; abrupt wavy boundary.

A<sub>2</sub>B<sub>1</sub> 11-13 inches. This horizon represents the light-gray caps and the tops of the columns. The A<sub>2</sub> caps consist of light-gray (1.5Y6.5/2.2) (dark grayish brown 10YR 4/2 when moist), massive, hard, friable, slightly sticky, slightly plastic silt loam. The upper part is dominantly the light-gray A<sub>2</sub> material, but it contains lenses 2-3 mm. thick of the pale-brown B material. This is moderately very fine vesicular and weak medium platy. The quantity of light-gray material decreases and the pale-brown material increases at the abrupt top of the weak fine somewhat rounded columns. Below the tops of the columns, the material is dominantly pale-brown (10YR5.8/3) (10YR4/3 when moist) coarse-textured silty clay loam, which breaks to strong to moderate medium and fine angular blocks and is very hard, sticky, and plastic. The peds have thick continuous clay films on vertical, horizontal, and pore surfaces, which are pale brown to brown (10YR5.5/2) dark brown (10YR3.5/3) when moist. The vertical surfaces of the columns have much light-gray silty coating. The peds contain a moderate number of very fine pores and a few very fine dark concretions. The B peds have a pH of 7.8 and are noncalcareous. Plentiful roots. Clear smooth boundary. Moist when sampled.

B<sub>21</sub> 13-17 inches. Pale-brown (1Y5.8/3) silt loam; dark-grayish brown to dark brown (10YR4/2.5) when moist; weak to moderate medium prismatic, breaking to strong fine and medium angular blocky; extremely hard;

extremely firm; sticky; plastic; thick continuous brown (8.5YR5/3 and 8YR4/2), dark grayish brown (9YR3.8/2) when moist, clay films penetrate fairly deeply into the peds; surfaces of peds are very dense, but the insides have a moderate number of fine pores; abundant roots, mostly very fine, penetrate the peds as well as between the peds; very few very fine very dark (manganese and iron) concretions; noncalcareous; moist when sampled; clear smooth boundary.

B<sub>22</sub> 17-21 inches. Pale-brown (1Y6.2/3) silt loam (less clay than B<sub>21</sub>); brown (1Y4.5/3) when moist; very weak medium prismatic, breaking to strong medium and fine angular blocky; very firm; sticky; plastic; thick continuous brown (9YR4.8/3), dark brown dark grayish brown (9YR3.8/2.5) when moist, clay films on vertical and pore surfaces and moderate continuous clay films on horizontal surfaces; clay films do not penetrate the peds as much as in the above horizon; very few, very fine, dark concretions; few fine pores; few filled insect channels ¼ to ½ inch in diameter; few roots; noncalcareous; moist when sampled; abrupt wavy boundary.

B<sub>3ca</sub> 21-25 inches. Light yellowish-brown to pale-yellow (2Y6.5/3) fine-textured silt loam; brown (1Y4.5/3) when moist; moderate to weak medium and fine subangular blocky; firm; slightly sticky; slightly plastic; slight darker coatings on peds; few roots; few egg-shaped or tubular filled cavities (insect); moderately calcareous with many fine veins and some thin coatings around nodules; moist when sampled; clear wavy boundary.

C<sub>1ca</sub> 25-29 inches. Very pale brown (1Y7/3) silt loam, yellowish brown to light yellowish brown (1Y5.5/3.6) when moist; weak medium platy, breaking to weak medium subangular blocky; friable; slightly sticky; slightly plastic; a few weakly cemented aggregates; strongly calcareous (prominent ca); nearly dry when sampled; clear wavy boundary.

C<sub>2ca</sub> 29-39 inches. Pale-brown (1Y6.2/3.2) silt loam; brown to dark yellowish brown (10YR4.3/3.5) when moist; massive to very weak coarse subangular blocky; hard; firm; slightly sticky; slightly plastic; few very hard one-inch nodules of soil material; slightly calcareous with few lime veins; few fine pores; nearly dry when sampled.

C<sub>3ca</sub> 39-45 inches. Pale-brown (10YR5.7/3) sandy loam; brown (10YR4/3.2) when moist; massive; friable; slightly sticky; slightly plastic; very few roots; few fine pores; slightly to moderately calcareous with few to moderate lime veins. This overlies a buried B horizon, which overlies another ca horizon.

**Remarks:** This is a moderately to somewhat strongly developed soil having a weak A<sub>1</sub>, a weak A<sub>2</sub>, a moderate to somewhat strong textural B, and apparently a prominent ca. It is not representative of the Power series with respect to too high an exchangeable sodium which approaches Rekow and slightly too thick an A<sub>2</sub>. Morphologically it is like the Power series. Research studies in Canyon, Ada and Elmore Counties indicate that varying amount of exchangeable sodium and salts may occur in the lower part of the Power profile and associated Purdum series. This is also true of the related Chilcott and Lanktree series. There is evidence that this group of soils may have developed under the influence of excess sodium salts. This series was established in Gem County, Idaho, 1949.



Table 23. — Chemical characterization and physical analysis of profile Power silt loam 56 Ida 2317

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil								
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	
1	A <sub>1</sub>	0-5	Not enough sample										
2	A <sub>21</sub>	.5-2.5	6.50	6.80	1.32	1.32	0.41	0.76	0.00	0.68	2.99	0.68	
3	A <sub>22</sub>	2.5-8	7.00	7.35	0.22	0.32	0.63	0.16	0.00	tr	0.20	1.02	
4	A <sub>23</sub>	8-11	7.40	7.70	0.11	0.19	0.78	0.03	0.00	0.89	0.11	0.51	
5	A <sub>2</sub> B <sub>1</sub>	11-13	7.60	8.10	0.62	0.21	1.49	0.09	0.00	1.47	0.14	0.80	
6	B <sub>21</sub>	13-17	8.00	8.80	0.74	0.36	2.87	0.16	0.00	2.25	0.35	1.49	
7	B <sub>22</sub>	17-21	8.35	9.15	0.19	0.08	4.44	0.01	0.00	2.99	0.57	0.67	
8	B <sub>3ca</sub>	21-25	8.45	9.30	0.37	0.32	5.34	0.01	0.00	3.78	0.77	1.05	
9	C <sub>1ca</sub>	25-29	8.80	9.30	0.51	0.30	6.11	0.01	0.00	4.14	1.16	1.44	
10	C <sub>2ca</sub>	29-39	8.65	9.25	0.94	0.20	5.27	0.01	0.00	3.38	1.18	1.92	
11	C <sub>3ca</sub>	39-45	8.50	9.20	0.51	0.17	6.81	0.02	0.00	1.72	1.54	2.98	

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.69	0.329	15.35
1.30	6.12	2.13	0.10	1.67	ND	13.64	ND	0.7	0.81	1.76	0.092	11.14
0.30	5.40	2.37	1.56	1.38	0.00	12.22	100.0	12.8	0.81	0.64	0.042	8.88
0.28	4.12	2.18	2.08	0.52	0.00	10.55	100.0	19.7	0.80	0.37	0.029	7.48
0.40	6.73	3.38	4.97	0.55	0.00	17.83	100.0	27.9	1.18	0.50	0.036	8.08
0.60	8.28	4.56	7.78	0.73	0.00	25.03	100.0	31.1	1.40	0.53	0.039	7.95
1.00	8.33	4.99	8.11	0.60	0.00	23.52	100.0	34.5	1.77	0.31	0.029	6.31
1.32	7.28	4.97	7.97	0.55	0.00	21.51	100.0	37.1	3.65	0.36	0.022	9.55
1.63	6.28	4.17	7.64	0.35	0.00	17.99	100.0	42.5	12.19	0.41	0.022	10.82
1.60	5.28	3.98	6.72	0.22	0.00	15.90	100.0	42.3	4.74	0.23	0.014	9.43
2.30	2.21	3.38	5.12	0.15	0.00	12.97	100.0	39.5	3.58	0.19	0.011	10.18

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.0	1.8	1.3	7.3	12.6	67.2	8.8	sil	52.5	27.7	9.5	ND
2	0.8	1.5	1.0	6.7	14.1	69.6	6.3	sil	32.4	23.2	5.7	ND
3	0.8	1.3	1.0	6.5	15.1	67.6	7.7	sil	27.0	21.2	5.0	ND
4	0.5	1.2	0.9	5.5	13.9	72.4	5.6	sil	25.0	20.2	4.4	ND
5	0.5	1.2	0.8	4.6	12.2	62.9	17.8	sil	32.7	24.2	9.1	ND
6	0.4	1.0	0.7	3.8	13.1	56.9	24.1	sil	42.9	33.4	14.0	ND
7	0.6	0.9	0.7	3.8	13.0	63.0	18.0	sil	41.6	32.6	12.7	ND
8	0.6	1.2	0.8	4.4	14.8	65.4	12.8	sil	39.6	29.4	11.4	ND
9	1.1	4.7	2.9	8.1	17.9	60.3	5.0	sil	40.2	26.2	6.7	ND
10	4.7	8.8	4.0	11.4	15.8	50.2	5.1	sil	31.8	18.6	6.5	ND
11	7.0	14.5	6.4	15.2	12.7	36.8	7.4	sl	26.9	15.4	6.9	ND

<sup>1</sup>Expressed as percent by weight.

### Purdam Series

The Purdam series comprises light-colored, deep, well drained Sierozems developed from a thin (1.5 to 4 feet) cover of loess or silty alluvium over stratified medium or moderately coarse-textured alluvium. The alluvium is chiefly from granitic or other intrusive acid igneous rock sources, but may be washed from the quartzic Idaho-Payette formation. The soil has an A<sub>1</sub> or A<sub>p</sub>, A<sub>2</sub>, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, C<sub>ca</sub>, M<sub>ca</sub> and C or D horizon sequence. The textural B horizon contains nearly twice as much clay as the A. This soil occurs on level to sloping, slightly to moderately dissected medium terraces. It is associated with the Power and Rekow soils and related to the Chilcott, Sebree, and Lanktree series.

#### Purdam silt loam (57 Ida 2327)

**General site characteristics:** Location — 2 miles north-east of Letha, Gem County, Idaho; 275 feet north and 140 feet west of the southeast corner of the NE ¼ NE ¼ sec.

31, T. 7 N., R. 2 W., 120 feet west of the fence along the west side of the road and 10 feet north of the field fence; sampled July 22, 1957, from a pit in a cultivated pasture. **Elevation** — about 2,450 feet. **Topography** — the site is in a level, broad ridgetop in a high, moderately dissected river terrace; the 1 percent slope is slightly convex and to the west. **Drainage** — good; medium to somewhat slow surface runoff; permeability of the subsoil is moderately slow to slow, of the hardpan, slow to very slow. **Parent material** — possibly loess to 37 inches or silt loam Payette River alluvium over a more sandy medium-textured river alluvium from intrusive acid igneous rock sources, possibly mixed with some material from basaltic and Idaho-Payette formation sources. **Vegetation** — irrigated clover grass pasture. **Erosion** — slight. **Climate** — approximately 11 inches of annual precipitation.

#### Profile description:

A<sub>p</sub> 0-5 inches. Light brownish-gray (10YR5.8/2) silt

loam; dark brownish gray (10YR3.6/2) when moist; weak thin platy, breaking to very weak very fine granular; hard; friable; slightly sticky; slightly plastic; abundant roots; few very fine pores; slightly moist; abrupt smooth boundary.

A<sub>2</sub> 5-7 inches. Light brownish-gray (10YR6.2/2) silt loam; dark grayish brown (10YR4/2) when moist; very weak medium platy; hard; friable; slightly sticky; slightly plastic; plentiful roots; common very fine pores; slightly moist; abrupt smooth boundary.

B<sub>1</sub> 7-9 inches. Pale-brown (10YR6/3) silt loam; dark brown (10YR3/3) when moist; very weakly medium prismatic, breaking to weak medium subangular blocky; very hard; firm; sticky; slightly plastic; plentiful roots; common very fine pores; thin patchy clay films on blocks; common to many very fine (less than 0.5 mm.) very dark brown iron and manganese soft concretions that moderately effervesce with H<sub>2</sub>O<sub>2</sub>; slightly moist; clear smooth boundary. A<sub>2</sub> material in pockets and lenses between the B<sub>1</sub> blocks is light brownish gray (10YR6/2), dark grayish brown (10YR4/2.4) when moist; and massive.

B<sub>2</sub> 9-16 inches. Pale-brown to brown (10YR5.5/3) (interior of peds) silt loam; dark brown to brown (10YR4/2.8) when moist; weak or very weak medium prismatic, breaking to moderate coarse and medium subangular blocky, then to weak fine subangular blocky; very hard; firm; sticky; plastic; few fine roots; dense; few very fine and fine pores; thin continuous clay films on peds and pore surfaces that are dark grayish brown (10YR4/2), dark brown (10YR3/3) when moist; few very fine (less than 0.5 mm.) soft iron and manganese concretions; slightly calcareous in spots; moist; gradual smooth boundary.

B<sub>3</sub> 16-28 inches. Pale-brown (10YR6/3) (interior of peds) silt loam; dark grayish brown to grayish brown (2Y4.5/2.2) when moist; moderate to weak medium and fine angular and subangular blocky; firm; brittle; slightly sticky; slightly plastic; few fine roots; dense; common 0.5 to 0.75 inch very firm nodules of soil material; thin continuous clay films on vertical and pore surfaces and thin patchy ones on horizontal surfaces that are brown (10YR5/3), dark brown (10YR3.3/3) when moist; noncalcareous except common calcium carbonate veins; moist; clear smooth boundary.

C<sub>1ca</sub> 28-35 inches. Pale-brown (10YR6.2/3) silt loam; scattered coarse sand; dark brown to brown (10YR4/3)

when moist; weak coarse subangular blocky; firm; slightly sticky; slightly plastic; few fine roots; no clay films; non-calcareous except for many calcium carbonate veins; moist; clear wavy boundary. Possibly loessal material to 37 inches.

D<sub>1ca</sub> 35-42 inches. Light-gray (10YR7/2) silt loam; brown (10YR5/3) when moist; massive; firm to friable; slightly sticky; slightly plastic; no or very few fine roots; strongly calcareous; moist; clear wavy boundary.

D<sub>2ca</sub> 42-49 inches. Pale-brown (10YR6.5/3) silt loam; few coarse sand grains; dark brown to brown (10YR4/3) when moist; very weak coarse subangular blocky; firm; slightly sticky; slightly plastic; very few fine roots; common fine pores; moderately calcareous, with common calcium carbonate veins; moist; clear smooth boundary. Old alluvial material.

D<sub>3ca</sub> 49-56 inches. Very pale-brown (10YR6.8/3) silt loam containing moderate coarse and medium sand; dark brown (10YR3/3) when moist; weak thin laminated; firm; slightly sticky; slightly plastic; very few fine roots; common very fine pores and few fine ones; moderately calcareous with 2-5 mm. seams of calcium carbonate between laminae; much yellowish-brown stainings; moist; abrupt wavy boundary. Possibly lacustrine material.

M<sub>ca</sub> 56-66 inches. 1 to 2 mm. of pinkish-white (7.5YR8/2), very dense, moderately calcareous cemented coating that is light brown (7.5YR6/4) when moist; abrupt wavy boundary.

Brown (10YR5/3) silica-lime hardpan that is dark brown (10YR3/3) when moist; moderate nearly continuous gray (N5/0) coating that is dark gray (N4/0) and gray (N5/0) when moist; tends to be weak medium and coarse laminated and breaks to fine angular fragments; extremely firm; top inch weakly to moderately cemented, rest is weakly cemented; little bluish material that may be vivianite; moderately calcareous with common to many calcium carbonate veins and lenses in cracks; abrupt wavy boundary.

D 66 inches plus. Pale-brown (10YR5.8/3) silt loam or loam; dark brown to brown (10YR4/3) when moist; massive or weak fine subangular blocky; firm, slightly sticky; slightly plastic; thin patchy clay films that are dark brown (10YR3.5/3) when moist; noncalcareous except for few calcium carbonate veins.

**Remarks:** This is modal for the series. Series proposed in Canyon County, Idaho, 1950.

Table 24. — Chemical characterization and physical analysis of profile Purdam silt loam 57 Ida 2327

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p</sub>	0-5	6.00	7.70	1.43	1.37	0.73	0.03	0.00	0.76	0.08	1.07
2	A <sub>2</sub>	5-7	6.00	7.60	2.14	1.34	1.33	0.03	0.00	0.41	0.08	2.91
3	B <sub>1</sub>	7-9	Not enough sample									
4	B <sub>2</sub>	9-16	6.60	7.30	1.08	0.43	1.16	0.01	0.00	1.27	0.16	0.49
5	B <sub>3</sub>	16-28	7.30	7.90	1.22	1.11	2.68	0.04	0.00	1.17	0.16	4.58
6	C <sub>1ca</sub>	28-35	8.00	8.10	1.30	0.74	1.26	0.01	0.00	0.97	0.31	2.24
7	D <sub>1ca</sub>	35-42	8.00	8.20	1.38	0.40	1.16	0.02	0.00	1.67	0.19	0.47
8	D <sub>2ca</sub>	42-49	8.15	8.40	1.29	0.32	1.01	0.01	0.00	1.19	0.22	0.80
9	D <sub>3ca</sub>	49-56	8.00	8.30	1.13	0.22	1.02	0.01	0.00	1.23	0.14	0.65
10	M <sub>ca</sub>	56-66	8.00	8.20	1.11	0.15	0.88	0.01	0.00	1.23	0.14	0.55
11	D	66+	7.70	8.20	1.04	0.08	0.89	0.01	0.00	1.11	0.14	0.76

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.50	6.71	3.46	0.48	0.30	6.41	16.20	60.4	3.0	0.95	1.65	.105	9.14
0.70	10.09	3.27	0.62	0.24	4.43	15.15	70.8	4.1	0.98	1.19	.079	8.73
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0.30	6.84	2.96	1.82	0.39	3.53	24.21	85.4	7.5	1.35	0.60	.045	7.78
1.45	21.00	3.09	0.92	0.42	4.33	22.97	81.1	4.0	2.35	0.45	.029	8.97
0.80	14.78	2.13	1.00	0.25	0.00	20.39	100.0	4.9	3.73	0.31	.023	7.83
0.45	13.15	1.36	0.83	0.35	0.00	20.77	100.0	4.0	14.31	0.38	.024	9.17
0.51	12.12	1.17	1.04	0.29	0.00	20.77	100.0	5.0	4.00	0.21	.018	6.67
0.40	11.35	1.18	1.28	0.29	0.00	20.01	100.0	6.4	4.26	0.29	.016	10.63
0.45	17.99	0.78	1.57	0.50	0.00	24.21	100.0	6.5	4.53	0.50	.021	13.81
0.45	14.04	0.79	0.97	0.48	0.00	27.83	100.0	3.5	1.72	0.29	.013	9.23

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.2	0.5	0.5	3.2	10.9	72.0	12.7	sil	36.2	25.9	7.7	ND
2	0.2	0.4	0.5	3.4	13.0	72.2	10.3	sil	34.2	24.9	6.8	ND
3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4	0.2	0.3	0.3	2.1	9.5	65.0	22.6	sil	35.9	29.1	13.2	ND
5	0.2	0.3	0.2	2.2	12.1	71.4	13.6	sil	37.1	29.3	12.6	ND
6	0.6	1.2	1.1	5.4	16.2	70.5	5.0	sil	36.0	26.1	9.2	ND
7	1.6	3.4	2.3	7.6	15.3	62.1	7.7	sil	45.8	33.1	12.7	ND
8	1.0	3.0	2.5	6.9	16.6	63.7	6.3	sil	37.4	25.3	9.5	ND
9	1.7	5.2	3.3	8.1	13.7	60.8	7.2	sil	33.9	24.6	9.4	ND
10	20.1	18.4	6.5	9.2	7.8	31.7	6.3	cosl	34.4	25.9	15.1	ND
11	4.7	5.1	2.5	6.0	8.1	50.4	23.2	sil	32.9	26.2	13.6	ND

<sup>1</sup>Expressed as percent by weight.

#### Purdam silt loam (56 Ida 2301)

**General site characteristics:** Location—200 feet north and 1,400 feet east of the southwest corner of sec. 35, T. 7 N., R. 2 W., about 4 miles northwest of Emmett, Gem County, Idaho. Elevation—about 2,400 feet. Topography—sampled July 23, 1956, in level slightly convex ridge in a gently undulating, slightly dissected terrace 50 feet above the river. Drainage—good; surface runoff is slow; subsoil permeability is moderately slow, and the hardpan is slow. Parent material—loess or loesslike over old alluvium of the Payette River, which is derived from intrusive acid igneous rock sources. Vegetation—irrigated alfalfa. Erosion—slight. Climate—average annual precipitation is approximately 11 inches.

#### Profile description:

A<sub>p</sub> 0-8 inches. Grayish-brown (10YR5.2/2) silt loam; very dark grayish brown (10YR3/2) when moist; very weak very fine granular; slightly hard; friable; slightly sticky; slightly plastic; noncalcareous; abrupt smooth lower boundary.

B<sub>1</sub> 8-15 inches. Grayish-brown (1Y5.2/2.2) silt loam; very dark grayish brown (10YR3.2/2.2) when moist; very weak to weak coarse and medium prismatic breaking to moderate medium angular blocky; slightly firm; sticky and plastic; noncalcareous; gradual, smooth lower boundary. Slightly darker moderate to thin clay films on vertical and horizontal peds and channels. Moderate number of soft, fine and very fine dark reddish-brown concretions in upper part. Moderate to many 2-3 mm. very dark gray to very dark brown manganese stains in upper 4 inches.

B<sub>21</sub> 15-23 inches. Grayish-brown to light brownish-gray (1Y5.4/2.4) silt loam; very dark grayish brown (10

YR3.4/2.2) when moist; weak coarse and medium prismatic breaking to moderate medium and coarse subangular blocky; moderate continuous slightly darker clay films on vertical and horizontal surfaces of peds, pores, and root channels; friable; sticky; plastic; noncalcareous; clear, smooth boundary.

B<sub>22</sub> 23-34 inches. Pale-brown (1Y5.5/2.8) silt loam; dark grayish brown (1Y4/2.2) when moist; weak coarse prismatic, breaking to moderate medium and coarse subangular blocky; thin to moderate continuous clay films on vertical and horizontal surfaces of peds; firm; slightly sticky; slightly plastic; noncalcareous; gradual, smooth boundary. Some manganese stains.

B<sub>23</sub> 34-42 inches. Pale brown (1Y5.8/3) silt loam; dark grayish brown to dark brown (10YR4.2/2.5) when moist; weak to moderate medium subangular blocky; thin clay films on vertical ped surfaces; friable, slightly sticky; slightly plastic; noncalcareous; abrupt, wavy lower boundary.

M<sub>ca</sub> 42-53 inches. Pale-brown (1Y6/3) weakly cemented hardpan that is brown (10YR4.5/3) when moist; very hard; very firm; lime in form of plates and veins in cemented material; appears to have continuous manganese staining.

C or D. 53-63 inches. Pale brown (1Y6.4/3) silt loam; brown (10YR4/3) when moist; strong medium and thick platy; discontinuous manganese staining; occasional vertical veins of lime; hard; firm; noncalcareous except for lime veins.

**Remarks:** This profile is similar to 57 Ida 2327 except the silt content is slightly less. The series was proposed in Canyon County, Idaho, 1950.

Table 25. — Chemical characterization and physical analysis of profile Purdam silt loam 56 Ida 2301

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p</sub>	0-8	5.75	ND	1.02	0.52	0.50	0.13	0.00	0.54	0.09	0.45
2	B <sub>1</sub>	8-15	6.05	ND	1.79	0.79	0.86	0.14	0.00	1.46	0.35	0.32
3	B <sub>21</sub>	15-23	5.75	ND	0.56	0.32	0.48	0.08	0.00	0.41	0.27	0.57
4	B <sub>22</sub>	23-34	5.95	ND	0.64	0.40	0.36	0.09	0.00	0.74	0.39	0.52
5	B <sub>23</sub>	34-42	6.15	ND	0.79	0.40	0.30	0.08	0.00	0.83	0.20	0.48
6	M <sub>ca</sub>	42-53	7.60	ND	1.61	0.52	0.30	0.05	0.00	1.31	0.26	0.40
7	C or D	53-63	7.17	ND	1.01	0.52	0.22	0.07	0.00	1.45	0.22	0.31

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.55	9.01	2.75	0.90	0.74	2.61	16.01	83.7	5.6	0.00	1.79	.099	10.51
0.80	9.60	3.12	0.35	0.81	4.51	18.39	75.5	1.9	0.00	1.01	.071	8.27
0.30	9.36	3.76	1.00	0.81	3.94	18.87	79.1	5.3	0.00	0.66	.053	7.28
0.32	9.24	4.36	0.20	0.79	4.18	18.77	77.7	1.1	0.00	0.44	.035	7.37
0.33	11.37	4.35	0.21	0.74	3.34	20.01	83.3	1.1	0.00	0.38	.031	7.19
0.60	19.05	3.75	0.38	0.73	0.00	28.30	100.0	1.3	6.18	0.20	.022	5.23
0.45	ND	ND	0.14	0.88	0.00	28.30	100.0	0.5	3.18	0.15	.014	6.14

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2- 1.0	1.0- 0.50	0.50- 0.25	0.25- 0.10	0.10- 0.05	0.05- 0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.2	0.3	0.4	4.0	12.5	66.2	16.4	sil	38.2	25.1	9.0	1.46
2	0.4	0.3	0.3	4.0	12.5	63.1	19.4	sil	35.2	25.2	10.1	1.69
3	0.1	0.3	0.3	4.1	12.6	61.6	21.0	sil	36.1	24.4	12.8	1.56
4	0.7	0.5	0.4	4.6	14.2	59.7	19.9	sil	35.4	26.0	10.4	1.58
5	0.5	0.5	0.4	5.2	15.1	56.9	21.4	sil	37.0	27.1	11.3	1.47
6	24.8	14.8	4.6	9.5	13.2	28.9	4.2	cosl	32.8	21.3	17.2	1.66
7	2.2	1.2	0.6	4.3	12.9	66.8	12.0	sil	34.7	25.1	13.2	ND

<sup>1</sup>Expressed as percent by weight.

### Quenzer Series

The Quenzer series comprises light-colored, deep, imperfectly drained, noncalcareous Alluvial soils derived from fine or moderately fine-textured alluvium, mainly from granitic and Idaho-Payette formations. The soils have A<sub>1</sub> or A<sub>p</sub>, C or D horizon sequence. The profile is gleyed to the surface, but the kind and degree of mottling is variable. Strata of medium or moderately fine textures may occur in the substratum, and gravel or sandy material is common below 30 inches. This soil occurs in level to slightly concave basins or swales in low terraces and bottom lands. It is associated with the Wardwell, Falk, Draper, and Harpt series and is related to the Vanderdassen series.

#### Quenzer silty clay (56 Ida 2305)

**General site characteristics:** Location — sampled July 26, 1956, 450 feet west and 1,260 feet north of center of sec. 20, T. 6 N., R. 1 W., in Gem County, Idaho. Elevation — about 2,350 feet. Topography — a basin-like area or depression in the low terrace of the Payette River. Drainage — imperfect; surface runoff slow; subsoil permeability slow; moderate fluctuating water table. Parent material — fine and moderately fine-textured young alluvium from intrusive acid-igneous rock sources, mostly from the Payette River but including some local alluvium from the Idaho-Payette formation. Vegetation — irrigated corn. Erosion — slight. Climate — approximately 11 inches of annual precipitation.

#### Profile description:

A<sub>pg</sub> 0-5 inches. Gray (2.5Y5/1.2) silty clay; dark gray (2.5Y3.8/1) when moist; common medium faint mottles that are light gray (2.5Y7/1), gray (2.5Y5/1) when moist; few fine distinct mottles that are brown (10YR4/3); very dark brown (10YR2/2) when moist; strong fine and medium subangular blocky; very hard; firm; sticky; very plastic; few black manganese stains 2 to 4 mm. across; noncalcareous; abrupt smooth boundary.

C<sub>1g</sub> 5-11 inches. Gray (2.5Y5.2/1.4) silty clay; dark gray (2.5Y3.8/1.2) when moist; few fine prominent mottles that are yellowish brown (10YR5/4), and dark yellowish brown (10YR3/4) when moist; few fine faint dark-gray (2.5Y4/1) mottles, very dark gray (2.5Y3/1) when moist; moderate fine angular blocky; extremely to very hard; firm; very sticky; very plastic; very dark gray to very dark grayish brown (2.5Y3/1.5) coating on peds when moist; contains abundant micaceous material; thin patchy clay films; noncalcareous; gradual, smooth boundary.

C<sub>2g</sub> 11-16 inches. Gray to grayish-brown (2.5Y 5.2/1.5) silty clay; dark gray to dark grayish brown (2.5Y 4/1.5) when moist; peds are dark gray to very dark gray (2.5Y3.5/1) on outside when moist; few fine faint light-gray mottles that are gray (2.5Y6/1) when moist; and few fine distinct dark-gray (2.5Y3/1) manganese stains, when moist; extremely to very hard; slightly firm; sticky; very plastic; very thin patchy clay films; moderate salt crystals; noncalcareous; gradual, smooth boundary.

C<sub>3g</sub> 16-33 inches. Gray to grayish-brown (2.5Y5.2/1.5) silty clay; dark gray to dark grayish brown (2.5Y4/1.5) when moist; few fine distinct very dark gray (2.5Y3/1) manganese stains; weak fine subangular blocky; extremely hard; firm; sticky; very plastic; noncalcareous; gradual, wavy boundary.

C<sub>4g</sub> 33-48 inches. Grayish-brown to light brownish-gray (2.5Y5.5/2.2) silty clay; dark grayish brown (2.5Y4.2/2) when moist; few fine prominent brown (10YR4/3) mottles, dark brown (10YR3/3) when moist; few fine distinct dark-gray (10YR4/1) mottles, very dark gray (10YR

3/1) when moist; weak medium and coarse subangular blocky; hard; slightly firm; stricky; very plastic; possibly some clay films; noncalcareous; gradual smooth boundary.

D<sub>1g</sub> 48-74 inches. Grayish-brown (2.5Y4.8/2) clay; dark grayish brown (2.5Y4.2/2) when moist; few fine distinct light-gray (2.5Y7/1) mottles; weak medium and fine angular blocky; possibly thin clay films; very hard; slightly firm; very sticky; very plastic; noncalcareous.

D<sub>2g</sub> 74 inches plus. Weakly cemented iron accumulation over gravel.

**Remarks:** Series proposed in Gem County, Idaho, 1957.

Table 26. — Chemical characterization and physical analysis of profile Quenzer silty clay 56 Ida 2305

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>pg</sub>	0-5	6.60	7.15	1.15	0.31	5.99	0.15	0.00	2.79	0.60	3.32
2	C <sub>1g</sub>	5-11	7.10	7.95	1.71	0.37	9.45	0.09	0.00	4.45	0.59	5.17
3	C <sub>2g</sub>	11-16	7.40	7.60	14.88	4.00	42.86	0.22	0.00	2.07	0.63	60.04
4	C <sub>3g</sub>	16-33	7.60	7.80	15.47	4.00	42.86	0.24	0.00	1.77	0.81	59.98
5	C <sub>4g</sub>	33-48	7.50	7.90	7.81	1.28	11.22	0.22	0.00	1.32	0.65	17.91
6	D <sub>1g</sub>	48-74	7.15	7.25	21.87	3.20	5.84	0.44	0.00	1.24	0.84	29.95

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.40	14.04	2.57	2.55	0.78	0.00	27.27	100.0	9.4	0.00	2.49	.106	13.67
1.82	15.84	2.76	4.20	0.69	0.00	31.07	100.0	13.5	0.00	1.91	.112	9.90
6.60	25.65	1.80	6.98	0.79	0.00	35.16	100.0	19.9	0.00	0.99	.052	11.02
6.60	26.36	3.60	6.96	0.85	0.00	42.16	100.0	16.5	0.00	0.80	.042	11.12
2.60	33.48	4.07	3.11	1.43	0.00	45.45	100.0	6.8	0.00	0.49	.028	10.11
3.00	35.81	3.08	0.77	1.41	0.00	46.65	100.0	1.7	0.00	0.43	.014	17.71

No.	Particle size distribution (mm) (percent)								Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C	Tensions					
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002	1/10 Atm		1/3 Atm	15 Atm		
1	0.7	1.0	0.9	3.8	3.9	49.1	40.6	sic	45.3	34.0	17.1	1.72	
2	0.9	1.0	0.8	3.5	5.0	45.8	43.0	sic	48.9	38.2	18.5	1.81	
3	0.0	0.3	0.4	2.2	2.8	50.7	43.6	sic	55.5	44.4	22.8	1.71	
4	0.0	0.3	0.3	1.7	1.8	48.0	47.9	sic	58.0	45.7	23.3	1.71	
5	0.0	0.1	0.1	1.5	1.3	49.5	47.5	sic	61.2	48.1	26.2	1.62	
6	0.0	0.2	0.1	0.9	0.8	28.6	69.4	c	62.5	50.6	28.8	1.85	

<sup>1</sup>Expressed as percent by weight.

## Rekow Series

The Rekow series are solumized-Solonetz soils in the Sierozem zone, developed from old alluvium loess. The soils have a thin A<sub>2</sub> or A<sub>p</sub> over a B<sub>2</sub>, B<sub>3sa</sub>, C<sub>ca</sub>, and M<sub>ca</sub> horizon sequence. These are slick-spots occurring in a complex with Purdam soils. They are related also to the Sebree, Chilcott, and Lantree.

### Rekow silt loam (57 Ida 2328)

**General site characteristics:** **Location** — sampled July 23, 1957, 1.25 miles northwest of Emmett and nearly a mile west of Shamrock Center, Gem County, Idaho. The sample pit is in a cultivated field in Mr. Peterson's farm 250 feet east and 125 feet south of the northwest corner of the NE ¼, sec. 1, T. 6 N., R. 2 W. **Elevation** — approximately 2,450 feet. **Topography** — the site is in the level part of a moderately dissected high terrace of the Payette River. The site has a plain slope to the west of 1 percent, and the total relief of the vicinity is about 3 feet. **Drainage** — good; surface runoff medium to slow; permeability of the subsoil is moderately slow to slow, of the hardpan, very

slow; no water table. **Parent material** — possibly loess to 13 inches; medium textured old alluvium to 37 inches; moderately coarse textured old alluvium below; alluvium is dominantly from intrusive acid igneous rocks, such as quartz monzonite, granodiorite, quartzdiorite, and granite. **Vegetation** — the site is in the more extreme part of a "slick spot" in a field of irrigated red clover. There is some very short red clover and weeds at the site. The spot of poor growth is 10 to 20 feet wide and about 2 to 3 times as long and has an irregular shape. The plant growth increases toward the perimeter of the spot to a good growth of red clover around the spot. The field may have 15 to 25 percent of the area covered with spots of poor or fair plant growth.

**Erosion** — slight but the spot may have been cut during leveling operations. **Climate** — same as at Emmett with 11 inches of annual precipitation.

### Profile description:

A<sub>p</sub> 0-5 inches. Light brownish-gray (10YR5.8/2) silt loam, dark grayish brown (10YR3.5/2) when moist; few pockets of brown (10YR5/3) B horizon, dark brown (10

YR3/3) when moist; weak thin platy, crushing to very weak very fine granular; very hard; friable; slightly sticky; slightly plastic; dry when sampled; abrupt smooth boundary.

B<sub>1</sub> 5-9 inches. Silt loam, very dark grayish brown to dark brown (10YR3.2/2.5) when moist; contains pockets of A<sub>2</sub> material that are dark grayish brown (10YR4/2.2) when moist; moderate fine subangular blocky; very hard; firm; sticky; plastic; few very fine pores; common very fine (less than 0.5 mm.) soft iron and manganese concretions that effervesce moderately with H<sub>2</sub>O<sub>2</sub>; noncalcareous; slightly moist when sampled; clear smooth boundary.

B<sub>2</sub> 9-13 inches. Silty clay loam, dark brown (1Y3.8/3) when moist; moderate medium prismatic, breaking to moderate coarse angular blocky, then to moderate fine angular blocky; firm; sticky; plastic; plentiful roots; few very fine pores inside peds but very dense thick continuous clay films on vertical and pore surfaces and moderate continuous clay films on horizontal surfaces, dark brown (7.5YR3/2) when moist; few very fine soft iron and manganese concretions that effervesce moderately with hydrogen peroxide; noncalcareous; moist when sampled; clear smooth boundary.

Above horizons possibly derived from loess; lower horizons from old alluvium.

B<sub>3ca</sub> 13-21 inches. Silt loam, dark brown to brown (10YR4/3) when moist; few coarse and medium sand particles; moderate fine and very fine angular blocky; very hard; firm; slightly sticky; slightly plastic; few roots; few fine and very fine pores; thin patchy clay films on vertical, horizontal, and pore surfaces, dark brown (10YR3.5/3) when moist; very slightly calcareous except for many calcium carbonate veins; moist when sampled; clear smooth boundary.

C<sub>1ensa</sub> 21-28 inches. Silt loam, dark brown (9YR 3.8/3) when moist; weak very fine subangular blocky; hard; very friable; slightly sticky; nonplastic; plentiful roots; very much white salt, light brownish gray (10YR6/2) to light gray (10YR7/2) when moist; moderately calcareous; moist when sampled; clear smooth boundary.

C<sub>2ensa</sub> 28-37 inches. Silt loam, dark brown (9YR3/3) when moist; weak fine subangular blocky and possibly very weak medium laminated; firm; slightly sticky; slightly plastic; very few roots; many calcium carbonate veins, streaks, and splotches; moderately calcareous; moist when sampled; abrupt smooth boundary.

M<sub>ensa</sub> 37-47 inches. Weakly cemented calcium carbonate-silica hardpan, very dark grayish brown (10YR3/2) when moist; weakly medium platy; moderately calcareous with many 1 to 5 mm. thick lenses of calcium carbonate, which are light yellowish brown (9YR6.5/4) when moist.

D<sub>1ensa</sub> 47-59 inches. Coarse sandy loam, dark brown (10YR3.5/3) when moist; weak medium laminated; friable; slightly sticky; nonplastic; moderately calcareous with many large splotches and streaks of light-gray (10YR7/2) calcium carbonate; moist when sampled; gradual boundary.

D<sub>2sa</sub> 59-68 inches. Loam, dark brown (10YR3.2/3) when moist; massive or weak thin laminated; friable; slightly sticky; nonplastic; noncalcareous except for very few calcium carbonate veins.

**Remarks:** These soils strongly restrict plant growth under irrigation and range use. They do not respond well to treatment with amendments. Series proposed in Emmett Valley, Gem County, Idaho, 1957.

Table 27. — Chemical characterization and physical analysis of profile Rekow silt loam 57 Ida 2328

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	C1	SO <sub>4</sub>
1	A <sub>p</sub>	0-5	6.50	7.10	0.49	0.33	2.11	0.07	0.00	1.80	0.24	0.63
2	B <sub>1</sub>	5-9	7.20	8.20	0.40	0.21	5.34	0.03	0.00	4.00	0.33	1.37
3	B <sub>2</sub>	9-13	7.45	8.90	0.50	0.35	6.32	0.00	0.00	3.44	0.82	1.52
4	B <sub>3ca</sub>	13-21	7.80	9.20	0.58	0.48	13.04	0.00	0.50	2.14	2.42	6.93
5	C <sub>1ensa</sub>	21-28	7.45	7.90	10.04	2.21	34.12	0.00	0.00	0.89	6.48	42.32
6	C <sub>2ensa</sub>	28-37	7.50	8.80	5.17	2.04	31.45	0.00	0.00	1.09	5.82	34.58
7	C <sub>3ca</sub>	37-47	7.50	8.80	4.49	1.84	35.63	0.00	0.50	1.20	11.79	31.04
8	D <sub>1ensa</sub>	47-59	7.80	8.60	6.07	2.10	33.69	0.00	0.49	0.93	19.09	26.14
9	D <sub>2sa</sub>	59-68	7.50	8.90	2.15	1.26	16.70	0.00	0.29	0.79	7.41	11.83

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.68	8.06	2.17	0.89	0.61	4.08	15.82	79.2	5.6	0.00	1.38	.071	11.27
1.07	10.94	4.36	5.12	0.45	0.00	25.25	100.0	20.3	0.00	0.83	.037	12.97
1.05	10.69	6.37	7.52	0.40	0.00	35.17	100.0	21.4	1.74	0.64	.037	10.00
2.60	8.63	5.35	7.50	0.35	0.00	26.30	100.0	28.5	3.04	0.34	.024	8.33
10.40	39.18	4.78	4.34	0.22	0.00	24.68	100.0	17.6	2.45	0.21	.023	5.22
9.60	10.84	4.80	7.26	0.22	0.00	26.97	100.0	26.9	3.26	0.26	.021	7.14
8.40	12.47	5.22	10.94	0.30	0.00	38.22	100.0	28.6	12.52	0.45	.019	7.89
8.80	12.66	4.99	10.18	0.35	0.00	35.17	100.0	29.0	13.38	0.43	.016	16.25
5.50	9.53	4.07	5.98	0.40	0.00	22.40	100.0	26.7	2.52	0.14	.013	6.15

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.1	1.3	1.0	4.9	13.5	65.1	13.1	sil	32.9	25.1	7.7	ND
2	0.7	0.8	0.6	4.4	10.6	60.3	22.6	sil	40.0	33.9	14.3	ND
3	1.5	1.4	0.7	4.0	10.3	50.1	32.0	sicl	45.3	41.5	18.6	ND
4	3.0	3.0	1.6	4.8	11.1	54.9	21.6	sil	37.5	32.8	13.6	ND
5	3.9	3.4	1.8	5.0	11.4	58.4	16.1	sil	35.0	28.2	12.3	ND
6	4.9	4.8	2.4	6.3	12.5	57.7	11.4	sil	33.2	25.6	11.8	ND
7	17.6	24.5	9.9	14.7	7.9	19.2	6.2	cosl	31.4	26.5	16.6	ND
8	12.3	19.6	8.3	14.7	10.5	29.3	5.3	cosl	36.8	28.8	13.4	ND
9	10.2	12.4	6.9	12.9	9.4	34.1	14.1	1	24.2	17.8	8.8	ND

<sup>1</sup>Expressed as percent by weight.

### Sweet Series

The Sweet series consists of slightly dark, well-drained, deep, Brown soils. They have an A<sub>1</sub>, AB, B<sub>2</sub>, B<sub>3ca</sub> and C<sub>m</sub> horizon sequence with approximately twice as much clay in the B<sub>2</sub> as in the A<sub>1</sub> horizon. The hardpan has weak cementation with alkali-soluble material. The soils are derived from old, stream alluvium principally from intrusive acid igneous rocks with some basaltic influence. The Sweet series is associated with the Montour and Newell series and related to the Haw, Purdam series.

#### Sweet silt loam (56 Ida 2320)

**General site characteristics:** **Location**—sampled October 3, 1956, 95 feet south and 280 feet west of the northeast corner of SE ¼ NW ¼ sec. 10, T. 7 N., R. 1 E., southeast of Sweet, Gem County, Idaho. **Elevation**—about 2,700 feet. **Topography**—the sample was collected in a pit about 50 feet west from the crest of a ridge top in a moderately dissected, undulating stream terrace about 50 feet above Squaw Creek. The slope in the immediate vicinity of the site is 2 to 3 percent to the west. About 50 feet to the southeast the ridge top breaks to a 10 percent southeast-facing slope. The site has a convex surface. **Drainage**—good; surface runoff medium to slow; permeability of the B<sub>2</sub> is slow, of the lower subsoil, very slow to slow. **Parent material**—old, stream alluvium, mainly medium textured, derived from granitic or quartz monzonitic and basaltic sources. **Vegetation**—sprinkler irrigated barley. **Erosion**—slight. **Climate**—approximately 12 inches of annual precipitation.

#### Profile description:

A<sub>1p</sub> 0-7 inches. Grayish-brown (10YR4.8/2.2) silt loam; very dark grayish brown (10YR2.8/2.2) when moist; upper 1.5 inches are weak thin platy, breaking to weak to moderate fine granular; lower part is weak to moderate fine and very fine granular; slightly hard; friable; slightly sticky; slightly plastic; abundant fine roots; many very fine pores; dry or slightly moist when sampled; abrupt smooth boundary. Ranges from 6.5 to 7 inches in thickness.

A<sub>12</sub> 7-9.5 inches. Similar in color and texture to A<sub>1p</sub>; weak to moderate very fine and fine granular; friable; sticky to slightly sticky; plastic to slightly plastic; abundant roots; many very fine and micro pores; moderate worm holes and casts; moist when sampled; clear smooth boundary. 2 to 2.5 inches thick.

A<sub>3</sub> 9.5-15 inches. Grayish-brown to brown (10YR 4.5/2.5) loam; very dark grayish brown (10YR3/2.2) when moist; weak coarse subangular blocky, breaking to weak fine subangular blocky, breaking to weak fine granular; friable; sticky; plastic; plentiful roots; many fine pores and few holes up to 0.5 inch in diameter; some 2 to 3 inch rodent holes; thin patchy clay films on vertical, horizontal, and pore surfaces, which are dark grayish brown (10YR 4.4/2.4), very dark dark grayish brown (9YR3/2.4) when

moist; slight light brownish-gray bleached silty specking on vertical surfaces; clear smooth boundary; moist when sampled. Ranges from 9 to 9.5 to 14 or 15 inches.

B<sub>1</sub> 15-21 inches. Brown (10YR4.5/3) loam; dark brown (9YR3.2/3) when moist; weak medium prismatic, breaking to strong to moderate fine subangular and angular blocky; very hard; firm; sticky to very sticky; plastic; plentiful roots; common very fine pores; moderate continuous grayish-brown to brown (10YR5/2.5) clay films on vertical and pore surfaces, which are dark brown (9YR3/3) when moist; moderate patchy clay films on horizontal surfaces; moderate light brownish-gray (10YR6/2) bleached silty specking on vertical and channel surfaces and some on horizontal surfaces; moist when sampled; abrupt wavy boundary. Ranges from 14 or 15 to 20.5 or 22 inches.

B<sub>2</sub> 21-33 inches. Brown (8YR5/3) clay loam; dark brown to brown (7.5YR4/3) when moist; moderate medium prismatic, breaking to strong coarse and medium angular blocky; extremely hard; very firm; sticky to very sticky; very plastic; very dense; very few fine pores; very few very fine roots; thick continuous brown to dark-brown (7.5YR4/2.5-4/3) clay films penetrate most of peds; moist when sampled; abrupt wavy boundary.

B<sub>3ca</sub> 33-38 inches. Brown (1Y5/3) sandy clay loam containing moderate very coarse sand and very fine gravel (mostly quartz); dark brown to brown (1Y4.5/3) when moist; weak coarse prismatic, breaking to moderate fine and medium angular blocky; extremely hard; very firm; sticky; plastic; dense to very dense; very few roots; very few very fine pores; thick continuous brown (8YR5/3.5) clay films on vertical and pore surfaces and moderate continuous clay films on horizontal surfaces, which are dark reddish brown (5YR3/2) when moist; noncalcareous except for common to many 2 to 3 mm. lime spots and veins; moist when sampled; abrupt smooth boundary.

B<sub>3m</sub> 38-46 inches. Brown to pale-brown (1Y5.5/3) light sandy clay loam; dark brown (10YR3/3) when moist; weak fine and medium angular blocky or very weak thick platy; very weak to weakly cemented; extremely firm; slightly sticky; slightly plastic; contains moderate coating of yellowish brown (10YR5/5 moist) in horizontal cracks and in veins; moderate continuous clay films in pores and thin patchy clay films on vertical and horizontal surfaces; upper part contains many white (10YR8/2) (10YR7/3 moist) noncalcareous veins; moist when sampled; gradual smooth boundary.

C<sub>m</sub> 46-58 inches plus. Brown to pale-brown (1Y5.5/3) coarse sandy loam, dark brown (10YR3/3) when moist; weakly to very weakly cemented; very firm; very hard; thin patchy clay films; very few very pale brown noncalcareous veins of silica; noncalcareous.

**Remarks:** This is modal Sweet. Series established in the Mayfield SCD, Ada and Elmore Counties, Idaho, 1943.

Table 28. — Chemical characterization and physical analysis of profile Sweet silt loam 56 Ida 2320

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>2</sub>	Cl	SO <sub>4</sub>
1	A <sub>1p</sub>	0-7	6.25	6.60	0.86	0.18	1.20	0.22	0.00	0.79	0.18	1.33
2	A <sub>12</sub>	7-9.5	6.40	6.70	0.49	0.11	0.21	0.13	0.00	0.78	0.28	0.34
3	A <sub>3</sub>	9.5-15	6.95	6.85	0.47	0.04	0.32	0.08	0.00	0.84	0.40	0.23
4	B <sub>1</sub>	15-21	6.05	6.50	0.43	0.17	0.29	0.05	0.00	0.73	0.18	0.43
5	B <sub>2</sub>	21-33	6.70	7.40	0.27	0.14	0.68	0.06	0.00	0.75	0.16	0.40
6	B <sub>3en</sub>	33-38	7.20	7.85	0.83	0.14	1.24	0.05	0.00	1.38	0.16	0.75
7	B <sub>3m</sub>	38-46	7.75	7.05	0.62	0.10	0.93	0.04	0.00	1.13	0.22	0.37
8	C <sub>m</sub>	46-58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
0.40	14.51	0.48	0.02	1.38	0.00	15.00	100.0	0.1	0.00	4.58	.103	25.82
0.25	8.87	0.29	0.14	0.92	4.28	14.50	70.5	1.0	0.00	0.89	.051	10.20
0.50	10.13	0.40	2.28	0.68	3.11	16.60	81.3	13.7	0.00	0.72	.043	9.77
0.20	16.12	0.28	0.42	0.59	4.29	21.70	80.2	1.9	0.00	0.50	.042	6.90
0.30	15.09	0.29	1.06	0.69	6.27	23.90	73.8	4.4	0.00	0.65	.032	11.88
0.50	20.02	0.29	0.93	0.55	0.00	26.70	100.0	3.5	3.72	0.28	.031	5.16
0.40	17.44	0.09	1.00	0.37	0.00	18.00	100.0	5.6	1.48	0.17	.019	5.26
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	1.9	3.5	2.8	9.9	11.6	53.5	16.8	sil	32.6	22.3	8.1	ND
2	3.0	3.3	2.6	9.3	11.2	51.8	18.8	sil	31.7	21.1	8.4	ND
3	2.7	4.0	2.6	8.2	10.0	48.9	23.6	l	33.4	22.4	9.8	ND
4	2.5	3.4	2.5	8.8	10.8	48.2	23.8	l	32.6	22.0	11.0	ND
5	3.8	5.9	4.4	15.2	10.4	24.5	35.8	cl	36.6	28.2	14.9	ND
6	7.2	11.0	8.2	16.6	7.1	18.9	31.0	scl	35.5	26.8	16.0	ND
7	8.2	12.0	9.0	19.8	9.1	21.6	20.3	scl	25.4	19.2	12.7	ND
8	12.2	15.0	9.3	16.4	7.1	23.8	16.2	cosl	22.4	9.2	9.2	ND

<sup>1</sup>Expressed as percent by weight.

### Vanderdasson Series

The Vanderdasson series comprises light-colored, deep, imperfect and poorly drained alkali calcium carbonate Solonchaks. The soils are high in carbonates and high in exchangeable sodium. Sodium carbonates probably account for most of the effervescence. They have a C<sub>en</sub>, D horizon sequence. They are derived from fine-textured materials of the Idaho-Payette sedimentary formations which formed from acid igneous stratified intrusive rock with minor mixing of basaltic materials. They are associated with the Emerson-Falk-Moulton-Chance catena, Baldock, Bowman, Mountainview and are related to the Letha, Wardwell, and Quenzer soils.

#### Vanderdasson silty clay (56 Ida 2306)

**General site characteristics:** Location — sampled July 25, 1956, Gem County, Idaho, about 5 miles southwest of Emmett, 150 feet north and 150 feet east of the southwest corner of sec. 16, T. 6 N., R. 2 W. **Elevation** — about 2,290 feet. **Topography** — sample was taken in a slight basin in a low terrace of the Payette River. **Drainage** — poor to imperfect; surface runoff very slow to slow; permeability of the subsoil and the underlying material is slow; water table at 60 to 72 inches when sampled. **Parent material** — fine textured young alluvium from the Payette River and the nearby hills derived mostly from intrusive igneous rock sources and minor basaltic materials. **Vegetation** — mostly

greasewood, *Sarcobatus vermiculatus*; with few saltgrass, *Distichlis stricta*; foxtail barley, *Hordium jubatum*. **Erosion** — none. **Climate** — approximately 10 inches of annual precipitation.

#### Profile description:

C<sub>1en</sub> 0-13 inches. Light gray (2.5Y7/1) silty clay; grayish brown (2.5Y5.2/1.8) when moist; moderate coarse prismatic, breaking to weak thin platy, then to moderate fine angular blocky; very hard; firm; very sticky; very plastic; moderately calcareous; gradual smooth boundary.

C<sub>2en</sub> 13-21 inches. Light gray (2.5Y7/1.5) silty clay; grayish brown (3Y5/2.2) when moist; weak medium prismatic, breaking to weak thin platy, then to moderate medium and fine angular blocky; very hard; firm; very sticky; very plastic; strongly calcareous; gradual smooth boundary.

C<sub>3en</sub> 21-28 inches. Light-gray to white (2.5Y7.5/1.8) light silty clay; grayish brown (3Y5/2) when moist; very weak medium platy, breaking to weak medium and fine subangular blocky; very hard; firm; sticky; very plastic; strongly calcareous; gradual smooth boundary.

D<sub>1en</sub> 28-36 inches. Light-gray (3Y7/2) loam; grayish brown to dark-grayish brown (3Y4.5/2) when moist; weak medium prismatic, breaking to moderate medium subangular blocky; very hard; friable; slightly sticky; slightly plastic; moderately calcareous; clear smooth boundary.

D<sub>2en</sub> 36-43 inches. Light brownish-gray (2.5Y6.2/2



and 3.5Y6/2.5) fine sandy loam; light olive brown to olive brown (3.5Y4.5/2.8) when moist; high in mica; very weak medium prismatic, breaking to moderate medium subangular blocky; very to extremely hard; friable; slightly sticky; nonplastic; few fine distinct very dark gray (2.5Y3/1) manganese stains; moderately calcareous; gradual smooth boundary.

D<sub>3g</sub> 43-57 inches. Light brownish-gray (2.5Y6/2.2) fine sandy loam; light olive brown to olive brown (3.5Y4.5/2.8) when moist; common coarse faint light-gray (2.5

Y7/2) mottles, friable, light olive brown (3Y5/2.6) when moist; massive; very hard; friable; slightly sticky; nonplastic; slightly calcareous; clear smooth boundary.

D<sub>4g</sub> 57 inches plus. Gray (N6/0) fine sandy loam; very dark gray to dark gray (N3.5/0) when moist; massive; very hard; friable; slightly sticky; nonplastic; noncalcareous to slightly calcareous. This is a strongly reduced layer.

**Remarks:** Series established in Emmett Valley, Gem County, Idaho, 1949.

Table 29. — Chemical characterization and physical analysis of profile Vanderdasson silty clay 56 Ida 2306

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	C <sub>1en</sub>	0-13	8.90	9.55	0.77	0.28	9.42	0.12	1.44	6.38	0.09	1.41
2	C <sub>2en</sub>	13-21	9.40	9.80	0.63	0.33	14.84	0.07	2.94	9.58	0.19	2.26
3	C <sub>3en</sub>	21-28	9.40	9.85	0.56	0.06	14.58	tr	3.26	9.29	0.54	1.14
4	D <sub>1en</sub>	28-36	9.40	9.75	0.52	0.05	9.04	tr	1.56	5.21	0.56	1.49
5	D <sub>2en</sub>	36-43	9.10	9.75	0.25	0.03	7.84	tr	0.86	3.13	0.67	2.63
6	D <sub>3g</sub>	43-57	9.20	9.80	0.29	0.04	8.24	tr	0.80	3.89	0.93	1.57
7	D <sub>4g</sub>	57+	9.10	9.78	0.23	0.04	7.26	tr	1.43	4.11	0.27	1.67

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>3</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
1.60	5.14	0.12	24.81	2.99	0.00	35.56	100.0	69.8	ND	1.52	.068	13.01
2.15	2.63	0.04	34.27	1.74	0.00	38.86	100.0	88.2	ND	0.95	.045	12.27
2.08	2.98	0.19	29.29	0.96	0.00	29.87	100.0	98.1	ND	0.54	.029	10.86
1.70	2.88	0.40	19.35	0.56	0.00	19.28	100.0	100.0	ND	0.26	.021	7.14
2.00	2.93	0.40	11.72	0.31	0.00	11.88	100.0	98.7	ND	0.11	.006	10.00
1.90	2.78	0.20	9.18	0.24	0.00	9.89	100.0	92.8	ND	0.11	.006	10.67
1.45	2.98	0.20	11.27	0.29	0.00	13.59	100.0	82.9	ND	0.11	.008	8.25

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.3	0.4	0.3	1.5	2.3	53.5	41.7	sic	41.9	37.5	19.2	1.60
2	0.1	0.5	0.3	1.4	1.3	48.0	48.4	sic	54.4	44.7	25.1	1.44
3	0.0	0.9	1.3	4.5	4.1	49.1	40.1	sic	54.2	43.8	22.2	1.51
4	0.3	5.4	7.2	16.3	11.9	40.2	18.7	sic	38.7	29.6	11.9	1.80
5	0.4	10.3	13.4	24.0	16.5	25.7	9.7	fsl	34.1	23.0	7.3	1.77
6	0.2	5.8	12.5	39.1	15.0	19.4	8.0	fsl	33.5	21.1	6.1	1.66
7	0.0	6.6	12.3	28.2	11.1	32.5	9.3	fsl	36.2	30.1	8.2	1.71

<sup>1</sup>Expressed as percent by weight.

#### Vanderdasson silty clay (57 Ida 2329)

**General site characteristics:** Location — sampled July 23, 1957, about 3.25 miles southwest of Emmett, Gem County, Idaho; 50 feet east and 600 feet south of the center of the SW ¼ sec. 23, T. 6 N., R. 2 W. **Elevation** — about 2,300 feet. **Topography** — sampled in a pit in a wide, level to slight depression, (back-bottom position) in a low terrace of the Payette River. **Drainage** — poor naturally and imperfectly altered; surface runoff very slow; permeability very slow; water table is at 20 inches, possibly caused by recent irrigation of adjoining field. **Parent material** — fine textured alluvium, dominantly from granitic and dioritic materials, including the Idaho-Payette formations and some basaltic materials. **Vegetation** — cheatgrass, *Bromus tectorum*. **Erosion** — nil. **Climate** — approximately 11 inches of annual precipitation.

#### Profile description:

A<sub>p</sub> 0-8 inches. Light-gray (10YR6.5/1) silty clay; dark gray (2.5Y4/1) when moist; vertical cracks 3 to 5

inches apart form indistinct (weak) coarse and very coarse prisms; extremely hard; very firm; very sticky; very plastic; abrupt smooth boundary. Dry when sampled.

C<sub>1</sub> 8-14 inches. Light-gray (2.5Y6/1) clay; gray to dark gray (2.5Y4.5/1) when moist; weak medium prismatic, breaking to moderate coarse angular blocky, then to moderate fine angular blocky; extremely hard; firm; sticky; very plastic; no clay skins; very few reddish semi-hard concretions; moderately calcareous; wet when sampled; gradual smooth boundary.

C<sub>2g</sub> 14-22 inches. Light-gray (2.5Y6/1) silty clay; gray (2.5Y5/1) when moist; common medium distinct brown to dark-brown (10YR4/3 moist) mottles; weak medium prismatic, breaking to moderate very fine angular blocky; very hard; firm; sticky; very plastic; very few roots; few very fine pores; moderately calcareous; wet when sampled; gradual smooth boundary.

C<sub>3eag</sub> 22-32 inches. Light-gray (2.5Y6/1) silty clay; gray (2.5Y5/1) when moist; common fine distinct mottles inside of peds, olive brown (2.5Y4/3-4/4) when moist;

moderate medium prismatic, breaking to moderate fine angular blocky; extremely hard; friable; sticky; very plastic; very few roots; outside of prisms are dense and inside have few very fine pores; strongly calcareous with some segregated calcium carbonate; sampled in water in pit; clear smooth boundary.

C<sub>4ca</sub> 32-52 inches. White (2.5Y8/1) clay; light gray (10YR7/2) when moist; massive but in places breaks to moderate very fine angular blocky; very hard; firm; sticky; very plastic; moderately dense; very strongly calcareous; sampled in water; clear smooth boundary.

D 52-61 inches. Gray (5Y5/1) clay; dark gray (5Y 4/1) and gray (5Y5/1) when wet; massive; extremely hard; firm; sticky; plastic; moderately dense; many manganese splotches; slightly calcareous with few calcium carbonate veins; sampled in water.

**Remarks:** This profile has more structure in the subsoil and more of a ca horizon than modal. Water stood at about 20 inches in the pit, and the layers below this were sampled in the water. This profile is similar to 56 Ida 2306, except it is about one chip darker in color and is gleyed higher in the solum. It has more structure in the subsoil and more of a ca horizon than modal.

Table 30. — Chemical characterization and physical analysis of profile Vanderdasson silty clay 57 Ida 2329

No.	Horizon	Depth in.	pH Paste	pH 1:5	Saturation extract me/1000 gms soil							
					Ca	Mg	Na	K	CO <sub>2</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
1	A <sub>p</sub>	0-8	8.50	9.00	0.59	0.51	15.22	tr	0.00	6.09	4.06	4.59
2	C <sub>1</sub>	8-14	9.30	9.75	0.30	1.37	34.83	tr	1.54	14.33	5.25	4.01
3	C <sub>2g</sub>	14-22	9.30	9.80	1.31	0.16	31.35	tr	2.34	15.25	3.08	2.99
4	C <sub>3eng</sub>	22-32	9.15	9.70	1.09	0.18	22.59	tr	1.16	12.87	1.81	1.54
5	C <sub>4ca</sub>	32-52	9.25	9.65	0.71	0.08	21.19	tr	1.91	10.69	1.14	1.61
6	D	52-61	Not enough sample									

ECx10 <sup>3</sup>	Exchangeable ions-me/100 gms.					C.E.C. me. 100	Base sat. %	E.S.P.	CaCO <sub>2</sub> equiv. %	O.M. %	N. %	C/N N=1
	Ca	Mg	Na	K	H							
2.30	12.33	1.35	19.23	1.72	0.00	50.22	100.0	38.3	ND	3.85	0.203	11.03
3.40	2.53	0.26	41.52	2.75	0.00	52.65	100.0	78.9	ND	0.95	0.062	8.87
3.30	2.49	0.38	44.36	2.70	0.00	54.40	100.0	81.5	ND	0.69	0.042	9.52
2.00	3.28	0.18	45.99	2.50	0.00	53.90	100.0	85.3	ND	0.31	0.045	4.00
2.00	3.15	0.39	35.38	1.75	0.00	44.36	100.0	79.8	ND	0.64	0.036	10.28
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.58	0.029	11.72

No.	Particle size distribution (mm) (percent)							Texture	Moisture properties <sup>1</sup>			Bulk Density
	VCS	CS	MS	FS	VFS	Si	C		Tensions			
	2-1.0	1.0-0.50	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	0.002		1/10 Atm	1/3 Atm	15 Atm	
1	0.2	0.9	0.4	1.6	2.1	45.6	49.2	sic	55.1	49.0	26.4	ND
2	0.1	0.8	0.6	1.3	1.0	39.6	56.6	c	72.5	69.0	40.8	ND
3	0.0	0.4	1.1	3.7	2.3	48.9	43.6	sic	70.8	67.3	37.0	ND
4	0.0	0.3	0.9	4.6	2.7	49.3	42.2	sic	76.2	67.0	38.5	ND
5	0.0	0.4	0.4	1.7	1.4	39.3	56.8	c	62.6	92.9	36.5	ND
6	0.1	0.7	0.7	1.5	1.6	22.1	73.3	c	166.7	178.1	ND	ND

<sup>1</sup>Expressed as percent by weight.

## Literature Cited

1. Association of Official Agricultural Chemists, Official and tentative methods of analysis, 6th Edition. Washington, D. C., 1945. 932 pp.
2. Hilgard, E. W., Soils, The Macmillan Co., New York, 1906.
3. Hosking, J. D., The cation exchange capacities of soils and the soil colloids. Jour. of Coun. for Sci. and Ind. Res. (Australia) 21:21-37, 1948.
4. Kilmer, V. J. and L. T. Alexander, Methods of making mechanical analysis of soils. Soil Science 68:15-24, 1949.
5. Peach, M., L. T. Alexander and L. A. Dean, Methods of Soil analysis for soil fertility investigation. U.S.D.A. Cir. No. 757, April, 1947.
6. U.S.D.A. Salinity Laboratory Staff, Diagnosis and improvement of saline and alkali soils. Handbook No. 60, 1954. 160 pp.
7. U.S.D.A. Soil Conservation Service, Soil Survey—Gem County Area, Idaho, Series 1958 (manuscript).
8. U.S.D.A. Soil Survey Staff, Soil survey manual. U.S.D.A. Handbook No. 18, 1951. 503 pp.