SOIL SURVEY OF THE TWIN FALLS AREA, IDAHO.

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DESCRIPTION OF THE AREA.

The Twin Falls area, Idaho, is situated in the northern part of Twin Falls County. Twin Falls County is in the southern tier of counties, its southern boundary being the Idaho-Nevada State line, and only one county to the west separates it from Oregon. The area is bounded on the north by Snake River, which also forms the boundary between Twin Falls County and Gooding and Jerome Counties, and on the east by Cassia County. The southern boundary of the eastern part is the Twin Falls-Cassia County line; to the west it follows roughly the course of the High Line Canal of the Twin Falls South Side irrigation project. The western boundary is Salmon Falls Creek. The area covered by the survey is 349 square miles, or 223,360 acres.

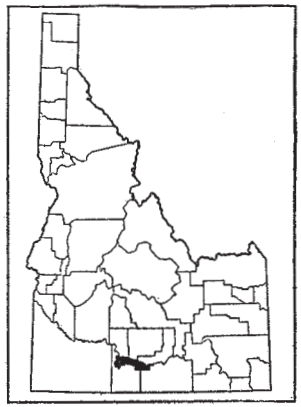

Fig. 44.—Sketch map showing location of the Twin Falls area, Idaho.

The Twin Falls area lies in the southern part of the great intermountain valley known as the Snake River Plains.[1] Considered separately, this part of the Snake River Plains has the aspect of a level to rolling plain, bounded on the south by the Rock Creek Hills and on the north and west by the descending cliffs of the canyons of Snake River and Salmon Falls Creek. This generally rolling to level topography is characteristic of more than 90 per cent of the area mapped in this survey (Pl. XLII, fig. 1). The lower slopes of the Rock Creek Hills extend into the area south of the Rock Creek settlement. On the plains proper there are a few rounded hills, locally called buttes, chief of which is Hansen Butte, about 4 miles southeast of the town of Hansen. This is not named on the map.

From Milner to Blue Lakes Bridge the Snake River Canyon is a narrow, steep-walled box canyon 100 to 600 feet in depth, the only breaks in the precipitous cliffs being very narrow benches in places and steep talus slopes. In the vicinity of Blue Lakes Bridge the canyon widens and includes small areas of bottom land and terraces, some of which form areas of agricultural land (Pl. XLII, fig. 2). From Blue Lakes Bridge downstream to Clear Lake Bridge the rim rock gradually becomes less prominent and finally gives way to a long, steep talus slope, which in places is separated from the river by narrow stretches of bench lands. Just below Clear Lake Bridge and straight north of Buhl the canyon wall is eroded away and the adjacent country is dissected into a region of rough and broken topography for a distance of 4 miles south from the river. This region of broken topography, covering about 18 square miles of the Twin Falls area, is marked by steep slopes and V-shaped ravines, with here and

[1] For a discussion of the geography and geology of this region see Bulletin No. 199 of the U. S. Geological Survey: Geology and Water Resources of the Snake River Plains of Idaho.—Russell.

there small, comparatively smooth areas forming ridge crests, benches, and narrow stream bottoms.

The general elevation of the upland region of the Twin Falls area is about 4,000 feet above sea level, as indicated by the following elevations: Milner, 4,210; Murtaugh, 4,130; Kimberly, 3,960; Twin Falls, 3,825 (Weather Bureau station); and Buhl, 3,843 feet.

The master stream of the Snake River Plains is Snake River, which forms the northern boundary of the Twin Falls area. Throughout most of its course adjacent to this area it is vigorously cutting its channel through the volcanic rock of the region. It makes a descent of many hundreds of feet from the Milner dam to the point where it leaves the area, largely in a series of falls and rapids. Two of the falls, Twin and Shoshone, are of great scenic interest as well as sites for the development of hydroelectric power. The larger tributaries of Snake River that form drainage ways for the Twin Falls area are Cedar Draw and Salmon Falls, Deep, Rock, and Dry Creeks. These all rise in the hills and higher country south of the area and cross it in a general northward direction, except Rock Creek, which has a northwestward course. Between these larger tributaries are smaller streams, locally called coulées, which carry the waste water from the irrigation system over the canyon walls, forming small waterfalls at many points.

Owing to the sloping and rolling topography and the complete ramification of the stream ways, the Twin Falls area, as a whole, is exceptionally well drained. The surplus irrigation water is well disposed of, except in a very few seepy areas which are described in detail elsewhere in this report.

Twin Falls County was formed in 1905 from the western part of Cassia County. Prior to this date there were a few old cattle ranches along the foot of the Cassia Hills (not named on map) and a few scattered ranches along Snake River. In the summer of 1904 the Twin Falls Southside Land & Water Co. irrigation project was opened to entry, and the first water was applied to the land in the spring and summer of 1905. The land under this project, which covers the greater and most important part of the area of this survey, was quickly taken up and developed, and the population increased very rapidly for the first five years. Since that time growth in population has been steady, though not so rapid. The Twin Falls-Salmon River project, part of which is also included in the area, was first watered in 1911, but on account of an insufficient water supply it has not had the same degree of successful development as the Twin Falls Southside tract.

The population consists very largely of native Americans, coming from practically every State in the Union. Probably more are from the Middle West than from any other section. Iowa, Illinois, and Ohio are very strongly represented. The South and West have also furnished a considerable proportion of the population of the county. There are some Germans, Scandinavians, and Dutch among the inhabitants, and a very few negroes, Mexicans, and Japanese.

The population of Twin Falls County was 28,398 in 1920. About 70 per cent was classed by the census as rural population. About one-fourth of this rural population is included in small towns scattered throughout the county, and the remainder consists of farm families. The entire Twin Falls Southside tract is rather thickly

settled and includes within its boundaries the greater part of the population of the county.

Twin Falls, the largest town and county seat, with a population of 8,324 in 1920, is an important trading center and shipping point. It has a number of manufacturing and packing concerns, among which are a beet sugar factory, a flour mill, two creameries, a dehydrating plant, meat-packing plants, and a number of apple-packing concerns. There are two wholesale grocery houses. Several commission companies buy alfalfa, hay, potatoes, onions, beans, and clover and alfalfa seed.

Buhl is situated at the terminus of a branch railway; it is an important trading and shipping town, with a population of 2,245 in 1920. Filer, with a population of 1,012, Kimberly with 501, Hansen with 278, and Murtaugh are all local trading and shipping points.

Twin Falls County is served by the Twin Falls Branch of the Oregon Short Line Railroad, which extends from Minidoka, on the main line, to Buhl. A subbranch runs from Twin Falls to Rogerson, on the Twin Falls-Salmon River tract. Construction has been started on a line from Rogerson to Wells, Nev., there to connect with the Southern Pacific Railroad, which will provide a direct route to San Francisco.

There are roads on the majority of the section lines in the irrigated districts. Some of these are unimproved, but the majority are graded and dragged. The State highway, from Hansen on the east to a point between Filer and Buhl on the west, is surfaced, partly with concrete pavement and partly with bitulithic pavement on a concrete base. A number of oil-bound macadam roads extend several miles north, south, and west from Twin Falls, and others extend north and south from Hansen. The State highway and other main roads leading out of Buhl are graveled for several miles, and there are many miles of graveled road in other parts of the county. The dirt roads are passable practically all the year, though they become badly rutted and very dusty in the summer and very muddy during the winter and early spring.

Telephone service extends throughout most of the irrigated region. Electric light and power are available in the towns and on the farms adjacent to the electric transmission lines.

Twin Falls, Buhl, Filer, Kimberly, and other smaller towns furnish a limited local market for farm products. Much of the alfalfa grown is fed locally to range sheep and to beef and dairy cattle. Much of the wheat is milled into flour at Twin Falls and Kimberly. Both flour and wheat are shipped to distant markets. Beet sugar is manufactured at Twin Falls and shipped to various parts of the country. Dairy products are manufactured at Twin Falls and Buhl and are sold in southern Idaho and at various points in adjoining States. Much of the fruit, vegetables, potatoes, dairy products, and flour is used locally. Potatoes, fruit, beans, and clover and alfalfa seed are extensively shipped to Middle West and Pacific coast markets. Cattle and sheep are shipped largely to Portland or to middle western points.

CLIMATE.

The climate of the area, like that of the large section of country known as the Snake River Plains, is characterized by a low annual rainfall, a dry atmosphere, hot summers, cold winters, and a large

proportion of sunny days. The dry heat of the summers is not oppressive and the winters are often rather open, though considerable snowfall occurs at times. Strong winds are common in the spring and early summer, and at this time of the year dust storms are not infrequent. The prevailing winds are from the west and southwest.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau station at Twin Falls:

Normal monthly, seasonal, and annual temperature and precipitation at Twin Falls.

(Elevation 3,825 feet.)

Month.	Temperature.			Precipitation			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1919).	Total amount for the wettest year (1907).	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	28.4	64	−15	1.06	0.90	1.79	6.6
January	26.8	64	−20	1.37	.51	1.34	7.6
February	31.4	61	−14	.97	1.23	2.90	6.7
Winter	28.9	64	−20	3.40	2.64	6.03	20.9
March	39.3	76	−3	.90	1.24	4.80	1.8
April	47.0	91	12	1.00	.98	.97	1.1
May	54.2	98	23	1.20	.14	.93	.4
Spring	46.8	98	−3	3.10	2.36	6.70	3.3
June	62.2	100	27	1.04	.00	2.43	T.
July	70.4	103	31	.40	.24	.15	.0
August	68.3	102	31	.24	.01	.43	.0
Summer	67.0	103	27	1.68	.25	3.01	T.
September	59.3	96	19	.75	1.49	.70	.0
October	48.0	91	10	.94	.72	1.19	.6
November	37.6	74	−8	1.16	1.07	.72	2.7
Fall	48.3	96	−8	2.85	3.28	2.61	3.3
Year	47.7	103	−20	11.03	8.53	18.35	27.5

Selected climatic data compiled from Weather Bureau records covering three stations located at Murtaugh, Twin Falls, and Buhl are given in the table below:

Climatic data for the stations at Murtaugh, Twin Falls, and Buhl.

	Murtaugh.	Twin Falls.	Buhl.
Mean annual precipitation.....inches	11.15	11.03	10.55
Total precipitation for the driest year.....do	7.09	8.53	3.05
Total precipitation for the wettest year.....do	19.39	18.35	14.65
Snow, average depth.....do	32.5	27.5	21.8
Mean annual temperature.....°F	46.4	47.7	49.2
Highest temperature recorded.....do	101	103	107
Lowest temperature recorded.....do	−26	−20	−12
Average date of last killing frost in spring	May 8	May 23	May 10
Average date of first killing frost in fall	Sept. 27	Sept. 30	Oct. 6
Average length of growing season.....days	141	129	148
Latest recorded date of killing frost in spring	June 22	July 14	June 1
Earliest recorded date of killing frost in fall	Aug. 23	Sept. 5	Sept. 12

The average annual precipitation at Twin Falls for the years since records have been kept is 11.03 inches; the average at Buhl is 10.55 inches and at Murtaugh 11.15 inches. The average annual snowfall at Murtaugh is 32.5 inches, at Twin Falls 27.5 inches, and at Buhl 21.8 inches. The precipitation comes largely in the fall, winter, and spring. The summers are usually very dry, making it possible to cure hay and seed crops in the field with little danger of damage from rain.

The frost-free season at the Twin Falls station is shorter than at the other stations, owing to the occurrence of frosts late in spring. The mean monthly temperature at Twin Falls is normally intermediate between those at Murtaugh and at Buhl.

Late spring frosts occasionally do considerable damage to fruit, beans, and tender vegetables. Beans are grown over a large area on the Twin Falls tract, but are more subject to frost, and consequently less grown, on the higher land in the east end.

The region lying in the bottom and on the slopes and benches of the Snake River Canyon is at a lower elevation than the upland composing the larger part of the Twin Falls area, and has a warmer climate and a longer growing season. Here are grown watermelons, cantaloupes, sweet potatoes, peaches, apricots, sweet cherries, and other crops that can not be grown with much assurance of success on the higher lands.

AGRICULTURE.

Prior to 1904 the area covered by this survey was largely a sagebrush desert. There was no agricultural development, except on a number of old cattle ranches on Rock Creek and Dry Creek at the base of the foothills, and a few others in the Snake River Canyon. On these ranches some hay was produced for the winter feeding of range cattle.

In 1904 the Twin Falls Southside Land & Water Co.'s tract, embracing a total area of 240,000 acres of land, was opened to entry under the Carey Act, and in 1905 the first water was run on the land. After that date development proceeded very rapidly. The land had to be cleared of brush and leveled before it could be cultivated. At the present time practically all of the land considered irrigable has been brought under cultivation. The land under water rights totals 203,748 acres, of which 187,401 acres were reported as cropped in 1921; roads, canals, and laterals occupy 12,256 acres; and the small remaining area is probably largely idle land. A small part of the Twin Falls-Salmon River tract, which was opened in 1911, lies in the southern part of the survey. The greater part of this land for which water is furnished is under cultivation.

Dry farming is of so little importance in the area as to be negligible. It has been tried in the past, but practically all the land, amounting to several thousand acres, once cleared for dry farming has been abandoned.

The character of the crops grown and cultural methods used have not changed greatly since the beginning of the development of the area, though the relative acreage of the different crops has varied greatly from year to year. Since the building of the sugar factory at Twin Falls in 1916 sugar beets have been an important crop. Early in the history of the development of the tract much alfalfa

was produced and shipped to outside markets. As this did not prove profitable on account of high freight rates, farmers turned to other crops. Potatoes, apples, clover seed, sugar beets, wheat, and beans in turn have had a wide popularity for a time, only to be replaced by something promising a larger cash return. The production of cash crops has been the chief aim of the farmers. Dairying and stock raising have developed slowly, though considerable feeding of range cattle and sheep has been carried on.

The following table shows the acreages of crops grown on the Twin Falls Southside tract in the last seven years, as reported by the Twin Falls Canal Co.:

Acreage of crops in the Twin Falls Southside tract, 1917 to 1923.

Crop.	1917	1918	1919	1920	1921	1922	1923
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Alfalfa hay	44,206	45,613	46,518	56,416	52,907	43,292	44,462
Alfalfa seed	76	87	580	1,937	1,765	189	218
Red clover hay	4,843	2,488	2,247	2,432	3,180	2,058	1,668
Red clover seed	9,183	3,126	5,548	9,385	13,056	9,798	8,190
White clover seed	2,518	379	209	28	320	520	379
Alsike clover seed	7,384	2,079	1,937	1,919	2,970	3,274	5,054
Pasture grass	13,175	13,113	15,581	14,071	13,672	12,072	14,995
Wheat	58,011	80,119	74,913	64,852	64,878	51,190	34,421
Oats	5,673	4,495	3,148	3,251	2,074	1,765	2,204
Timothy hay	74	4					
Corn	963	874	1,752	2,469	3,445	5,959	15,407
Barley	4,766	4,958	4,638	6,175	3,070	3,589	5,749
Rye	123	200	14	29	31	72	144
Potatoes	6,880	3,699	3,956	4,254	7,656	10,933	6,846
Beans	5,495	11,618	11,308	7,233	3,420	8,179	19,397
Peas	1,101	929	155	124	125	46	156
Sugar beets	7,440	3,395	5,167	5,715	7,959	1,791	3,804
Stock beets	53	90			24	36	40
Millet	14	2					
Apples	5,643	3,242	3,445	2,370	2,062	2,070	2,448
Peaches	450	315	454	287	175	205	201
Prunes	152	201	212	144	100	96	213
Pears				13			
Apricots						8	
Berries					7		
Grapes				46	39	19	9
Family orchards	1,977	2,024	2,643	2,943	3,293	2,080	2,053
Melons	11	8	22		3	11	10
Lettuce						102	157
Onions	115	30	7		22	68	139
Miscellaneous vegetables				94		9	28
Gardens	646	825	841	947	1,150	900	840
Miscellaneous	593	594	600				
Total	181,565	184,507	185,895	187,134	187,403	160,331	169,232
Acreage not reported						43,417	34,519
Total acreage						203,748	203,751

Besides the acreage above reported, a few thousand acres on the Twin Falls-Salmon River tract lying within the area are producing alfalfa hay, alfalfa seed, clover seed, wheat and other grains, and potatoes. A few thousand acres in the Rock Creek and Dry Creek neighborhoods are producing alfalfa and wild hay and a small quantity of grain.

The soils of the area are very productive where supplied with irrigation water and properly farmed. Data obtained from publications of the University of Idaho Agricultural Experiment Station and from other sources indicate that alfalfa yields from 2 to 7 tons of hay per acre, with an average of about 4 tons; wheat produces 20 to 90 bushels per acre, with an average of 35 to 40 bushels; beans yield 10 to 45 bushels, with an average of 25 bushels; potatoes, 100 to 800 bushels,

averaging about 250 bushels; sugar beets, 5 to 25 tons, averaging about 12 tons; corn, 30 to 100 bushels, averaging about 45 bushels; alsike clover seed, 2 to 20 bushels, averaging 7 bushels; red clover seed, 2 to 12 bushels, averaging 5 bushels; alfalfa seed, about 6 bushels per acre on an average, with record yields of 30 bushels; barley, 30 to 100 bushels, averaging 60 bushels; and oats, 30 to 120 bushels, averaging 75 bushels. Apples produce 5 to 10 tons per acre in favorable years, but are subject to frequent losses by frost over much of the area.

The wide range in yields is probably due largely to differences in farming methods, as the soils over the greater part of the area are remarkably uniform. The extremely high maximum yields given are most often obtained on small acreages, but show the possibilities where the best methods are used.

The soils over the greater part of the area are recognized as being well adapted to all the crops named above. The sandier soils to the northwest and north of Buhl and in the Snake River Canyon farther east are recognized as being especially adapted to melons, early vegetables, peaches, apricots, sweet cherries, and grapes.

Alfalfa and clover hay, as well as beet tops, beet pulp, and some grain and clover straw, are consumed by the farm stock and range cattle and sheep. Little hay is shipped, as many areas are quarantined against alfalfa from this section on account of the alfalfa weevil, which has been found here. Part of the wheat grown is ground into flour at Twin Falls and Kimberly, but much is shipped to Middle West and Pacific coast markets. Potatoes go mainly to California and the Middle West. Sugar beets are manufactured into sugar at Twin Falls, and the sugar has a nation-wide market. Much of the corn, oats, and barley is used locally for stock feeding. Beans are grown, largely under contract, for eastern seed companies. Clover and alfalfa seed have a market chiefly in the East and Middle West. Apples are shipped, in bulk or boxed, mainly to Chicago. The other fruits and vegetables are largely used locally. In recent years a number of cars of head lettuce have been shipped to outside markets. A small quantity of market milk is used locally. Ice cream, butter, and cheese are manufactured, and shipped in part to outside markets. Some cream is also shipped to Pocatello, Salt Lake, and other outside points. Cattle, sheep, and hogs are shipped to Portland, Salt Lake City, and California and Middle West markets.

Dairying is practiced on a rather small scale in the area. It is slowly increasing in importance, being fostered by the high freight rates on the bulk of farm products and the large production of cheap feeds available. Sheep, hogs, and beef cattle are raised but not on a large scale. Many range cattle and sheep are fed on the ranches during the winter. According to the annual report of the Twin Falls Co. for 1923, there were on the Twin Falls tract 698 mules, 7,824 work horses, 913 colts, 1,126 mares, 31 stallions, 2,530 beef cattle, 7,976 milk cows, 2,961 heifers, 4,119 calves, 43,605 sheep, 33,753 hogs, and 32 goats.

The farmers have found from experience that the growing of alfalfa, clover, or other leguminous crops is essential to maintaining soil fertility. Large crops of potatoes, beets, and grains are obtained on ground that has been in alfalfa and clover, while the yields dwindle after the land has been in other crops for several years. Crop rotations vary considerably, but usually include the growing of

alfalfa or clover, followed by some intertilled crop, such as potatoes, sugar beets, beans, or corn, and then by wheat or some other small grain. Barnyard manure is practically the only fertilizer used. It is often wasted, and straw and stubble are often burned.

Most of the farm labor is American, though cheap Mexican labor is often used in the beet fields. Wages paid for farm labor vary from $40 to $100 per month, depending on the nature of the farming operations. Special labor is paid $3 to $6 or more per day for harvesting and threshing. Much of the labor of thinning, hoeing, and harvesting beets is let by contract.

Farms vary from a few acres to 320 acres or more in size. The prevailing sizes are 40 and 80 acres, with an average of about 60 acres. The greater part of the land, probably about 70 per cent, is farmed by owners. Where land is farmed by tenants the commonest practice is that of share renting, the part received by the owner being one-third to three-fifths, depending on the nature of the crop and the seed, machinery, and livestock furnished by the owner.

Little land is changing hands at the present time (1923). Prices have declined greatly since the high peak reached just after the war. It seems probable that values range from $125 to $300 an acre, depending on location, improvements, depth of soil, and freedom from stones. From $175 to $200 an acre is about the average price asked.

SOILS.

The Twin Falls area lies in that part of the Snake River Plains which was covered, in comparatively recent geological times, by a series of lava flows. The lava consolidated into a black massive rock known as basalt, which constitutes the bedrock over practically all the area. The individual lava flows are separated in places by volcanic material of different character, such as volcanic breccia, volcanic sand, and lapilli, and by water-laid sediments consisting of clay, sand, and gravel. This interbedding of material may be observed along the walls of the deeper canyons of the area, but is of importance in connection with the soils only in the broken country north and northwest of Buhl. In this region the basalt sheets are comparatively thin and the beds of unconsolidated material are thick, with the result that erosion has proceeded quite rapidly, exposing old alluvial or lacustrine material and favoring the formation in places of more recent alluvial deposits.

The Rock Creek Hills, which lie to the southward, have contributed some material to the soils of the Twin Falls area. They are composed of volcanic rock, called rhyolite, which is older than the basalt of the plains and of a different character.

The basalt bedrock of the area is covered by a mantle of remarkably uniform, fine, dustlike material, composed largely of silt and very fine sand. The surface color, when dry, is a very light brown. It is evident that this material has not been derived by weathering from the rock which underlies it. All evidence tends to show that it owes its present distribution to wind, which has picked it up from mountain slopes and alluvial and lacustrine deposits and carried it to its present location.[2] Similar material, called loess, covers exten-

[2] United States Geological Survey, Bul. No. 199. Geology and Water Resources of the Snake River Plains of Idaho

sive areas in eastern Washington, in the Mississippi Valley, and in China. This dustlike, wind-borne material, 80 per cent or more of which is silt and very fine sand, is the parent material from which almost all the soil of the area has been formed.

From the parent material the soils of the area have developed under the influence of an arid climate, a moderate to high summer temperature, and a moderate to low winter temperature. The low annual rainfall has permitted the retention of soluble salts in the soil, but the pervious texture and structure of the parent material, the undulating to rolling topography, and numerous cracks and crevices in the basalt bedrock, have favored good drainage conditions over most of the area, and prevented the excessive accumulation of those salts which constitute "alkali."

The carbonates of calcium and magnesium have largely been leached from the surface layers to a depth of 15 or 18 inches, and have been concentrated in a deeper layer, 15 to 18 inches thick, which is distinctly noticeable by its compactness and its white to yellowish-white color. This material effervesces freely in dilute hydrochloric acid. Below 3 feet the parent material, itself rich in free carbonates, is encountered.

The soils of the area are classified in soil series on the basis of differences in origin, color, and structure. Each series is composed of soil types which differ from each other in the texture or relative coarseness or fineness of the surface soils.

The soils developed from the wind-borne material, which covers over 83 per cent of the area, have been classed in the Portneuf series, which is represented mainly by the Portneuf silt loam, with a small proportion of the Portneuf fine sandy loam.

The McCammon sandy loam is formed from residual material resulting from the disintegration in place of a granular volcanic rock. The remaining soils of the area, which have a total extent of about 15 per cent of the entire surface, are derived wholly or in part from water-laid material.

The Downey series represents fine material and gravel washed down from adjacent hills and deposited in the form of broad alluvial fans or stream terraces. The material has been in place a sufficient length of time to develop a profile similar to that of the soils in Portneuf series, from which it is differentiated by slightly darker color and the presence of underlying cemented gravels. The color is light brown to brown. The coarser material consists of fragmentary volcanic rock.

The Ephrata series, represented by the fine sand and loam types, occurs as high-terrace remnants of old sedimentary deposits along Snake River. The color is light brown; the substratum consists of stratified gravel of many different kinds of rock, largely chert, quartzite, and volcanic rock, some of which is partly cemented by lime. It is likely that much of the finer material of the surface soils of this series is wind-borne, and the upper part of the profile is similar to that of the Portneuf series.

Two series of soils, the Beverly and the Red Rock, each represented by the fine sandy loam type, include the more recent alluvial soils occupying stream bottoms and low terraces, which are typically underlain by gravels. The Beverly is a light-brown to brown soil derived from a wide range of materials, including chert, quartzite,

granite, and various kinds of volcanic rock. The Red Rock is dark brown to dark grayish brown in color; the material is largely accumulated from regions of volcanic rock and from the loessial deposits of the surrounding uplands.

The Onyx series is represented in this area by local areas of silt loam occupying coulée bottoms and local drainage ways in association with the Portneuf series. The soil is of brown color and typically of alluvial origin, though as occurring in this survey it probably consists to a large extent of fine material of the Portneuf series which has been drifted into the depressions by winds and mixed with alluvial accumulations.

The following table gives the actual and relative extent of each soil type mapped in the Twin Falls area:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Portneuf silt loam	125,696	83.5	Red Rock fine sandy loam	3,008	1.4
Shallow phase	60,736		McCammon sandy loam	1,600	.7
Rough broken land	8,128	3.6	Onyx silt loam	1,408	.6
Downey loam	3,072	3.1	Beverly fine sandy loam	704	.3
Shallow phase	3,904		Ephrata fine sand	448	.2
Ephrata loam	4,096	2.7	Portneuf fine sandy loam	384	.2
Alluvial-fan phase	2,048				
Rough stony land	4,864	2.2	Total	223,360	
Scabland	3,264	1.5			

M'CAMMON SANDY LOAM.

The McCammon sandy loam, to a depth of 3 inches, is a dark-brown sandy loam containing angular fragments of basalt. This is underlain by a slightly compact brown to rusty-brown sandy loam which grades at varying depths into undecomposed bedrock. The bedrock in most places is within 3 feet of the surface, and is a black, granular, volcanic formation, loosely consolidated and very readily disintegrated. The McCammon sandy loam is largely composed of residual material resulting from the disintegration of this rock, with some admixture of finer material blown in by the wind. The rock fragments found in the soil vary in size from small angular particles to stones 6 to 8 inches in diameter, but are not generally numerous and over much of the area are absent from the surface.

The McCammon sandy loam is confined to the rough country north and northwest of Buhl, where it occurs as level or gently sloping areas in a general region of Rough broken land. Because of its small extent the type is of relatively little importance agriculturally, although much of it is irrigated and cultivated. The type is more generally suited to the production of watermelons, cantaloupes, and other vegetables than to general farm crops. Trucking and gardening are favored by a comparatively long growing season and the loose sandy texture and warm nature of the soil, while large scale general farming is rather handicapped by the small size and topographic position of areas of the type and by the necessity for close attention to moisture supply.

PORTNEUF FINE SANDY LOAM.

The Portneuf fine sandy loam to a depth of 12 or 15 inches is a light-brown to brown fine sandy loam containing relatively large proportions of very fine sand. This is underlain by a compact stratum of light grayish brown or light brownish gray fine sandy loam, very rich in lime, which extends to a depth of 2 to 3 feet. Beneath this compact layer the substratum is variable, typically consisting of a friable fine sandy loam or sandy loam in places grading into fragmentary basalt material within the 6-foot section.

The areas mapped as Portneuf fine sandy loam are small and scattered. The largest and most typical area is in sections 18 and 19, T. 9 S., R. 15 E. It lies just below the general upland level, but above the region of broken topography to the eastward. The lower substratum here has a high lime content and much fragmentary basalt material at depths of 4 to 5 feet.

A small area occupies a bench in Snake River Canyon, in section 17, T. 9 S., R. 16 E. The surface soil here in places contains fragmentary basalt material washed from the adjacent canyon walls. The subsoil and substratum are also partly composed of small angular basalt fragments, but the main body of the material is a fine sandy loam, probably carried to its present location by wind. Much of this area has been ruined by seepage and alkali. Other similar areas, too small to indicate on the map, occur in the adjacent Rough broken land.

A very narrow belt on the edge of Snake River Canyon, in sections 29, 32, and 33, T. 9 S., R. 17 E., is included with this type. It is a brown fine sand with a dunelike topography which indicates windblown materials. This area is not irrigated and has no present agricultural value. A similar small area lies in section 34, T. 11 S., R. 18 E., above the High Line Canal. It is an accumulation of windblown fine sand lying upon material of the Downey soils, by which it is surrounded. If of greater extent it would have been recognized under a separate series and type designation.

Two very small areas of Portneuf fine sandy loam are mapped on the bench in Snake River Canyon near Shoshone Falls. The surface soil is chiefly the typical light-brown fine sandy loam, which owes its present location to wind transportation, but varies from the typical in character and depth. Generally it is a calcareous fine sandy loam below a depth of 12 inches, grading into fragmentary basalt and lime concretions, and in places underlain within the 6-foot section by basalt bedrock.

The agricultural value of the Portneuf fine sandy loam depends upon topographic position and water supply. The area in sections 18 and 19, T. 9 S., R. 15 E., which lies within the Twin Falls Southside project, has about the same general value as the Portneuf silt loam with which it is associated. The areas located on the benches in Snake River Canyon, unless affected by seepage and alkali, are valuable for fruit and truck crops where a water supply is obtainable.

PORTNEUF SILT LOAM.

The Portneuf silt loam, in its natural undisturbed state, shows a well-developed and remarkably consistent vertical profile. The surface layer of 2 or 3 inches consists of a very light brown silt loam or

very fine sandy loam, distinctly separate from the soil just beneath it. When dry this surface layer is very slightly coherent, forming a fragile crust, which is broken by small vertical cracks into irregular blocks or plates that can be lifted out. These fragments of the surface layer are somewhat vesicular and very friable. They reduce to a powder upon very slight pressure, and absorb water almost instantaneously. This surface layer may be called the "desert mulch." Immediately below the desert mulch is a layer of silt loam of columnar structure and distinct brown color, which extends to a depth of about 15 inches. Locally this brown layer approaches a very fine sandy loam in texture. It grades into a compact yellowish-white silt loam, very rich in lime, which extends to a depth of about 36 inches. The compact layer, though in most places rather difficult to penetrate with the soil auger, is not impervious to water, and plant roots, especially those of alfalfa, readily grow into and through it. The compact layer is underlain by a mellow light-brown very fine sandy loam or silt loam, locally containing small lime cemented nodules, which continues to bedrock. Figure 45 gives a diagrammatic view of the profile of this soil.

The typical natural profile of the Portneuf silt loam can be observed only in the virgin areas. Even here it has been to some extent destroyed by the work of burrowing animals, especially badgers, which have brought up the deeper soil and subsoil and scattered it over the surface. On the steeper slopes erosion has exposed the whitish lime layer in places, and elsewhere has covered it to a greater depth than is typical. The work of leveling for cultivation, digging ditches, and plowing the land has, of course, entirely destroyed the natural profile of the upper soil. Leveling has introduced variations in the color of the surface, by exposing the whitish lime layer over small areas. The mixing of the soil under cultivation has given the general brown color of the brown subsurface layer to fields. Freshly plowed land, when moist, has a dark-brown appearance.

The depth to bedrock is the main variable feature of the Portneuf silt loam. Over much of the area it is 3 feet or less, and where such a condition prevails over a considerable acreage the areas have been differentiated on the soil map as a shallow phase. Areas which are shallow and also stony are indicated by stone symbols.

In places near the foot of the Rock Creek Hills in the southeastern part of the Twin Falls area very small rock fragments or gravel, washed down from the adjacent hills, are present on the surface and through the soil section. This variation from the typical Portneuf silt loam is found in association with the Downey soils. West of Buhl a similar condition exists near the area of Ephrata loam.

The Portneuf silt loam is found in all parts of the area. The greatest development of the typical deep soil is eastward from Twin Falls, around Kimberly and Hansen, and east and southeast from Hansen. The topography is nearly level to undulating, with some moderately steep slopes, such as those of Hansen Butte (Pl. XLI, fig. 1). Practically everywhere the topography and slope are favorable to irrigation and to the proper disposal of surplus irrigation water. Poor drainage conditions in the typical deep soil of the type are confined to very small areas, the largest being in the neighborhood of Rock Creek in sections 21 and 22, T. 11 S., R. 18 E., and

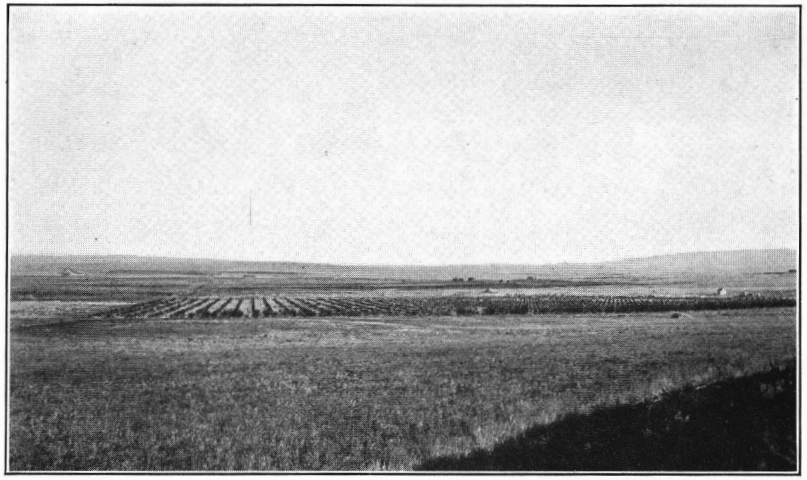

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FIG. 1.—PREVAILING TOPOGRAPHY IN THE TWIN FALLS AREA.

A general view in the southeastern part of the Twin Falls tract. Hansen Butte in left background. Rock Creek Hills dimly outlined in right background.

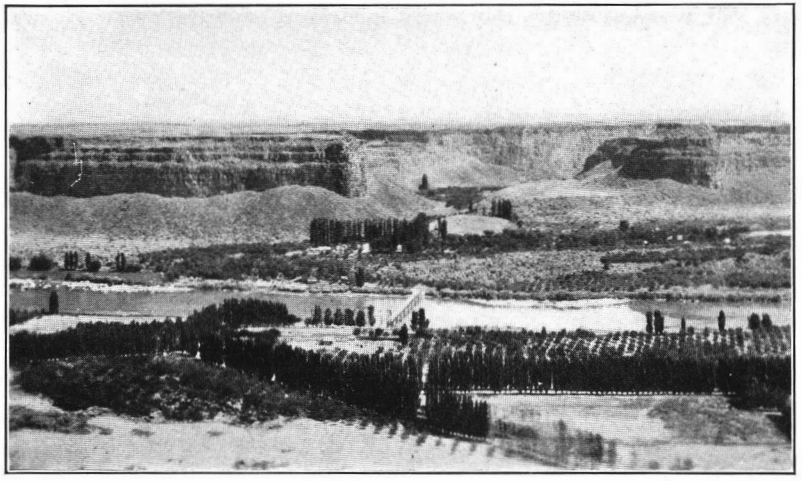


FIG. 2.—TERRACE AND BOTTOM LANDS IN THE SNAKE RIVER CANYON.

Terrace land in the foreground. Blue Lakes Ranch across the river. The Blue Lakes in the bottom of the tributary canyon are deep blue pools formed by springs having their sources in cavities and porous beds of the basaltic lava sheets.

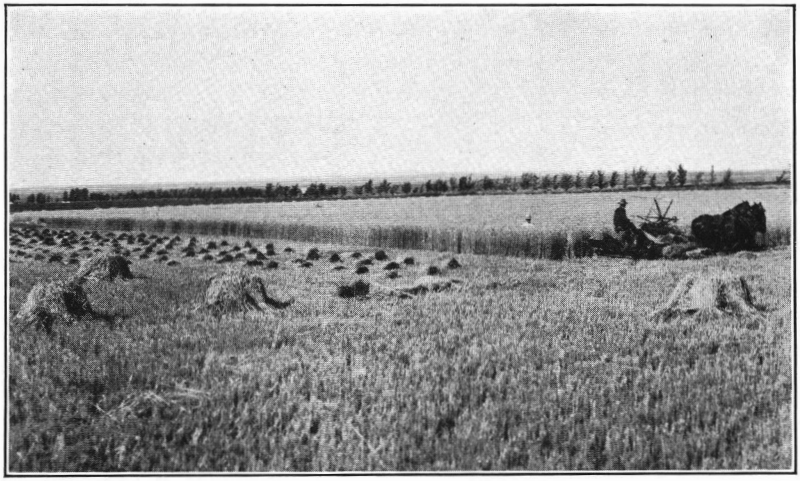


FIG. 1.—WHEAT FIELD ON PORTNEUF SILT LOAM.

This is an exceptionally fine stand of wheat on a farm 4 miles north of Twin Falls.

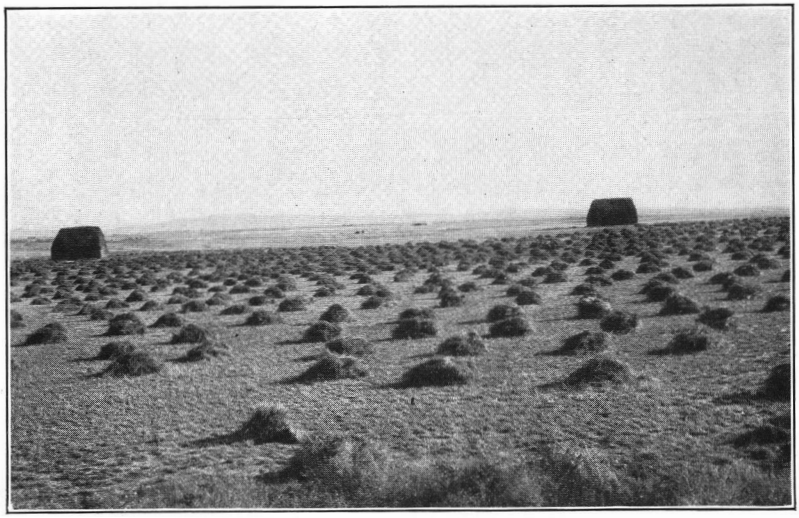


FIG. 2.—THIRD CUTTING OF ALFALFA ON PORTNEUF SILT LOAM.

Stacks from earlier cuttings in the background.

near Dry Creek in section 25, T. 11 S., R. 19 E., and section 30, T. 11 S., R. 20 E.

The Portneuf silt loam, because of its productivity and predominant extent, is the most important soil type of the area. Practically all of the land of this type which has been supplied with irrigation water is under cultivation. No part of the land included in this type was originally in forest. The dominant native vegetation was

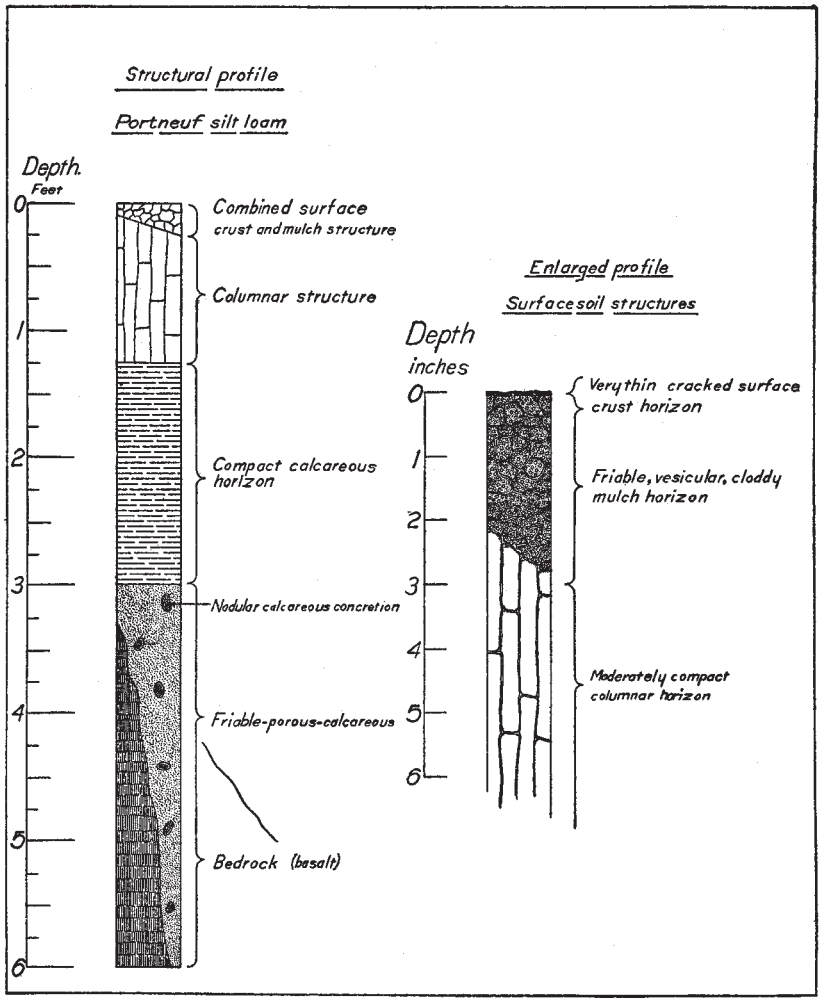


FIG. 45.—Diagram showing profile of Portneuf silt loam.

black sage, which attained a vigorous growth and extended almost without interruption over the entire area. Other species commonly associated with the sage were western wheat grass, fine-leaved bluegrass, and a species of moss. Rabbit brush, broncho grass, and other small grasses were found in some places. Wild mustard and Russian thistle commonly came in when the land was cleared and left to lie idle.

The most important crops are wheat, barley, alfalfa and red clover hay, potatoes, sugar beets, apples, beans, and clover and alfalfa seed. Dairying and hog raising are practiced on a small scale over most of the area. Many range cattle and sheep are fed each winter. Wheat yields heavily, the average yield being about 40 bushels per acre, while yields of 80 bushels or more are on record (Pl. XLIII, fig. 1). Barley yields 40 to 90 bushels, alfalfa hay 3 to 6 tons, with an average of about 4 tons (Pl. XLIII, fig. 2), potatoes 200 to 500 bushels, sugar beets 8 to 20 tons, beans 10 to 45 bushels, and alfalfa and clover seed 3 to 15 bushels per acre. Apples yield heavily when the fruit buds are not killed by spring frosts, but are subject to such killing, except in certain restricted areas which have especially good air drainage.

The land in this type, because of its undulating to rolling topography, is generally irrigated by the furrow or "corrugation" method. A common practice in the handling of this type is a rough rotation consisting of alfalfa for an indefinite number of years, followed by grain, potatoes, or sugar beets. Sometimes the land is kept in one of these crops for several years in succession. A very marked increase in yields of other crops is usually obtained on land which has been in alfalfa, and a very marked decrease follows the practice of cropping to grain for several years in succession. The only fertilizer used is barnyard manure, and even its use is not very extensive. The wasting of manure and the burning of straw stacks are very common.

Land of this type in the Twin Falls Southside tract is valued at from $150 to $300 an acre, depending on the improvements, nearness to towns, shipping points, or hard surfaced roads, the topography as related to ease and efficiency in irrigation, and the depth of the soil and degree of freedom from rock.

A better defined system of rotation, including a leguminous crop, a grain crop, and a clean-cultivated crop, is to be recommended. This will keep up maximum yields and rid the land of many weed pests, some of which are obtaining a strong hold in the region. Manure and straw should be carefully conserved and incorporated with the soil, as they supply the humus and nitrogen, the materials most needed in the soil.

Portneuf silt loam, shallow phase.—The immediate surface layer of the shallow phase of the Portneuf silt loam is a very light brown silt loam. This is underlain at about 2 inches by a brown silt loam, which grades at about 15 inches into material of similar texture but lighter colored and rich in lime. At a depth of 2 to 3 feet calcareous hardpan and lime-coated basalt fragments are encountered. This substratum is usually more or less fragmentary, and rests upon the basalt bedrock. The undisturbed soil profile is confined to unirrigated areas. Even in such areas there has been considerable mixture of the various layers owing to erosion by wind and water and to the work of burrowing animals, notably badgers. Small angular fragments of basalt and lime-cemented hardpan have been brought to the surface, and the highly calcareous subsoil has been freely mixed with the surface soil. Where irrigated and cultivated, the surface soil has been thoroughly disturbed and mixed by clearing, leveling, plowing, and cultivating the land. The shallow phase of the Portneuf silt loam occurs in all parts of the Twin Falls area, associated

with the deeper soil of the type. Its most conspicuous development is west and southwest of Buhl, where it occupies more than half of the land over a territory of several square miles.

Throughout the central part of the Twin Falls area the shallow phase is associated with the deeper typical Portneuf silt loam as elongated, comparatively narrow areas along the coulée courses, characteristically attaining its most extensive development on westward and southwestward facing slopes. North and east from Twin Falls, in the region of Kimberly and Hansen, and generally in the whole eastern part of the county, areas of the shallow phase are few and small.

The topography of this phase is nearly level to rolling or sloping. Much of it lies on coulée slopes of moderate gradient, seldom too steep for farming, although proper irrigation is difficult in places. Drainage is generally sufficient to take care of surplus water, the only exception being a few seeped slopes and water-logged lands adjacent to stream ways. One of the most conspicuous of the seeped areas in this phase lies in section 26, T. 10 S., R. 17 E., immediately south of Rock Creek Canyon. This area, at one time unfit for farming because of its water-logged condition and the resulting accumulation of alkali, is being successfully reclaimed by ditching.

The shallow phase of the Portneuf silt loam is an important soil agriculturally. It is second in extent only to the typical soil of the type, and although it requires more frequent applications of water, it produces very nearly as large crops as the deeper soil. Nearly all of the phase which is supplied with water is under cultivation.

The native vegetation is very much the same as that of the typical Portneuf silt loam; that is, sagebrush, moss, and fine-leaved grasses, though the grasses are perhaps less plentiful.

The crops are the same as those named for the deeper soil and the yields probably average only very slightly lower. The land is handled in practically the same way. Land values run slightly lower.

Shorter runs of water at more frequent intervals should be the rule on this phase, as the water-storing capacity is limited by the thinness of the soil mantle. The same recommendations as to crop rotation and incorporation of organic matter given for the deeper soil are applicable to the shallow phase.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the typical Portneuf silt loam:

Mechanical analyses of Portneuf silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
540901	Surface soil, 0 to 3 inches	0.0	0.0	0.7	2.3	32.6	54.6	9.8
540902	Subsurface, 3 to 14 inches	.0	.4	.3	3.4	34.9	50.5	10.5
540903	Subsoil, 14 to 36 inches	.0	2.1	1.3	3.6	29.6	55.0	8.4

DOWNEY LOAM.

The Downey loam to a depth of about 2 inches is a very light brown or light grayish brown silt loam to very fine sandy loam, containing small angular to slightly rounded gravel. This is underlain

by a brown to rather dark brown loam relatively high in very fine sand. At a depth of about 18 inches this grades into a yellowish-white or light-gray stratum, very rich in lime, rather compact, and usually 18 to 20 inches thick. Below this the material is a light-brown to light-grayish very fine sandy loam or silt loam, moderately rich in lime and mellow in structure. The substratum beneath this is gravel, generally cemented into a conglomerate by lime carbonate. The undisturbed profile, as above described, can be observed only in uncleared, uncultivated areas. It is very similar to that of the Portneuf silt loam, with which it is associated so closely that boundaries between the two types must be arbitrarily drawn. The difference is chiefly one of origin of material and the presence of a cemented gravel substratum, the Downey soil being a mixture of wind-borne loess and material washed down from the Rock Creek Hills, while the Portneuf silt loam is typically composed entirely of loess material.

The Downey loam, as mapped, includes areas of variable texture, the fine material ranging from a light silt loam to a fine sandy loam. There is also considerable variation in the quantity and vertical distribution of the small rock fragments or gravel which characterize the type. In general, the quantity of coarse material is greater near the Rock Creek Hills, and the individual fragments are likely to be larger. A third variation is in the depth to the cemented gravel or conglomerate substratum. Where it is consistently less than 3 feet over considerable areas, such areas have been mapped as a shallow phase.

The Downey loam is confined to the southeastern part of the Twin Falls area. The largest development is in the neighborhood of Rock Creek, the settlement near the foot of the Rock Creek Hills. Other areas are mapped on or near the southern boundary of Twin Falls County between Rock Creek and the southeastern corner of the county.

The topography is nearly level to sloping, the general downward gradient being northward. Drainage conditions are variable. The unirrigated areas are, of course, well drained, having sufficient slope to provide run-off for the small rainfall of the region. A large proportion of the area bordering Rock Creek, below the High Line Canal, is badly water-logged.

The Downey loam, on account of its limited extent and the fact that a large part of that which is under irrigation is water-logged and affected by alkali, is not a very important agricultural soil in this area. Approximately three-quarters of the land included in this type is under irrigation, and of this probably not over half is actually in crops. The remainder is too wet or contains too much alkali for cultivation and is used for wild meadow and pasture.

The native vegetation consists largely of sagebrush, with a few small, fine-leaved grasses and moss. After the land becomes affected by alkali, greasewood and salt grass form the chief vegetation. Foxtail, rye grass, sweetclover, and sunflowers are common in neglected fields slightly affected by alkali.

The important crops are alfalfa, wild hay, and wheat. Range cattle are fed on much of this land during the winter. Alfalfa yields

3 to 5 tons per acre, wild hay about 2 tons. Wheat yields 30 to 70 bushels per acre. This land is largely included in old stock ranches. It is farmed in a haphazard manner, the land often being kept in alfalfa and wild hay for long periods of years. Much of it has become water-logged and is affected by accumulations of alkali salts, with no provision made for drainage. The wintering of cattle on the land often causes the accumulation of much organic matter on the surface. Artificial manuring is seldom resorted to.

The greatest need of land included in this type is drainage. A more frequent plowing up of hayfields and the growing of alfalfa in place of wild hay are to be recommended where the soil is sufficiently free from alkali to permit.

Downey loam, shallow phase.—The surface layer of 2 inches of the shallow phase of the Downey loam is a very light brown or light grayish brown loam containing relatively large proportions of very fine sand and silt, and considerable subangular to slightly rounded gravel. This is underlain by a brown loam of similar texture, which generally grades into a lighter colored loam or silt loam very rich in lime. The substratum, usually found within 3 feet of the surface, consists of water-laid gravel cemented by lime. The gravel and stones in the surface layer and forming the substratum are all volcanic rock, chiefly rhyolite, washed down from the Rock Creek Hills, which lie to the south.

The shallow phase lies chiefly in two areas, separated by the narrow belt of bottom land along McMullen Creek, at the foot of the Rock Creek Hills. The topography is nearly level to undulating with a general northward slope. This slope is sufficient to insure good drainage, except for very small areas just below the High Line Canal, which have been somewhat seepy. This local condition is being corrected by ditching. Smaller areas of this phase are mapped along or near the southern boundary of Twin Falls County, east of Rock Creek. One of these areas, lying in the extreme southeastern part of the county, varies from the other areas in that it is underlain in places by basalt rather than cemented gravel, although the surface material contains the characteristic fragments of rhyolite washed down from the adjacent hills. The shallow phase of the Downey loam is similar in origin to the deeper typical soil, being a mixture of wind-borne fine material and material washed from the adjacent hills.

The shallow phase of the Downey loam, because of its limited extent, is not very important agriculturally in this area. The native vegetation is practically the same as that of the deeper soil. Approximately one-half of this land is under irrigation and practically all that under irrigation is used for growing crops. The important crops are alfalfa, wheat, and red clover. Alfalfa yields 3 to 5 tons per acre, red clover about 3 tons, and wheat 30 to 60 bushels per acre. Some of the land of this phase has been affected by seepage, but is now drained. Rotation practice includes the alternate growing of alfalfa or clover and grain.

The table below gives the results of mechanical analyses of samples of the surface soil, subsurface, and subsoils of the typical Downey loam:

Mechanical analyses of Downey loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
540916	Surface soil, 0 to 2 inches	3.1	3.2	1.7	8.5	22.2	53.4	7.8
540917	Subsurface, 2 to 15 inches	1.7	2.8	1.5	8.0	22.5	47.7	15.8
540918	Upper subsoil, 15 to 29 inches	1.2	2.8	4.4	4.4	35.0	42.4	9.7
540919	Lower subsoil, 29 to 72 inches	.2	2.5	2.2	6.4	28.4	53.5	6.7

EPHRATA FINE SAND.

The Ephrata fine sand to a depth of about 12 inches is a light-brown to brown sand of fine to medium texture. The underlying material consists typically of porous stratified gravel and sand beds many feet in thickness, though as mapped in this survey small areas in which the beds are of finer texture may be included. The surface sand is composed chiefly of quartz and basalt particles; the underlying gravel is composed of pebbles of various kinds of rock, including quartzite, chert, and volcanic rocks. Rounded waterworn gravel is found locally on the surface and in places through the entire soil section. In a number of places large waterworn basalt bowlders, ranging up to 5 feet or more in diameter, occur on the surface and embedded in the soil and substratum.

The Ephrata fine sand occupies old, high, level to undulating terraces of the Snake River in the eroded region north of Buhl. Its total area is very small. All of it lies beyond the limits of the Twin Falls Southside irrigation system, and the only available water supply is waste water, which has been used to a very small extent. The type in this area is, therefore, of very little agricultural importance. Owing to its sandy texture and the porous nature of the gravelly substratum, the water requirement is high, and frequent irrigations would be necessary. Elsewhere in Idaho, Oregon, and Washington similar soil with a good water supply is used for the production of apples, peaches, and other fruits, and potatoes, melons, and various vegetables.

EPHRATA LOAM.

The surface material of the Ephrata loam, to a depth of about 2 inches, consists of a light-brown loam containing a relatively large proportion of very fine sand and silt, with numerous waterworn pebbles scattered over the surface. This is underlain by a brown, friable, light-textured loam approaching a very fine sandy loam, which extends to a depth of 12 to 15 inches, and is generally not sufficiently calcareous to effervesce in dilute hydrochloric acid. The material beneath the brown layer consists of stratified sand and gravel. As occurring in this survey this material departs from the typical substratum of the Ephrata series in that it is partially cemented by lime, and contains thin, interbedded layers of calcareous hardpan. The pebbles in the substratum, as well as those on the surface, are chiefly quartzite and chert, with some volcanic material, and are all waterworn.

There is considerable variation within the area mapped as Ephrata loam, in the quantity of gravel upon the surface, and in the depth of the soil material overlying the gravel bed. Over small areas the gravel may be almost or entirely absent, while in other places, especially on slopes near the canyon of Salmon Falls Creek, it covers the surface.

The gravel substratum, while generally reached at depths ranging from 12 to 18 inches, may lie much deeper in places. In cultivated areas and on slopes subject to erosion and sheet wash, the natural soil profile has been disturbed, with resulting mixture of the different layers, especially the upper two.

The Ephrata loam occurs as one continuous area between Deep Creek and Salmon Falls Creek in the extreme western part of the Twin Falls tract. It occupies a high rolling ridge trending north and south, averaging about 1½ miles in width. Much of the land is above the gravity laterals of the Twin Falls irrigation system, and still maintains its original vegetation, predominantly black sage. The land under ditch is farmed to the general crops of the area, with methods and yields similar to those prevailing on the shallow phase of the Portneuf silt loam.

Extensive pits have been opened in section 30, T. 9 S., R. 14 E., and a considerable quantity of gravel has been excavated for use as road surfacing.

Ephrata loam, alluvial-fan phase.—The typical surface material of the Ephrata loam, alluvial-fan phase, is a rich brown to light-brown loam carrying small quantities of coarse sand and fine gravel and considerable fine sand and silt. The subsoil to a depth of 2 or 3 feet is a light-brown to a light grayish brown sandy loam or fine sandy loam containing an appreciable quantity of waterworn gravel, which usually increases with depth and grades into a stratified gravel bed. The phase represents material which has been transported and deposited by water, with some admixture of wind-borne and wind-blown silt and fine sand. It is not a very uniform soil type over extensive areas. Even within the small total acreage mapped in the Twin Falls area there is considerable variation in color from a light brown to a rich or reddish brown, in texture from fine sandy loam to rather heavy loam, and in depth to the substratum from a few inches to 4 or 5 feet. Areas in Snake River Canyon northeast of Buhl differ especially in that they have large, rounded, smooth basalt bowlders, many of them 5 or 6 feet in diameter, upon the surface and partly embedded in the soil. The presence of bowlders is indicated on the soil map by stone symbols.

The alluvial-fan phase of the Ephrata loam occupies small areas in the region of generally broken topography northeast of Buhl and in the wider parts of Snake River Canyon near and below the mouth of Cedar Draw. The topography is nearly level to sloping and gently rolling. Most of the areas are surrounded entirely or in part by Rough broken land or Rough stony land. The areas in Snake River Canyon nearly all occupy stream terraces above the reach of flood water. Drainage conditions are favorable to agriculture throughout the phase, except for very small areas which are water-logged from waste or excess irrigation water.

Because of the small acreage of the phase it is not an important agricultural soil in the Twin Falls area. The topographic position of most of the areas of the phase at comparatively low elevations and in protected situations, and the warm and mellow nature of the soil itself, make it a valuable truck and fruit soil. Where supplied with irrigation water it is very successfully used in the produc-

tion of watermelons, cantaloupes, tomatoes, and other vegetables; and sweet cherries and peaches do especially well in the more favored locations.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Ephrata loam:

Mechanical analyses of Ephrata loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
540923	Surface soil, 0 to 2 inches	4.2	4.5	4.2	6.7	25.6	47.8	7.1
540924	Subsurface, 2 to 12 inches	4.0	7.2	2.4	16.1	20.5	42.3	7.5
540925	Subsoil, 12 to 72 inches	29.7	34.4	6.5	14.0	4.8	5.6	4.9

BEVERLY FINE SANDY LOAM.

The Beverly fine sandy loam consists of 10 to 15 inches of brown to light-brown fine sandy loam, underlain by a light-brown fine sandy loam which extends to a depth of 3 feet or more. In most places the subsoil is underlain by a substratum of gravel within the 6-foot section. The type represents recent alluvium deposited by Snake River and its tributaries and shows a wide variation in character and arrangement of material.

The larger areas are mapped along the streams in the rough broken country north of Buhl. Smaller and less typical areas are found in Snake River Canyon as far up as Blue Lakes Bridge, above which they are excluded by the narrrowness of the canyon. The topography is level to gently sloping. A very small proportion of the type is subject to overflow, otherwise drainage conditions are good.

A large proportion of the Beverly fine sandy loam is irrigated and utilized. Where water supply is sufficient it is a productive soil. The topographic position in the lower broken country and the canyon bottom insure a comparatively long growing season, and the sandy character of the soil favors easy tillage and warmth. The type is used in the production of alfalfa, corn, potatoes, truck crops, and fruit (Pl. XLIV, fig. 1).

RED ROCK FINE SANDY LOAM.

The surface soil of the Red Rock fine sandy loam has a depth of about 12 inches and is a dark-brown to dark grayish brown fine sandy loam, in places carrying considerable gravel. The subsoil is extremely variable, consisting of stratified water-laid deposits of silt, sand, and gravel, with various mixtures of the different grades of material. The typical substratum, usually encountered at depths of 3 to 6 feet, is a gravel bed, the individual pebbles of which are water-worn fragments of volcanic rock.

The Red Rock fine sandy loam represents alluvial material carried and deposited by the larger tributaries of Snake River which head in the Rock Creek Hills. The largest area is in the neighborhood of Rock Creek post office, in the broad flat bottoms of Rock Creek. This area lies only slightly lower than the adjoining areas of Downey loam, and in places the two soil types are very similar and grade into

each other, and the boundaries are arbitrarily drawn. In section 22, T. 11 S., R. 18 E., Rock Creek enters its lower gorge and the bottom land becomes a very narrow strip, averaging less than 500 feet in width, confined between the walls of a rock-bound canyon. Two small tributaries of Rock Creek, Cottonwood, and McMullen Creeks, have small bottoms of Red Rock fine sandy loam. West and northwest from Artesian City and south of Lake Murtaugh the broad flat bottoms of Dry Creek are occupied by Red Rock fine sandy loam, but northward from Lake Murtaugh the bottom land of Dry Creek is confined to a narrow strip bounded by moderately steep slopes. Another area of Red Rock fine sandy loam is mapped along Deep Creek in the vicinity of Castleford. This area is similar to the Rock Creek and Dry Creek alluvium in texture and material, but differs in color, being a lighter brown. Other very small areas of this type are mapped in the bottoms of the smaller streams.

The topography of the Red Rock fine sandy loam is nearly level to gently sloping. Much of the type is water-logged, with a thoroughly saturated subsoil. This water-logged condition, with the presence in places of toxic quantities of alkali, limits the agriculture of much of the type to the production of wild hay and pasturage. In general the Deep Creek area is better drained than the areas along Dry Creek and Rock Creek, and general farming is possible. Wheat and alfalfa are grown chiefly, although the other farm crops are successfully raised.

ONYX SILT LOAM.

The Onyx silt loam is a brown silt loam approaching a very fine sandy loam in texture, with no consistent vertical profile. In many places the lower part of the 6-foot section is slightly coarser than the upper, often approaching a fine sand or fine sandy loam in texture.

This type occupies the narrow bottoms of the small streams or coulées characteristic of the upland region of the Twin Falls area. The topography is level or gently sloping. The drainage conditions, as modified by irrigation, are variable. The coulées are extensively used as drainage ways in the irrigation system, but the water is generally directed into a single narrow channel, leaving the bottom sufficiently well drained for agricultural use. A small proportion of the type is seeped, and in places accumulations of alkali are apparent.

In agricultural use and value the type is similar to the Portneuf silt loam with which it is associated, with the exception that a larger proportion is in pasture land.

ROUGH STONY LAND.

Rough stony land includes the rim rock and steeper talus slopes of the canyons of Snake River and its larger tributaries, notably Salmon Falls Creek and Rock Creek. It is everywhere a narrow belt between the level of the upland plain and the stream bed or stream bottom, representing in places an almost vertical drop of 600 to 800 feet in elevation. The rock is all volcanic, chiefly massive basalt. The type is of no agricultural importance.

ROUGH BROKEN LAND.

Rough broken land includes areas of generally shallow and stony soil, with eroded, broken, or hilly topography. The slopes, while generally too steep for successful agriculture, are not precipitous, and rock outcrops are not numerous, the rock, where present, being mostly in the form of loose stones and detritus.

The largest continuous area mapped as Rough broken land lies north and northwest of Buhl, where Deep Creek and smaller tributaries of Snake River have eroded the interbedded volcanic and lacustrine deposits to the extent of producing a rough and hilly topography over several square miles. Another area, south and southwest of the village of Rock Creek, includes the lower slopes of the Rock Creek Hills. Smaller areas along the streams represent eroded terraces or steeply sloping stream banks.

Rough broken land is used chiefly as pasture. A few included patches of nearly level land have been cleared and irrigated and are farmed with moderate success. These patches are very small, ranging from a fraction of an acre to possibly 5 acres in extent, are shallow and stony in places, and in some places are saturated with seepage water and show harmful accumulations of alkali on the surface.

SCABLAND.

Scabland, as mapped in this survey, includes areas of shallow soil and rock outcrop so intermingled that a separation is impracticable. The soil material, where present, is generally similar to the shallow phase of the Portneuf silt loam or to the Portneuf fine sandy loam. The rock exposures are outcrops of basalt.

The largest and most typical body of Scabland in the Twin Falls area lies northeast of the city of Twin Falls, just above the rim rock along Snake River Canyon. Another area is located in Snake River Canyon at the mouth of Rock Creek. Smaller areas are distributed along the canyons of Snake River and Salmon Falls Creek.

The Scabland is characteristically undulating, in places rolling. As a whole it is nonagricultural, although very small included areas of soil have been irrigated with waste water and utilized, chiefly for pasture.

PHYSICAL AND CHEMICAL PROPERTIES OF SOILS.[3]

The soils of the greater part of this area are remarkably uniform and have a rather high moisture-holding capacity. This is readily seen from the table below giving the moisture equivalents of five sets of samples taken at points several miles distant from each other, four of which represent the Portneuf silt loam, the predominating type, and one the shallow phase of this type. For comparison corresponding data are given for similar samples from representative types of the recent-alluvial, old valley-filling, and residual soils. All these soils are desirable from the standpoint of their physical properties, their value depending largely upon the depth of soil overlying the rock.

[3] This chapter was prepared by Prof. G. R. McDole, of the University of Idaho Agricultural Experiment Station.

Moisture equivalents of soils of the Twin Falls area.[1]

Depth of sample.	Portneuf silt loam.				(5) Portneuf silt loam, shallow phase.	(6) Red Rock fine sandy loam.[2]	(7) Downey loam, shallow phase.	(8) McCammon sandy loam.
	(1)	(2)	(3)	(4)				
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
0 to 6 inches	22.8	22.4	22.8	23.6	23.3	23.4	22.6	16.3
7 to 12 inches	22.6	23.6	24.4	24.0	26.0	29.4	21.6	17.6
2d foot	22.0	23.8	23.3	23.9	27.2	28.9	25.2	
3d foot	19.8	22.2	20.3	20.9	23.1	23.1		
4th foot			21.2					
5th foot			25.6					
6th foot			26.1					

[1] Determinations given in this table were made in the laboratories of the University of Idaho. The moisture equivalent is the percentage of moisture held by the soil after it has been centrifuged and the average particle subjected to a force of 1,000 gravity. The percentages are on the basis of 100 per cent being the weight of the oven-dry (110° C.) soil.

[2] This sample is somewhat heavier in texture than the average of this type.

DESCRIPTION OF SAMPLES.

(1) Composite of five borings taken on the NW. ¼ sec. 24, T. 10 S., R. 18 E., in an alfalfa field.

(2) Composite of five borings three-quarters mile east of Twin Falls.

(3) Composite of five borings in the NW. ¼ sec. 33, T. 10 S., R. 17 E., in a field of beans.

(4) Composite of five borings taken in the SW. ¼ sec. 26, T. 10 S., R. 13 E.

(5) Composite of five borings taken in the SE. ¼ sec. 29, T. 10 S., R. 16 E.

(6) Composite of five borings taken one-half mile north of the Rock Creek settlement.

(7) Composite of five borings taken one-half mile west of sample No. 6.

(8) Composite of five borings taken about the middle of the line between secs. 23 and 24, T. 9 S., R. 14 E.

In addition to the above samples subjected to physical tests, samples collected by the State representatives during the progress of the survey were sent to the Idaho Agricultural Experiment Station for complete chemical analysis. The descriptions of the soils analyzed follows:

Sample No. 1 is a composite of two samples taken from the Portneuf silt loam. Each sample represents a composite of five borings. One sample was taken on the NW. ¼ sec. 24, T. 10 S., R. 18 E., in an alfalfa field. The second sample was taken from the NW. ¼ sec. 33, T. 10 S., R. 17 E., from a field planted in beans. The two samples were mixed, making a composite sample representing a total of ten borings.

Sample No. 2 represents a composite of five borings taken from the shallow phase of the Portneuf silt loam in the SE. ¼ sec. 24, T. 10 S., R. 13 E.

Sample No. 3 is a composite of five borings taken from the Red Rock fine sandy loam in a field of alfalfa. This sample is not quite representative of the type, as it is somewhat heavier in texture, is lighter colored, and contains less organic matter than usual. This sample was taken one-half mile north of the Rock Creek settlement.

Sample No. 4 represents a composite of five borings each from two samples collected in the shallow phase of the Downey loam in the Rock Creek district. Below the first 2 feet of soil is gravel and a "caliche," or cemented lime carbonate layer. Signs of alkali show in this area. All analyses were carried out by the A. O. A. C. method. The results are given in the following table:

Chemical composition of representative soils from Twin Falls County.[1]

Element.	(1) Portneuf silt loam.				(2) Portneuf silt loam, shallow phase			(3) Red Rock fine sandy loam.				(4) Downey loam, shallow phase		
	0 to 6 inches.	6 to 12 inches.	12 to 24 inches.	24 to 36 inches.	0 to 6 inches.	6 to 12 inches.	12 to 24 inches.	0 to 6 inches.	6 to 12 inches.	12 to 24 inches.	24 to 36 inches.	0 to 6 inches.	6 to 12 inches.	12 to 24 inches.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
SiO_2	68.80	61.90	60.60	62.00	72.90	68.61	69.33	69.33	72.20	71.44	70.60	69.00	65.30	50.89
TiO_2	.47	.40	.41	.41	.42	.42	.48	.44	.50	.45	.43	.54	.58	.54
Fe_2O_3	3.53	3.20	3.19	3.15	4.18	4.26	3.97	4.43	4.26	4.53	3.85	3.96	4.16	3.62
Al_2O_3	11.13	9.25	8.35	9.03	12.56	11.50	12.97	14.05	12.89	13.65	12.72	13.70	12.91	10.51
CaO	5.20	10.50	11.70	10.00	2.70	8.10	2.00	2.20	2.40	2.80	3.80	3.30	6.60	15.80
MgO	2.68	2.24	2.74	4.06	2.04	3.06	1.89	1.95	2.12	2.07	1.88	2.17	2.33	2.65
K_2O	1.72	1.04	1.39	1.73	2.22	2.25	1.78	1.73	2.00	2.12	2.35	1.99	1.62	.77
Na_2O	1.60	1.80	1.58	1.51	1.14	1.00	.84	.64	.77	1.03	1.47	1.41	.99	1.12
P_2O_5	.22	.25	.23	.21	.17	.19	.23	.18	.18	.22	.18	.23	.20	.20
N	.13	.09	.06	.04	.10	.08	.07	.14	.10	.06	.04	.15	.13	.12
Org. Co_2	3.61	5.26	3.86	3.54	2.52	1.79	2.39	3.63	1.77	.76	.36	3.68	3.15	6.66
Inorganic Co_2	2.43	4.98	5.88	5.20	.43	.32	4.38	.54	.18	.78	1.35	.77	3.07	7.34
SO_3	.14	.20	.15	.16	.21	.10	.16	.17	.24	.15	.09	.12	.24	.21
Totals	101.66	101.11	100.14	101.04	101.59	101.68	100.49	99.43	99.61	100.06	99.12	101.02	101.28	100.43
H_2O	2.51	2.24	2.02	2.01	2.87	2.74	2.97	2.34	2.50	4.14	2.68	2.80	4.16	3.89

[1] Analyses by Department of Agricultural Chemistry, University of Idaho.

The table below gives the results of chemical analyses made in the Bureau of Soils of samples of the Portneuf silt loam. The samples were taken from the NE. ¼ sec. 4, T. 11 S., R. 16 E., which is just outside the area surveyed, and represent the natural zones in the soil profile.

Chemical analyses of three samples of soil from Twin Falls, Idaho.[1]

Element.	Sample No. 540901, 0 to 3 inches.	Sample No. 540902 3 to 14 inches.	Sample No. 540903, 14 to 36 inches.	Element.	Sample No. 540901, 0 to 3 inches.	Sample No. 540902, 3 to 14 inches.	Sample No. 540903, 14 to 36 inches.
	Per ct.	*Per ct.*	*Per ct.*		*Per ct.*	*Per ct.*	*Per ct.*
SiO_2	72.44	68.69	58.06	SO_3	0.13	0.08	0.20
TiO_2	.64	.65	.49	Ignition loss	3.63	4.85	11.30
Fe_2O_3	3.92	4.30	3.10				
Al_2O_3	12.16	12.91	9.67	Total	101.00	100.64	101.04
MnO	.06	.05	.05				
CaO	2.04	2.73	10.80	N	.07	.08	.03
MgO	1.47	1.75	3.41	CO_2 from carbonates	None.	None.	8.42
K_2O	2.57	2.42	1,98	Organic matter			
Na_2O	1.77	2.01	1.80	H_2O at 110°C	2.05	3.20	2.10
P_2O_5	.17	.20	.18				

[1] Analyses made by G. J. Hough, August 9, 1921.

IRRIGATION.

Most of the irrigated lands of the area surveyed are embraced in the Twin Falls Southside tract. This is a Carey Act project constructed by the Twin Falls Southside Land & Water Co.

Under the terms of this act of Congress of 1894 and later amendments certain public lands are granted each of the arid or semiarid States if reclaimed under State supervision. The work of construction is done by private capital through individuals or corporations organized for this purpose. The original title to the land is vested in

[4] This chapter was prepared in part by Prof. G. R. McDole, of the University of Idaho Agricultural Experiment Station.

the United States Government, the original title to the water in the State. With the approval of plans by the State land board, the State and Federal Governments enter into a contract under the terms of which a prescribed area is withdrawn from entry, to pass to the State when certain obligations in construction have been fulfilled. The maximum charge for water rights to be paid to the party constructing the works is fixed by the State land board. Upon completion of payments for water rights, ownership of the system passes to the water users.

Under the terms of contract with the Twin Falls Southside Land & Water Co. the settlers paid 50 cents an acre for the land and $25 an acre for the water. The construction corporation was to do all construction work and deliver water to within one-half mile of each legal 160-acre subdivision.

The first unit of 40,000 acres was placed on sale in 1904, and the first delivery of water was made in the spring of 1905. In September, 1909, the State Board of Land Commissioners pronounced the system complete, and the Twin Falls Canal Co. was organized at this time to act as a holding company for the water users.

Water under this project is diverted from the Snake River by a dam at Milner, at the head of the Snake River Canyon, the canal company being entitled to 3,600 second-feet of the natural flow and flood water. In addition to this the system is entitled to an auxiliary supply of 95,000 acre-feet of storage water impounded in Jackson Lake on the South Fork of the Snake River. The water is distributed by 747 miles of irrigation ditches. The main canal is 26 miles long, 100 feet wide, and 11 feet deep and supplies 3,760 cubic feet of water per second. The area within this segregation consists of 416 square miles. The area under actual cultivation and on which water assessments are made (1922) is 203,748 acres.

The Twin Falls-Salmon River project, also a Carey Act project, a few thousand acres of which lie within the area surveyed, is supplied with water from a reservoir on the Salmon Falls Creek near Rogerson. The water supply was originally inadequate, out the irrigated acreage has been greatly cut down to increase the supply on the reduced acreage.

A few thousand acres of land are also irrigated under private water rights along Rock Creek and Dry Creek above the Twin Falls canals, and under the Murtaugh Lift project. A few ranches along the Snake River are irrigated by waste water from the higher lands. The proposed Hansen Butte project will, if completed, irrigate about 45,000 acres of land, most of which is included in the eastern end of the Twin Falls area.[5] This is a pumping project, the source of water being the Snake River.

Water for irrigation has been ample for most years. The quantity used varies from 2 to 3 acre-feet. Additional water is to be obtained upon the completion of the American Falls dam, which will guarantee sufficient water even in the driest years.

The land is slightly rolling and the corrugation method of distributing the water is used (Pl. XLIV, fig. 2). Some districts within the area are sufficiently level to permit irrigation by flooding between borders. For alfalfa and grain the corrugation method is used almost entirely. For corn, potatoes, beets, and other intertilled crops

[5] The rest of the Hansen Butte project lies within the Minidoka area, recently covered by the Soil Survey.

the water is applied by the furrow method. The waste water is caught in the coulées, is let out into laterals, and used again on the lower parts of the tract. This practice insures good surface drainage and a very economical use of the water.

The deeper soils of the area have a uniformly high water-holding capacity. In the shallow phase of the Portneuf silt loam, the shallow phase of the Downey loam, much of the Ephrata loam, and in the McCammon sandy loam, the soil layer is so thin that it dries out rather quickly. On these shallow soils the irrigations should be at more frequent intervals than on the deeper soils, but need not be as heavy.

ALKALI.[6]

The soils of this region are principally of wind-blown origin and carry only small quantities of alkali. Most of the area is so situated that the drainage from the surrounding country does not reach the land under cultivation.

There are two sources of alkali in this region, the concentration of alkali salts derived from the higher surrounding country, and the concentration of alkali due to the seepage of irrigation water within the tract. The natural drainage has been sufficient to prevent the accumulation of alkali salts over any considerable area previously to its reclamation. The greatest areas of alkali accumulation occur along Rock Creek below the Rock Creek settlement, and along Dry Creek northeast of Artesian City. No attempt is being made to reclaim much of this land, but some of it has been improved by means of drainage ditches and is producing satisfactory crops.

There are some places on the slopes where seepage water is causing the water table to come sufficiently near the surface to cause a concentration of alkali. Drainage is being provided as such areas appear by means of ditches, and also by wells which carry off the drainage into subterranean fissures in the lava bedrock. The drainage situation is well in hand and very little trouble is expected from seepage in the future.

The table below gives the analysis of soluble salts found in soil samples from areas where alkali accumulation is not evident, and the analysis of samples of soil taken in the Rock Creek district from an alkali spot.

Soluble salts in soils of the Twin Falls area.[1]

	Na_2CO_3.	$NaHCO_3$.	NaCl.	Na_2SO_4.
Samples of soil showing no effect of alkali:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1st foot	0	0.026	0	0.010
2d foot	.006	.057	.007	.014
3d foot	.013	.048	.007	.017
Samples of an alkali spot in the Rock Creek district:				
1st foot	0	.318	.223	.815
2d foot	0	.061	.500	.875
3d foot	.006	052	.835	.303

[1] Analysis by Department of Agricultural Chemistry, University of Idaho.

SUMMARY.

The Twin Falls area is situated in the north-central part of Twin Falls County, in the central part of southern Idaho. Its total extent is 349 square miles, or 223,360 acres.

[6] This chapter was prepared by Prof. G. R. McDole, of the University of Idaho Agricultural Experiment Station.

The area lies in the southern part of that great stretch of country known as the Snake River Plains. The greater part of it consists of a level to rolling plateau or bench, bordered on the south by the Rock Creek Hills and on the north and west by the cliffs of the Snake River and Salmon Falls Creek Canyons. A few rounded hills or buttes occur on this plateau. Small areas of the foothills and the slopes and terraces of the Snake and Salmon Falls Canyons are included in the survey. The general elevation of the plateau is about 4,000 feet above sea level.

The region is drained by the Snake River and its tributaries, the Salmon Falls Creek, Deep Creek, Cedar Draw, Rock Creek, and Dry Creek, and many smaller drainage ways or coulées. The greater part of the area has very good natural drainage.

A few scattered cattle ranches existed prior to the opening of the Twin Falls Southside tract in 1904. Since that time settlement and irrigation development have been rapid. The Salmon River tract was opened in 1911, but on account of the limited water supply it has not had as successful a development as the Twin Falls tract. The population of Twin Falls County in 1920 was 28,398. Most of this number lived upon the Twin Falls tract. About 70 per cent of the population is classed by the census as rural, while about 55 per cent actually live on the farms.

Twin Falls, with a population of 8,324 in 1920, is the county seat and most important town. Buhl, Filer, Kimberly, and Murtaugh are other towns of the area.

Railroad facilities are furnished by the Twin Falls Branch of the Oregon Short Line, a part of the Union Pacific Railroad system. Good roads cover the greater part of the area.

The climate is characterized by a low annual rainfall, low humidity, a large number of clear days, hot, dry summers, and cold winters. The annual precipitation averages about 11 inches. The lowest temperature recorded at Twin Falls is −20° F., the highest, 103° F. The average length of the growing season ranges in different parts of the area from 129 to 148 days.

The important crops are alfalfa hay, wheat, beans, potatoes, sugar beets, corn, clover seed, and apples. Barley, oats, clover hay, and alfalfa seed are also fairly important. Melons, peaches, and sweet cherries are grown on a small scale on the canyon slopes and terraces. Cattle and sheep feeding and some dairying are carried on. Cattle, sheep, hogs, horses, and mules are raised, but not on a large scale. Wheat, flour, potatoes, sugar, beans, apples, and livestock are shipped to distant markets. Dry farming is of negligible importance in the area.

The soils covering the larger part of the area are remarkably uniform as to origin, texture, color, and profile, as well as in agricultural value. The most important variation is the difference in depth to the basalt bedrock or other substratum.

Seven soil series are represented in the area by 9 soil types and 3 phases. In addition, 3 types of miscellaneous materials are shown on the map.

The soils of the Portneuf series are of wind-borne or loessial origin. They cover about 83 per cent of the area. The fine sandy loam is inextensive. The silt loam and its shallow phase are the most extensive soils in the area. The surface soils of this series are light brown

to brown, and overlie a compact, highly calcareous, light grayish brown upper subsoil and a loose, floury deeper subsoil. The substratum is of basalt bedrock. The silt loam is a very important agricultural soil; it covers the greater part of the irrigated area and produces large yields of a variety of crops.

The McCammon sandy loam covers small areas north of Buhl. It is a shallow, dark-brown soil, residual from basalt. A small proportion is under cultivation and producing alfalfa, grains, and melons.

The soils of the Downey series are similar in appearance and profile to those of the Portneuf series, but contain considerable gravel and have a cemented gravel substratum. They represent outwash from the hills, probably intermixed with wind-laid materials. The Downey loam and a shallow phase of this type were mapped. Considerable areas of these soils are under cultivation and producing crops similar to those produced on the Portneuf silt loam.

The Ephrata series, as mapped in this area, is represented by two types, the fine sand, and the loam, the latter having an alluvial-fan phase. These soils occur on high terraces in the Snake River Canyon and along the Salmon Falls Creek. The surface soils are a light brown and overlie stratified beds of gravel and sand. Only small areas are under cultivation.

The Beverly fine sandy loam has a light-brown to brown surface soil over a stratified subsoil containing much gravel. It is a recent-alluvial deposit composed of a great variety of rock materials. It occupies small areas on the lower land along the Snake River and small tributary streams. Much of it is under cultivation, producing alfalfa, corn, potatoes, truck crops, and fruit.

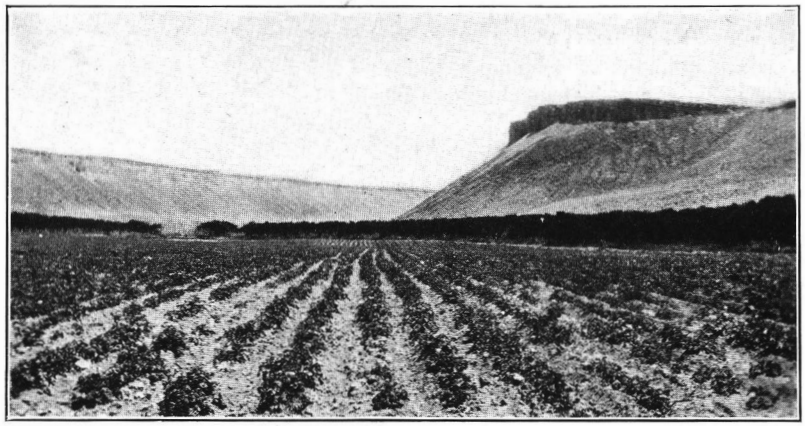
The Red Rock fine sandy loam is derived from recent-alluvial deposits, largely of volcanic rock material. The surface soil is brown to dark grayish brown, and the subsoil consists of irregularly stratified materials including much gravel. A large part of the total area is water-logged and is used for production of wild hay and pasture. Small areas are used for alfalfa, wheat, and other common crops.

The Onyx silt loam is a brown soil occupying coulée bottoms and local depressions in the upland. It is associated with the Portneuf soils and consists of fine materials derived mainly from the Portneuf soils drifted into the depressions by winds and modified by alluvial agencies. It is inextensive and of minor agricultural importance.

Scabland, Rough broken land, and Rough stony land, are all non-agricultural types, except that the first two furnish a small amount of pasturage.

Irrigation is necessary for successful farming. The Twin Falls Southside Tract, lying entirely within the area surveyed, has a total irrigated area of 203,748 acres. A few thousand acres lying within the area are irrigated under the Salmon River tract, the Murtaugh irrigation district, and private water rights on Rock Creek and Dry Creek and in the Snake River Canyon. The proposed Hansen Butte project, if carried out, will irrigate approximately 45,000 acres, a part of which lies within the limits of the area. Water is used at the rate of 2 to 3 acre-feet per acre. The shallower soils require more frequent but lighter irrigations than the deeper soils.

Drainage is generally good. Seepy spots are being reclaimed by drainage wells and ditches. Alkali concentrations are confined largely to these seepy places.



S. 11119

FIG. 1.—VIEW ON CRYSTAL SPRINGS RANCH IN THE SNAKE RIVER CANYON.

Basaltic canyon walls and talus slopes in distance. Potatoes in foreground and peach orchard in background on soils of the river terraces, mainly Beverly fine sandy loam.

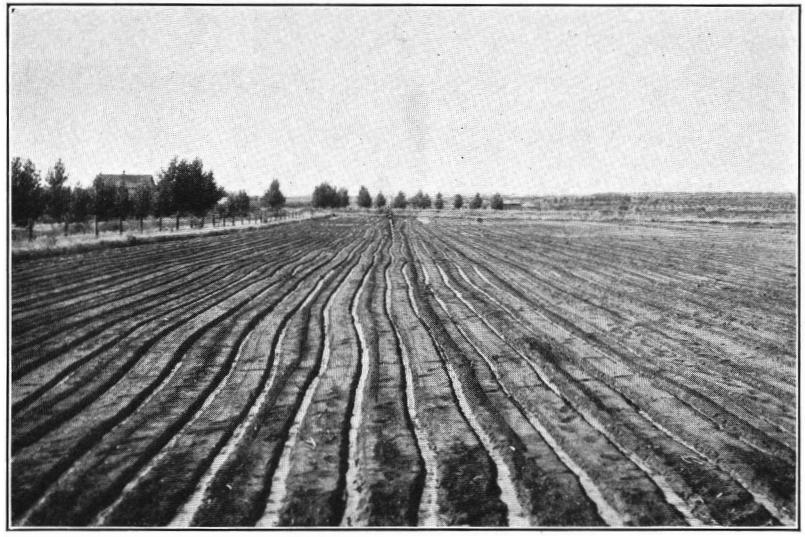


FIG. 2.—VIEW SHOWING CORRUGATION METHOD OF IRRIGATION.

This is the method generally practiced in the Twin Falls area.

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Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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