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Soil Survey of the University of Idaho Sandpoint Research and Extension Center

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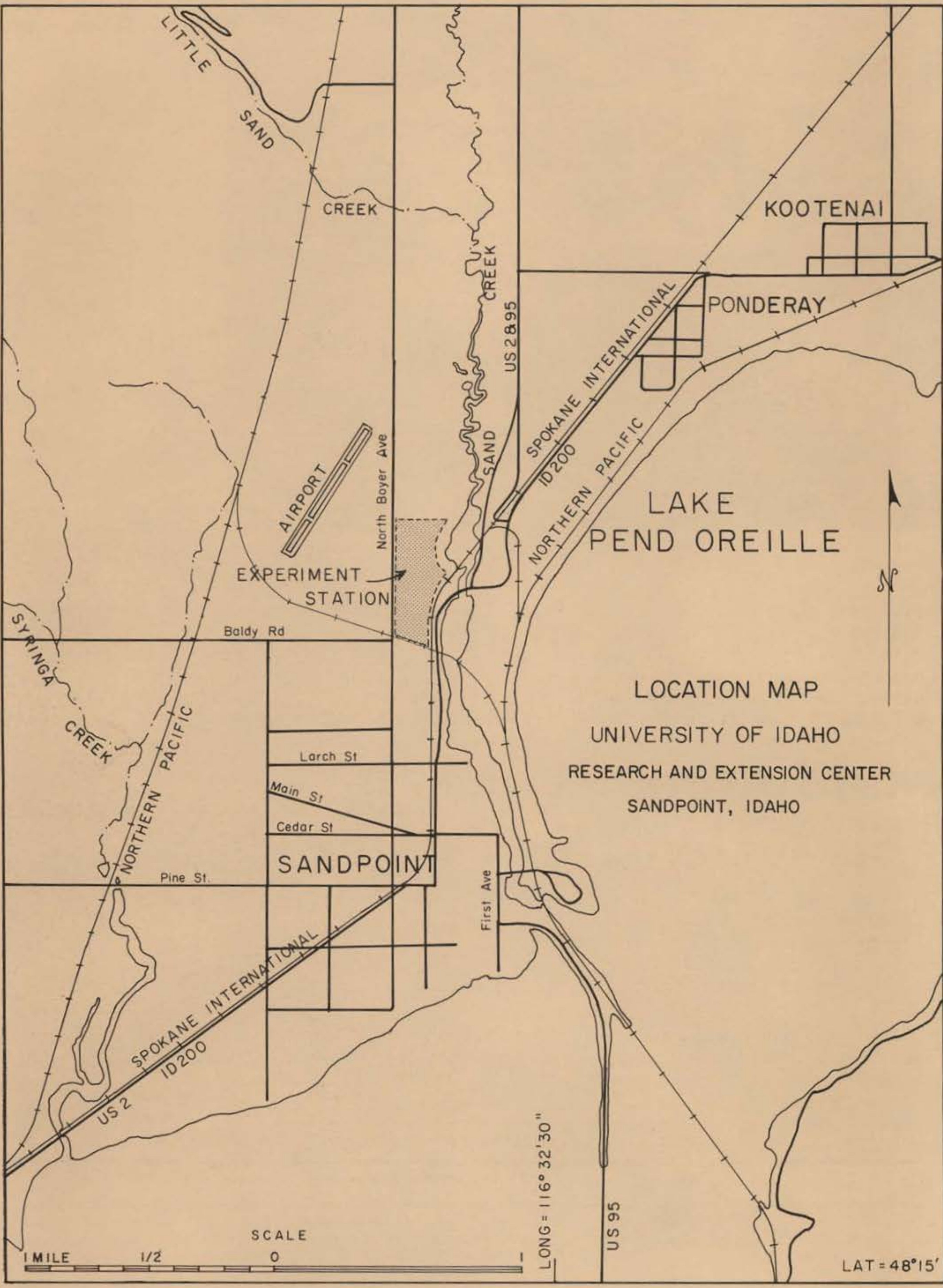
UNIVERSITY OF IDAHO
College of Agriculture



LITTLE
SAND
CREEK
KOOTENAI
PONDERAY
CREEK
US 2&95
SPOKANE INTERNATIONAL
ID 200
NORTHERN PACIFIC
SAND
AIRPORT
North Boyer Ave
LAKE
PEND OREILLE
N
EXPERIMENT STATION
Baldy Rd
SYRINGA
CREEK
NORTHERN PACIFIC
Larch St
Main St
Cedar St
SANDPOINT
Pine St.
First Ave
SPOKANE INTERNATIONAL
ID 200
US 2
LOCATION MAP
UNIVERSITY OF IDAHO
RESEARCH AND EXTENSION CENTER
SANDPOINT, IDAHO
SCALE
1 MILE
1/2
0
1
LONG = 116° 32' 30"
US 95
LAT = 48°15'

Soil Survey of the University of Idaho Sandpoint Research and Extension Center

*R. E. McDole, H. B. Maxwell and M. A. Fosberg**

Location

The Sandpoint Research and Extension Center is located on the north edge of the city of Sandpoint in Bonner County. The Center occupies about 63 acres in the west half of the northeast quarter of section 15, T.57N., R.2W (Fig. 1). The Center is bordered on the west by North Boyer Avenue and on the south by the Great Northern Railroad. On the east, the property is bordered by the Great Northern Railroad, U.S. Highway 95 and the banks of an arm of Lake Pend Oreille, which extends up into what was originally Sand Creek. The elevation is approximately 2,200 feet, latitude 48°18′ and longitude 116°25′.

History

The Sandpoint Research and Extension Center was established as the Sandpoint Branch Experiment Station in 1915. T. J. Humbird, president of the Humbird Lumber Company, donated the land comprising the Center. The deed transferring the property to the State Board of Education and Board of Regents of the University of Idaho was dated July 12, 1913 (Hungerford 1960).

The original deed showed a donation of about 170 acres of land, although the records in the county assessor's office showed about 117 acres. About 15 acres of bottomland along Sand Creek was lost through an easement to the U.S. Army Corps of engineers, and an additional 4.5 acres was deeded to

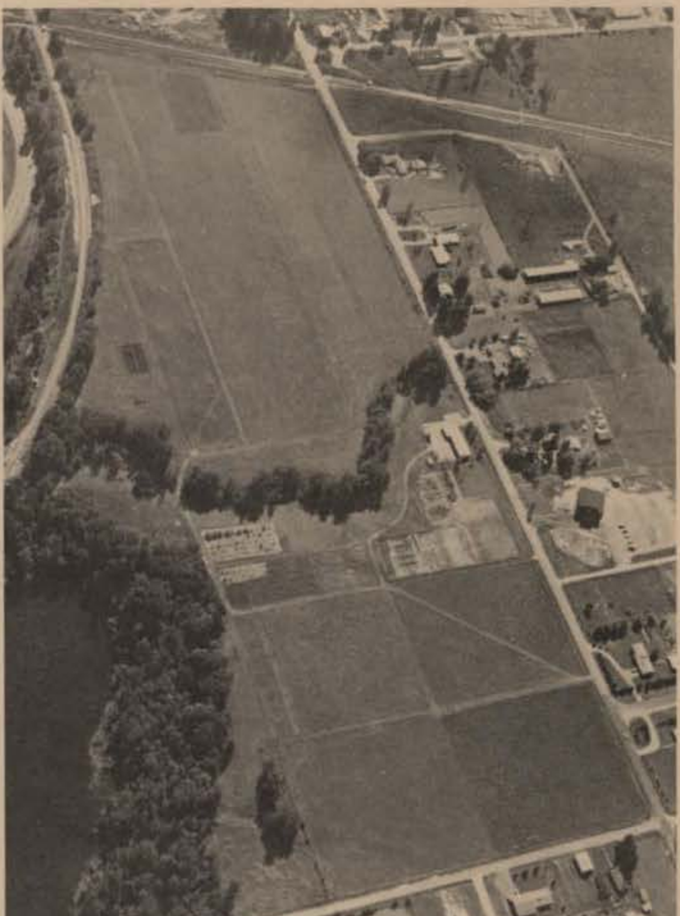


Fig. 1. Aerial view, looking south, of the Sandpoint Research and Extension Center. The center buildings are located adjacent to North Boyer Avenue, shown on the right.

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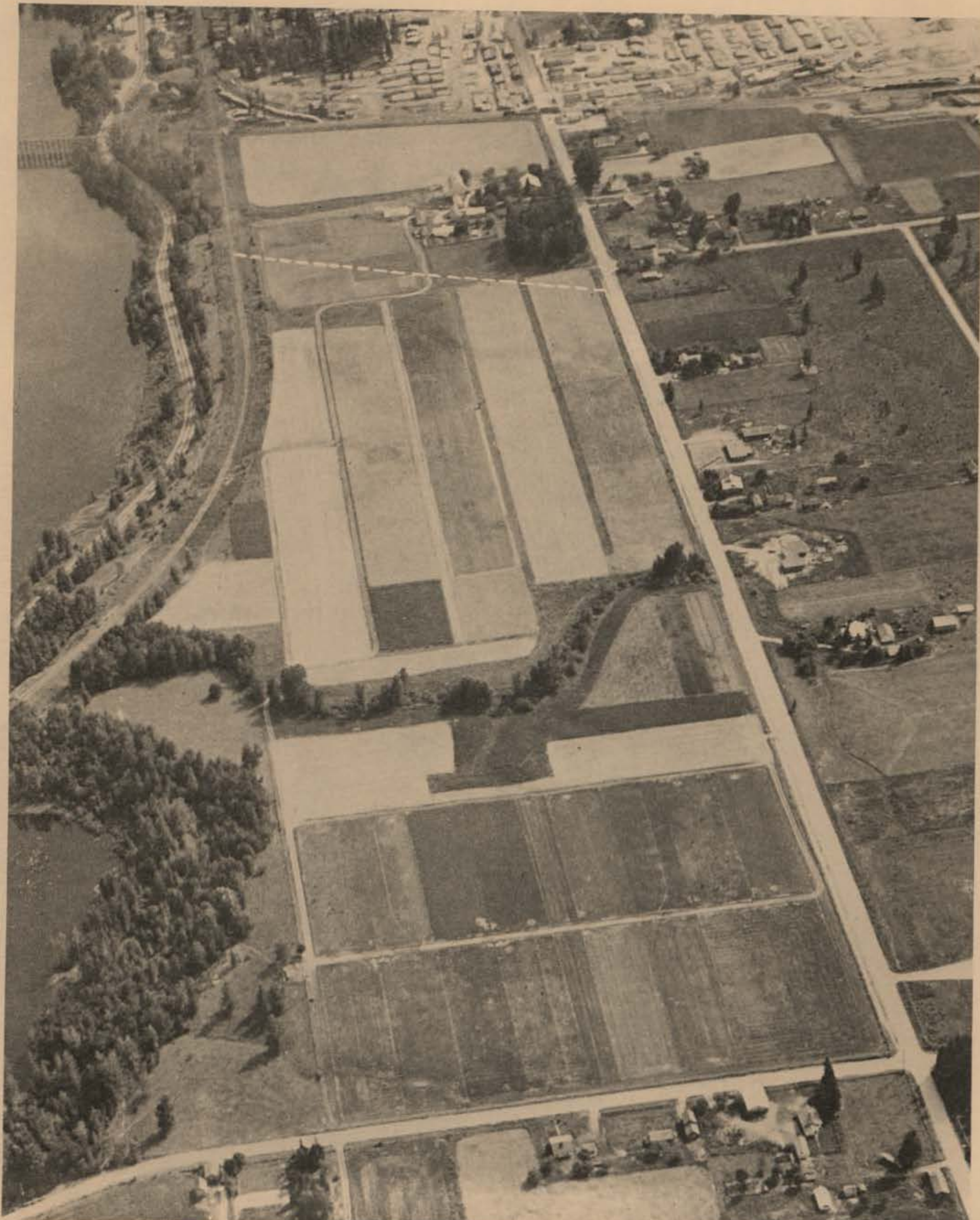


Fig. 2. Aerial view, looking south, of the Sandpoint Experiment Station taken in August 1953. The portion of the station south of the dashed line (which included the building site) was sold to the railroad in 1967. Waters of Pend Oreille Lake are visible to the east of the station.

the State Highway Department in 1958 for improvements made in U.S. Highway 95. In 1967 about 17 acres, which included the original station headquarters and buildings, was sold to the Great Northern Railroad (Fig. 2). The remaining 63 acres comprises the present Research and Extension Center.

Credit for the establishment of the Sandpoint Center should not only be given to the Humbird Lumber Company for the land donation but also to the citizens of the Sandpoint area who gave labor and materials for construction of the Center's first buildings. Citizens of the three northernmost Idaho counties have all strongly supported the Center.

Early agriculture in Idaho's three northern counties consisted primarily of cultivating lands that had been cleared of forests. During this time, considerable interest grew in developing an agricultural industry. Both farmers and lumber companies wanted to increase the value of their cutover lands.

Ten acres of the station land was cleared in the fall of 1913 (Fig. 3) and planted to several varieties of alfalfa and clover. The Idaho Agricultural Experiment Station's 1915 annual report indicated that the alfalfa made good growth its first summer but was winterkilled in the winter of 1914-1915. During the following years, more land was cleared and planted to various forage and cereal crops. Most experimentation involved trials with varieties of clovers, alfalfa, cereals, field peas and root crops.

The soils staff from the U of I Moscow campus worked extensively on the station with rotation and fertilizer trials. Research was also conducted with livestock, including dairy, sheep and swine. A dairy herd was established to use the extensive pasture area bordering Sand Creek. Sprinkler irrigation was introduced to the station about 1950. Subsequently, irrigation was used primarily on forage crops and in later years in production of small fruits and ornamentals.

In general, research at the Sandpoint Center was directed toward practical agriculture in the northern Idaho area. Most of the area in the Center's vicinity has been used for forage-livestock enterprises. Because of this, much of the station's research was directed toward evaluation of adapted forage crops for the unique climate and soil of the area.

Although cereal production is not a major crop in Bonner County, the Center has been used extensively for testing varieties adapted to other northern Idaho counties. Center personnel also have been involved in off-station testing. In the past few years, interest has grown in small fruits, ornamentals and Christmas trees as the number of small, family farms has increased in Idaho's three northern counties.

Fig. 3. About 10 of the original 170 acres of land which comprised the Sandpoint Branch Experiment Station was cleared of trees in 1913 to allow for the planting of several varieties of alfalfa and clover.

Geology

The Sandpoint Research and Extension Center is situated on nearly level, glacial outwash delta or lake terrace near the point where the Pend Oreille River drains Pend Oreille Lake. The site is in the North Rocky Mountain geomorphic province in the Purcell Trench, a long, relatively narrow depression or valley extending south from Canada. The trench is bordered on the east by the Cabinet and Coeur d'Alene Mountains.

Table 1. Clay mineral composition of soil samples taken from Mission silt loam soils (from Fosberg et al. 1979).

Horizon	Parent material	Clay mineral composition
Ap	mixed ash & outwash	I, K or C[2], V, NC[3]
B2ir	mixed ash & outwash	I, K or C, V, NC
IIA&Bxb	outwash	I, V, K or C
IIB21xtb	outwash	I, V, K or C
IIB22tb	outwash	I, V, K or C
IIB31b	outwash	I, K or C, V
IIB32b	outwash	I, K or C, V
IIC	outwash	I, K or C, V

[1]C = chlorite; I = illite; K = kaolinite; V = vermiculite; NC = noncrystalline. Minerals are listed in order of intensity of X-ray diffraction peaks with the mineral having the most intense deflection listed first.

[2]By using only X-ray diffraction analyses, it is impossible to identify kaolinite when chlorite is known to be present.

[3]NC was listed last to indicate a reduced deflection of overall peak height.

The trench was originally carved by preglacial stream erosion but was later altered by glacial excavation and deposition during the times of continental glaciation. Ice from the continental glaciation almost entirely overrode the surrounding mountains which rise to elevations exceeding 6,500 feet above sea level.

The parent materials comprising the soils at the Center are primarily glacial-lacustrine sediments ranging from thin, very fine sand strata to moderately thick, silty clay loam strata. Most of these materials were laid down in an ancient glacial lake formed by melt water from the receding ice sheets. As the glaciers receded at the close of the Ice Age, Sandpoint Creek and other minor intermittent drainages eroded the glacial-lacustrine materials forming a dendritic drainage pattern.

During this extended period of stream erosion, deposition of volcanic ash from volcanic events to the west and southwest contributed heavily to the surface soils. Volcanic eruptions in the Cascade Mountains resulted in massive amounts of airborne volcanic ash which were carried by the prevailing westerly winds and deposited in the northern Idaho area. These materials comprise a major component of the soil surface in the Sandpoint Center's vicinity.

Clay mineral composition of the Mission soils shows the difference in the two parent materials comprising the soil profile (Table 1). Published information on the Mission soil mineralogy, including X-ray diffraction patterns, shows the presence of noncrystalline volcanic ash material in the upper horizons (Fosberg et al. 1979).

Table 2. Average precipitation by month.

Year	Precipitation (inches)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
58	5.14	5.13	1.94	3.43	0.65	2.25	0.55	0.92	1.66	1.68	6.87	4.63	31.42
59	6.89	2.13	2.26	2.04	2.79	1.88	0.26	0.68	4.57	3.44	7.72	4.06	38.72
60	3.58	3.00	3.74	2.67	3.25	1.08	0.01	2.32	1.77	3.17	9.71	1.47	35.77
61	3.66	7.13	3.02	2.42	4.33	0.80	0.83	1.50	0.94	4.13	2.80	7.17	38.73
62	2.71	2.18	3.28	1.95	2.83	0.41	0.28	0.71	2.23	3.36	5.96	3.85	29.75
63	1.29	4.02	3.52	2.87	1.80	2.80	0.81	1.16	1.65	2.23	6.56	2.65	31.36
64	6.04	1.01	3.84	1.60	1.26	2.26	1.53	2.63	1.67	0.86	4.21	7.22	34.13
65	3.06	2.99	0.13	3.09	2.28	2.07	0.32	3.76	1.34	0.30	3.49	3.39	26.22
66	5.11	2.26	5.11	0.64	1.67	4.97	1.09	0.83	0.36	1.95	7.33	6.89	38.21
67	9.43	1.48	2.12	1.58	0.76	2.21	0.39	T	0.32	5.09	3.00	2.78	29.16
68	3.63	4.46	2.58	1.00	2.28	1.98	0.97	4.01	2.89	4.92	4.88	5.13	38.73
69	5.44	1.23	1.29	3.84	3.64	1.94	0.90	0.00	3.44	1.84	1.02	3.98	28.56
70	7.15	3.83	1.85	2.08	1.45	2.68	1.39	0.23	2.65	2.84	2.67	5.74	34.56
71	4.82	2.58	3.01	2.67	2.28	3.95	1.42	1.43	2.17	2.85	3.15	4.54	34.87
72	4.05	3.65	3.03	2.61	2.17	3.04	1.84	1.02	1.83	0.91	3.41	6.31	33.87
73	4.01	1.10	1.62	1.02	1.93	1.02	T	0.59	3.33	2.92	10.02	8.26	35.82
74	8.28	4.08	4.29	2.61	2.07	0.84	1.83	0.54	0.45	T	7.91	4.48	37.38
75	3.41	4.76	2.75	1.82	1.63	2.90	1.05	3.13	0.07	4.86	3.09	4.28	33.75
76	2.94	5.24	1.60	2.37	2.50	1.95	1.26	4.46	0.16	1.23	2.38	2.33	28.42
77	1.59	1.09	2.13	0.30	2.56	1.45	1.08	2.85	2.63	1.83	4.87	7.15	29.53
78	3.02	1.84	1.21	2.45	5.48	0.77	2.46	3.00	1.99	0.34	2.08	1.66	26.30
Mean	4.32	3.10	2.59	2.15	2.36	1.97	0.92	1.63	1.82	2.41	4.91	4.67	33.10

Climate

Bonner County, where the Sandpoint Research and Extension Center is located, has a modified continental climate. The oceanic influence of westerly winds from the Pacific Ocean modifies temperatures and increases precipitation where these moisture-laden winds meet the mountainous areas of northern Idaho. The same mountains divert the colder waves of the eastern continental interior. Summers are comparatively short and cool. Extremely cold winter temperatures are generally of short duration. Comparatively little rain falls during the summer months, and July and August are the driest months of the year (Table 2). Heaviest precipitation occurs from November to March, much of which occurs as snow.

Pend Oreille Lake has a moderating affect on the climate in the immediate vicinity. Since the Center is located near the lake, air temperatures are several degrees higher and the frost-free season several weeks longer than most other sections of the country (Poulson et al. 1939).

A U.S. Weather Bureau station is maintained at the Center. Climatic data have been collected since 1911. Maximum and minimum air temperatures for the past 21 years are given in Tables 3 and 4. Growing degree days are given in Table 5. The frost-free season is about 117 days (Table 6). Dates of killing frost in spring and fall are given in Table 7. Table 8 gives the extreme occurrences of freezing temperatures.

Native Vegetation

Most of the land at the Center has been cleared of timber. The remaining timber is along the drainage channel that runs west to east across the middle of the property and along the banks of Pend Oreille Lake on the east.

The native vegetation under which the soils originally developed included Western red cedar (*Thuja plicata*), Western larch (*Larix occidentalis*), Paper birch (*Betula papyrifera* var. *communtata*), Lodgepole pine (*Pinus contorta*) and White pine (*Pinus monticola*).

Crop Production

The relatively short frost-free period limits both crop yields and the number of adapted crops. Table 9 gives the yields for the main agricultural crops on Mission soil at the Center.

Soil Fertility

The Mission soils at the Center present some unique fertility problems. The volcanic ash in the soil parent material causes most of these problems (Jones et al. 1979).

The surface horizons contain high amounts of volcanic ash parent material. These surface horizons have a much higher capacity for P sorption than the lower horizons which are derived from glacial sediments.

Table 3. Maximum air temperature by month.

Year	Temperature (°F)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
58	34.3	42.0	46.6	54.9	75.3	76.4	83.8	87.4	69.4	57.9	40.1	34.9
59	34.1	34.1	45.3	57.4	61.3	72.6	82.6	75.6	63.1	54.6	37.4	34.3
60	28.5	36.0	43.0	55.2	60.6	74.0	87.2	74.8	71.6	57.4	41.5	31.9
61	35.6	41.0	47.2	53.3	63.9	79.9	84.2	86.8	66.0	53.7	38.2	31.7
62	29.5	37.0	41.4	59.9	62.8	74.4	79.7	77.2	72.3	54.8	44.3	38.3
63	26.8	43.1	48.9	55.7	67.2	73.3	79.1	81.8	74.6	59.5	42.6	32.4
64	35.1	39.4	40.4	53.0	63.5	72.3	80.4	71.9	65.1	55.8	40.1	31.0
65	35.1	39.0	43.3	59.1	64.7	72.1	81.7	78.1	63.4	59.2	43.3	35.9
66	33.6	39.4	44.4	57.4	69.1	69.4	79.2	80.2	75.5	57.9	42.3	37.3
67	37.5	42.8	43.9	53.1	64.8	74.7	83.7	88.6	79.3	56.2	42.8	32.7
68	32.6	44.1	50.3	54.4	64.2	71.5	82.3	74.8	67.1	51.9	41.0	29.9
69	23.3	36.6	47.1	56.7	69.9	74.8	79.9	81.3	71.3	53.5	44.1	34.1
70	30.8	40.1	46.5	50.8	67.7	76.9	83.5	84.6	65.7	53.9	41.6	32.5
71	34.2	38.6	42.1	54.8	68.0	68.7	80.0	85.1	64.6	53.7	40.5	33.6
72	30.0	38.4	49.5	51.7	66.4	71.3	77.9	83.2	64.8	55.3	42.0	29.2
73	30.8	39.6	48.7	57.3	68.5	73.7	84.9	84.1	71.4	55.2	36.8	35.9
74	31.5	39.6	45.6	55.5	61.8	79.5	80.4	81.0	—	62.3	41.2	36.7
75	31.2	34.3	42.4	52.2	65.1	69.9	84.1	75.2	71.6	52.9	40.0	36.6
76	36.3	37.5	42.1	56.2	68.9	68.4	79.0	—	73.2	58.4	42.4	37.1
77	30.2	42.4	46.4	64.1	63.2	77.9	79.9	82.8	64.5	56.5	38.5	31.8
78	31.8	37.6	49.5	56.4	62.3	76.3	80.7	76.4	66.9	59.0	38.1	28.4
Mean	32.0	39.2	45.5	55.7	65.7	73.7	81.6	80.5	69.1	56.2	40.9	33.6

Table 4. Minimum air temperature by month.

Year	Temperature (°F)											
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
58	25.9	31.6	29.6	34.6	43.2	50.0	50.9	49.5	41.9	32.5	27.0	26.5
59	22.5	22.6	30.2	34.8	37.4	47.2	47.5	45.4	44.3	35.4	21.9	24.4
60	15.6	21.7	25.5	34.4	40.1	44.7	48.6	48.4	39.8	34.0	28.8	23.1
61	23.2	30.9	30.0	33.4	40.3	47.7	51.0	49.6	39.5	33.3	23.7	21.3
62	16.4	25.3	25.4	34.1	40.4	43.7	46.7	48.4	42.0	38.0	34.2	29.6
63	14.5	29.4	30.3	35.0	40.2	49.1	48.6	49.8	46.1	37.2	32.3	23.1
64	25.7	20.4	24.8	32.1	39.9	47.8	49.9	46.4	39.4	35.6	28.8	19.6
65	26.7	23.2	20.9	34.3	38.2	45.7	49.1	52.0	39.3	37.1	31.5	24.8
66	23.9	24.8	26.5	32.5	40.0	43.4	49.2	46.8	46.2	33.7	30.7	29.4
67	26.4	27.6	27.8	31.0	39.6	48.2	47.3	48.0	44.9	37.9	29.8	24.2
68	23.0	28.3	30.7	32.2	39.4	45.9	48.7	49.3	43.9	33.9	28.8	16.8
69	12.6	19.7	25.5	35.8	41.6	49.2	45.0	43.2	44.0	33.1	27.9	26.4
70	21.3	25.8	25.3	32.5	38.3	47.9	50.3	43.1	38.1	31.6	28.0	20.5
71	22.8	23.4	25.7	32.8	40.4	45.4	47.5	48.5	38.7	32.9	30.8	21.4
72	16.0	24.6	31.4	31.7	41.8	46.4	47.8	48.1	39.3	30.9	31.2	18.5
73	17.9	24.3	29.0	31.3	38.5	45.6	45.7	45.1	41.1	35.7	28.2	28.5
74	18.7	27.7	30.0	36.3	37.8	47.8	48.4	47.0	—	28.1	30.6	27.6
75	18.9	18.4	27.2	31.3	39.0	45.1	51.5	46.5	38.3	36.9	26.6	25.9
76	25.3	25.5	23.1	34.5	39.6	42.7	47.8	—	40.5	29.9	25.7	23.9
77	19.3	26.8	29.1	33.0	38.3	46.5	46.5	48.9	41.5	32.1	26.5	20.4
78	22.2	26.7	30.4	36.6	39.5	45.6	49.6	48.2	43.8	31.4	23.8	14.2
Mean	20.9	25.2	27.5	33.5	39.7	44.3	46.2	43.3	41.6	33.9	28.4	23.3

Table 5. Growing degree days by month using 40° and 50° bases.[1]

Base	March	April	May	June	July	Aug.	Sept.	Oct.
40°	96	265	449	567	688	652	497	277
50°	21	120	264	357	506	481	318	120

[1]Everson et al. 1976.

Table 6. Length of growing season at the Sandpoint Center for four temperature thresholds at 50 percent probability or average occurrence of these temperatures in the spring and fall.[1]

Days	Temperature			
	20°F	24°F	28°F	32°F
	232	199	154	117

[1]Everson et al. 1978.

Table 7. Probability of spring and fall freezing thresholds.[1]

Temp.	Percent probability of indicated or lower temperature occuring on or after date in spring.					Percent probability of indicated or lower temperature occuring on or after date in fall.				
	90%	75%	50%	25%	10%	10%	25%	50%	75%	90%
20	Mar 1	Mar 9	Mar 19	Mar 28	Apr 5	Oct 11	Oct 23	Nov 6	Nov 20	Dec 2
24	Mar 19	Mar 27	Apr 5	Apr 14	Apr 22	Sep 25	Oct 7	Oct 21	Nov 4	Nov 16
28	Apr 12	Apr 22	May 2	May 13	May 23	Sep 13	Sep 23	Oct 3	Oct 14	Oct 24
32	May 3	May 10	May 19	May 27	Jun 4	Aug 27	Sep 4	Sep 13	Sep 22	Oct 1

[1]Everson et al. 1978.

This high P sorption capacity was found in both cultivated and uncultivated soils, indicating a natural rather than a manmade condition.

The P sorption was also related to the clay content as well as the Fe, Al and Mn content of the soils. The clay fraction sorbed more P than the silt fraction. Aluminum content was more highly correlated to P sorption than Fe and Mn content.

Based on research data on Mission soils, the Mission soils have a sorption capacity of as much as 1,000 to 3,000 pounds P_2O_5 per acre (Pennington 1980).

Research

Research at the Center is generally related to the three surrounding northern Idaho counties. Each of these counties has a distinct type of agriculture; thus, the potential for research at the Center covers a wide range of crops and problems.

The Center is within Bonner County where the major kinds of agriculture are livestock and forage production. Small grain production is limited primarily to oats and barley. Very little wheat is produced. Forage production includes extensive pasture acreage. Alfalfa hay production is not well adapted to the area because of production problems.

Boundary County is immediately adjacent to Bonner County to the north. Its southern boundary is 14 miles north of the Center. Kootenai County adjoins Bonner County on the south. Its northern boundary is 22 miles south of the Center. Both Boundary and Kootenai counties have extensive acreages of small grains, forage crops and grass seed.

The number of small, family size farms or ranchettes has grown in all three of these northern counties. The demand has increased for research and information on home gardens, specialty crops such as small fruits, Christmas trees and ornamentals.

Center Layout

The present field configuration at the Center was established in 1967. (Field layouts and numbers are given in a map at the back of this report.) Prior to 1967, when a section of the Center's southern portion was sold to the railroad, the Center's headquarters was located in the southwest corner of the property (Fig. 1). A new headquarters was constructed in 1967 a short distance north of the old headquarters along the west side of the property.

Soils

The Center's soils were found to include one soil series having three mapping units. The soil series has been identified as the Mission series. Some chemical and physical properties of a typical pedon of this soil are given in Tables 10 and 11.

Mission Series

The Mission series is classified as a coarse silty mixed, frigid Andic Fragiochrepts. This classification does not take into account the argillic horizon that occurs in the fragipan. (It has been proposed that the great group Fragixeralf be added to soil taxonomy. If this were done, the Mission series would be classified as an Andic Fragixeralf.)

The Mission soil has a silt loam textured surface to a depth of 45 to 75 cm (18 to 30 inches). The surface layer is heavily influenced by deposition of volcanic ash materials. Below the surface soil, textures range from silty clay loam to sandy loam because of the glacial lacustrine nature of the materials in the subsoil and substratum. The surface soil's volcanic content gives it some unusual characteristics (Jones et al. 1979, Fosberg et al. 1979).

The Mission series consists of very deep, moderately well-drained soils formed in glacial lacustrine materials with an overlying ash mantle. Permeability is moderate in the Ap and Bir horizons and slow in the Bx horizons. A perched water table may occur above the IIA&Bxb horizon for brief periods in the spring because of the slow permeability of the underlying horizon. Slopes range from 0 to 25 percent, but most areas have slopes of less than 3 percent.

Table 9. Approximate yields of main agriculture crops on the Mission soils.

Crop	Yields*
Alfalfa	3.5 to 4.2 ton/acre
Wheat	45 to 55 bu/acre
Oats	70 to 80 bu/acre
Barley	65 to 75 bu/acre

*Average yields produced with optimum management.

Table 8. Extreme occurrences of freezing temperature thresholds.[1]

Temperature	Spring		Fall	
	Earliest	Latest	Earliest	Latest
28°F	Mar. 22, 1940	May 31, 1926	Sep. 7, 1929	Nov. 12, 1944
32°F	Apr. 23, 1957	June 14, 1930	Aug. 16, 1935	Oct. 22, 1940

[1]Everson et al. 1978.

Pedon Description

Mission silt loam (74-Ida-0909) on a nearly level slope under cropland; described May 7, 1974 by Maynard Fosberg and Jack Chugg. (Colors are for dry soil unless otherwise noted.)

Ap — 0 to 23 cm (0 to 9 inches). Pale brown (10YR 6/3) silt loam, brown (YR 4/3) moist; weak, medium and fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and fine pores; common very fine and fine roots, many black concretions, 1 to 3 mm; the Ap was originally the B2ir horizon; noncalcareous.

B2ir — 23 to 28 cm (9 to 11 inches). Light, yellowish-brown (10YR 6/4) silt loam, brown to strong brown (7.5YR 5/5) moist; moderate, fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many fine and medium pores; horizon discontinuous because of variation in plow depth; noncalcareous; abrupt, wavy boundary.

IIA&Bxb — 28 to 35 cm (11 to 14 inches). Light gray (2.5Y 8/3) silt loam, yellowish-brown (10YR 5/4) moist; weak, medium prismatic parting to moderate, medium and coarse angular blocky structure; hard, very firm and brittle; slightly sticky and slightly plastic; many very fine and fine pores; thin silt coverings on block surfaces; very abundant manganese concretions, 1 to 3 mm; many thin, continuous clay films; horizon parts in large thick plates; brittleness and density characteristics of fragipan; noncalcareous; clear, wavy boundary.

IIB21xtb — 35 to 45 cm (14 to 18 inches). Pale yellow (2.5Y 8/4) silt loam, yellowish-brown (10YR 5/5) moist; moderate, medium and coarse angular blocky structure; very hard, very firm and brittle; slightly sticky and slightly plastic; many very fine and fine pores; many moderately thick, continuous clay films; dark brown to brown (7.5YR 4/4) moist; silt coatings on surfaces; free of clay films; many concretions very firm but brittle (fragipan); noncalcareous, clear, wavy boundary.

Table 10. Chemical properties of Mission silt loam (74-Ida-0909).

Sample no.	Horizon	Depth (cm)	Depth (in)	pH (paste)	Conductivity (mmhos/c)	Water saturation (%)	Available P (ppm)	Sesquioxides: Dicitrate Extract[1] Fe (%)	Dicitrate Extract[1] Al (%)	Pyrophosphate Extract[2] Fe (%)	Pyrophosphate Extract[2] Al (%)
1	Ap	0- 23	0- 9	6.0	0.12	56		1.95	0.48	0.10	0.21
2	B2ir	23- 28	9-11	nd	nd[3]	nd[3]		2.18	0.55	0.09	0.24
3	IIA&Bxb	28- 35	11-14	6.1	0.16	41		2.33	0.18	0.05	0.06
4	IIB21xtb	35- 45	14-18	6.2	0.16	48		2.18	0.20	0.10	0.10
5	IIB22tb	45- 67	18-26	6.2	0.17	45		2.33	0.18	0.05	0.05
6	IIB31b	67- 83	26-33	6.2	0.20	51		1.95	0.19	0.04	0.05
7	IIB32b	83-105	33-42	6.6	0.18	52		1.95	0.19	0.04	0.05
8	IICb	105-150	42-60	7.6	0.30	51		1.80	0.15	0.03	0.03

Sample no.	Exchangeable ions Ca (meg per 100 g)	Mg	Na	K	Exch acidity (meg/100g)	CEC[4] (meg/100g)	Base saturation (%)	OM (%)	Organic carbon (%)	Nitrogen[5] (%)	C:N ratio	NaF[6] pH
1	1.7	0.33	0.1	0.36	16.5	15.5	13.1	3.56	2.07	0.145	14.3	10.3
2	1.2	0.12	0.1	0.07	15.5	20.6	8.5	2.38	1.38	0.084	16.4	nd[3]
3	2.0	0.63	0.1	0.15	3.2	7.6	46.9	0.30	0.18	0.017	10.6	7.4
4	2.5	0.83	0.1	0.16	3.4	8.6	51.5	0.32	0.19	0.045	4.2	7.5
5	2.5	0.83	0.1	0.13	4.0	7.8	47.4	0.32	0.18	0.036	5.0	7.3
6	2.3	0.92	0.1	0.15	3.2	8.7	51.7	0.36	0.22	0.041	5.4	7.4
7	2.8	0.96	0.1	0.19	1.9	9.6	68.0	0.40	0.23	0.037	6.2	7.5
8	6.5	0.88	0.1	0.13	0.2	7.4	97.8	0.32	0.18	0.031	5.8	8.5

[1]Sodium dithionite — sodium citrate extraction.
[2]Sodium pyrophosphate extraction.
[3]nd — not determined.
[4]Cation exchange capacity (CEC) run on leachate of 10% acidified NaCl by Kjedahl.
[5]Total nitrogens ran by Kjeldahl method.
[6]A measure of amorphous minerals present.

IIB22tb 45 to 67 cm (18 to 26 inches). Pale yellow (2.5Y 7/4) silt loam, yellowish-brown (10YR 5/5) moist; moderate, coarse angular blocky structure; very hard, firm, slightly sticky and slightly plastic; many fine and very fine pores; zones of thin stratifications; many black concretions, 1 to 2 mm; manganese staining with clay films, 20 to 80 percent clay films, 20 percent thin clay films; some A2 coatings; noncalcareous; clear, wavy boundary.

IIB31b 67 to 83 cm (26 to 33 inches). Pale yellow (2.5Y 8/3) silt loam, yellowish-brown (10YR 5/4) moist; weak, coarse subangular and angular blocky structure; very hard, firm, slightly sticky and slightly plastic; many very fine and fine pores; few medium pores; 2 to 20 percent thin clay films and thin silt coats; subangular aggregates break into thin laminations; many fine concretions, <1mm; noncalcareous; clear, wavy boundary.

IIB32b 83 to 105 cm (33 to 42 inches). Pale yellow (2.5Y 8/3) silt loam, yellowish-brown (10YR 5/4) moist; weak, coarse subangular blocky structure; zones of very thin stratification; very hard, firm, slightly sticky and slightly plastic; few black concretions; gradual, wavy boundary.

IICb 105 to 150 cm (42 to 60 inches). Pale yellow (2.5Y 8/3) silt loam, yellowish-brown (10YR 5/4) moist; stratified with laminations.

Mapping Unit Descriptions

The Center's soil survey includes three mapping units. The mapping units differ in slope, with the steeper slopes occurring along the margins of small drainages which transect the station from west to east.

MsA Mission silt loam, 0 to 3 percent slopes. This is the most extensive unit at the Center.

MsB Mission silt loam, 4 to 15 percent slopes. This unit is of minor extent and is found at the head of small drainage channels that bisect the Center. The A and B2ir horizons overlying the IIA&Bxb are thinner than in the typical Pedon described.

MsC Mission silt loam, 16 to 25 percent slopes. This unit is of minor extent and forms the sides of drainage channels that bisect the Center. This area is primarily under grass or tree vegetation.

Table 11. Physical properties of Mission silt loam (74-Ida-0909).

Sample no.	Particle size distribution (mm)[1] percent by weight: Very coarse sand (2-1.0)	Coarse sand (1-0.5)	Medium sand (0.5-0.25)	Fine sand (0.25-0.1)	Very fine sand (0.1-0.05)	Total sand (2-0.05)	Total silt (0.05-0.002)	Total clay (<0.003)	Gravel & stones (<2mm)	Textural classes
1	2.9	2.2	1.1	1.1	4.7	12.0	79.1	8.9	none	silt loam
2	1.3	2.3	1.1	0.9	8.1	13.7	77.1	9.3	none	silt loam
3	1.0	1.4	0.6	0.5	0.2	3.7	81.1	15.2	none	silt loam
4	nd[2]	nd	nd	nd	nd	0.9	79.3	19.9	none	silt loam
5	nd	nd	nd	nd	nd	0.1	80.4	19.5	none	silt loam
6	nd	nd	nd	nd	nd	0.1	78.0	22.0	none	silt loam
7	nd	nd	nd	nd	nd	0.1	73.9	26.1	none	silt loam
8	nd	nd	nd	nd	nd	1.8	81.0	18.5	none	silt loam

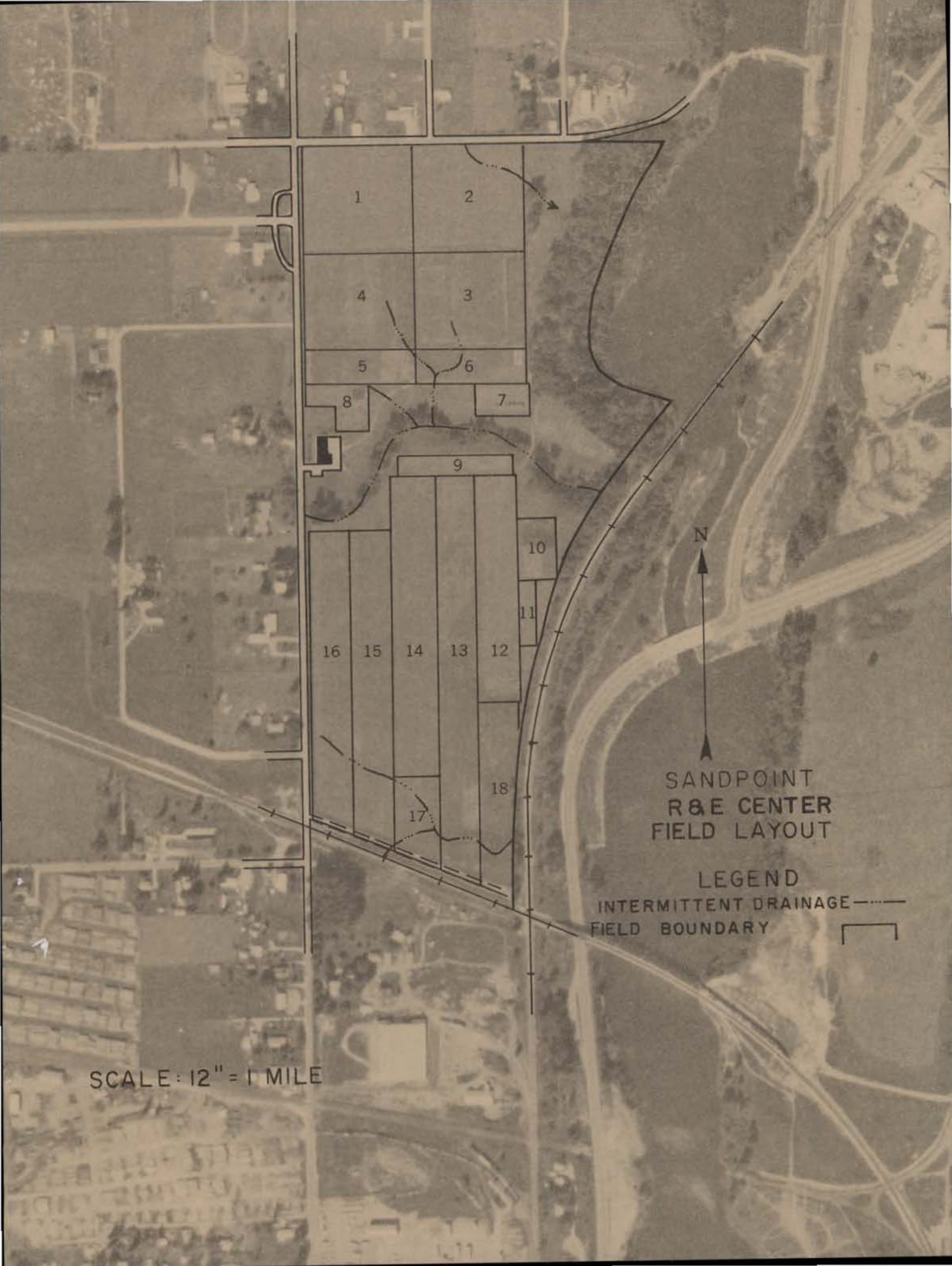
Sample no.	Silt size distribution (mm) — percent: Coarse (0.05-0.02)	Medium (0.02-0.005)	Fine (0.005-0.002)	Bulk density clod	Water content[3]: 1/3 bar	15 bar	Liquid limit	Plastic limit	Plastic index
				(g/cc)	(%)	(%)	(%)	(%)	(%)
1	35.8	37.8	5.6	1.1	49.0	9.4	Nonplastic	Nonplastic	Nonplastic
2	nd[2]	nd	nd	nd	nd	nd	nd	nd	nd
3	13.0	61.6	6.5	1.6	30.4	5.9	24	19	5
4	8.9	63.7	6.6	1.6	32.8	7.9	28	21	7
5	11.3	63.5	5.6	1.6	33.4	7.9	28	24	5
6	8.1	63.0	6.9	1.5	33.5	9.5	29	22	7
7	6.3	59.2	8.4	1.5	36.7	11.0	31	20	11
8	13.9	59.9	6.7	1.5	36.7	7.4	28	24	4

[1]Centrifuge method, carbonates removed, calgon added.

[2]nd — not determined

[3]Ran on < 2mm sieved samples.


MSA
MSB
MSA
MSC
1
MSB
MSB
MSC
2
MSA
MSB
N
SANDPOINT
R&E CENTER
SOILS MAP
LEGEND
INTERMITTENT DRAINAGE
SOILS BOUNDARY
SAMPLE SITE
1
SCALE: 12" = 1 MILE


1
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SANDPOINT
R&E CENTER
FIELD LAYOUT
LEGEND
INTERMITTENT DRAINAGE
FIELD BOUNDARY
SCALE: 12" = 1 MILE


X B.M. ASSUMED EL. 100.0
100
95
90
85
80
95
95
90
90
95
85
SANDPOINT
R&E CENTER
TOPOGRAPHIC MAP
LEGEND
INTERMITTENT DRAINAGE
CONTOURS
(1 FOOT INTERVALS)
95.
N
SCALE: 12" = 1 MILE

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