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Hidden Rock

INDIAN SERVICE PROJECT, VICINITY FT. DEFIANCE, ARIZONA

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The area under consideration is a triangular fenced field of about fifteen acres, located one and one-fourth miles southeast of Fort Defiance in the vicinity of the Good Samaritan Mission. It occupies a low terrace on the north bank of Black Creek.

The topography is characterized by a two percent slope toward the east, interrupted in the northern part of the plat by a terrace line which coincides with the soil boundary between types three and four. The entire surface is choppy and in the northern portion, several small knolls indicate the presence of alkali. A few shallow intermittent drains, crossable with farm implements, traverse the field. At present, the vegetative cover consists of Russian Thistle.

SOILS

The area consists of four soil separations, represented by three and one phase. All of them may be classed under one soil series. The soil profile of the entire area at about eighteen to twenty inches below the surface has a compact layer which resembles a hard pan. In most places, the layer is approximately twenty inches thick. Under type three, it is somewhat thicker. This layer consists of a reddish-brown or chocolate brown, compact highly colloidal clay or sandy clay, which has a prismatic structure that breaks down into nut sized fragments when disturbed. Along the cleavage surface, are indications of accumulations of white alkali. This layer has an alkali concentration of .195 of one percent of total salts. Traces of black alkali were also observed.

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TYPE 1.

The surface to a depth of twelve inches is a reddish-brown friable sandy loam with a granular structure. From twelve to eighteen inches below the surface, the soil consists of alternate layers of compact light reddish-brown sandy clay loam and dark brown clay. These layers have an average thickness of from two to four inches. The subsoil from eighteen to thirty-eight inches is characterized by a compact chocolate-brown, highly colloidal sandy clay. This type is located in the eastern and southern portion and occupies about one-half of the entire area.

SEPARATION 2 - Alkali phase of Type 1.

White alkali crust is present over a large portion of the surface of this phase. At present, the surface is free of vegetative cover. The soil profile is similar to the regular type, except the general structure is more compact. The phase is located in the northeastern portion and occupies about an acre of the total area.

TYPE 3.

This type has a dark reddish-brown sandy clay loam surface to a depth of six inches. The soil from six to twelve inches is a light red sandy loam. The next layer is a dark brown or grayish-brown moderately compact clay to a depth of twenty inches. At this depth, the soil becomes very compact, consisting of a reddish-brown or chocolate brown sandy clay or clay. This layer continues to a depth of forty-eight inches where it grades into a loose, red sand or sandy loam. The soil below sixty-eight inches is a compact dark grayish-brown clay. This type is located in the northwestern portion of the field on a slight elevation above type four.

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TYPE 4. The surface soil to a depth of eight inches is a chocolate brown or coffee brown granulated clay loam. From eight to twenty inches below the surface, the soil is a rich reddish-brown sandy clay loam. Below twenty inches, the subsoil is similar to that of types one and three. This type extends throughout the north central portion of the area.

ALKALI TABLE

Field Number	Soil Number and type	Depth in inches	Percent Alkali	P.P.M.	$NaCO_3$	Location
1	1 - Sandy Loam	0 - 6	.17	1,700	Trace	S.E. Corner
2	1 - Sandy Loam	6 - 18	.19	1,900	Trace	S.E. Corner
3	1 - Sandy Loam	18 - 24	.25	2,500	Trace	S.E. Corner
4	1 - Sandy Loam	0 - 6	.07	700	None	S.C. Corner
5	1 - Sandy Loam	6 - 18	.10	1,000	Trace	S.C. Corner
6	1 - Sandy Loam	18 - 24	.13	1,300	None	S.C. Corner
7	3 - Sandy Clay Loam	0 - 6	.02	200	None	S.C. Corner
8	3 - Sandy Clay Loam	6 - 20	.02	200	None	S.C. Corner
9	3 - Sandy Clay Loam	20 - 48	.195	1,950	Trace	S.C. Corner
10	3 - Sandy Clay Loam	48 - 68	.05	500	None	S.C. Corner
11	2 - Alkali Spot	0 - 6	1.09	10,900	Strong	N.E. Section
			P.P.M. 437			
12	2 - Alkali Spot	6 - 18	.37	3,700	Strong	N.E. Section
			P.P.M. 742			

Water analysis - Good for irrigation use.

A soil having less than 2,000 p.p.m. of total alkali salts and no indications of CO_3 or black alkali is considered a good agricultural

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soil as far as alkali is concerned. When a soil has over four thousand p.p.m. total salts and strong indications of black alkali, it is not recommended for irrigated agriculture.

From the alkali table, it is observed that the alkali spots are the only serious places on the area from an alkali standpoint. Tests of the water from Black Creek indicate that the water is relatively free from salts, therefore, it is very good for irrigation purposes. Continued use of excess amounts of this water on these alkali spots in time may leach them out to such an extent that these areas would become relatively free of alkali and, therefore, could be used for agriculture. At present these spots may have trouble in producing plant growth, as indicated from the present lack of vegetative cover.

RECOMMENDATIONS.

1. Leveling of the surface is necessary before the field is placed under irrigation.

2. Alfalfa may be planted over the entire area. It is recommended that alfalfa be planted in order to help break down the semi-hard pan that exists at from eighteen to twenty inches below the surface. This is accomplished when the roots in that layer decay and leave air spaces, therefore, water and air may percolate through the layer more readily.

3. Corn may be planted in the southern portion of the field, especially on type 1.

4. Care should be exercised to keep the compact subsoil layer open below eighteen inches in order that water logging may not develop. If this layer is not kept open, the water will have a tendency of sealing the highly colloidal soil. This is accomplished through the swelling of the moist colloids in the soil. When a soil becomes water logged, it looses its agricultural value.

Note: The following report is based on a field survey requested by the Indian Service.

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PROPOSED RANGE FURROWING AREA EAST OF FT. DEFIANCE

This area proposed for range furrowing is divided into two parts. One which is fenced consisting of 160 acres; and the other an unfenced area where stock control will be expected, if the proposed work is done, consisting of 430 acres. (See sketch for location).

The average slope is about 1 to 1.5% and in general is fairly even.

The soil varies from a clay loam to clay.

Present vegetation consists of yellow brush. Russian thistle, a little chamise and a few patches of alkali sacaton.

Small gullies are forming on the lower end of these areas where the water naturally concentrates.

No fencing is proposed.

Seeding of a mixture of blue stem and sacaton is recommended in connection with the range furrowing.

Range furrowing is proposed at 10 feet intervals.

COST SUMMARY:

Range furrowing and seeding on 160 acres fenced @ $2.25 per acre	$ 360.00
Range furrowing and seeding on 430 acres unfenced with assurance of stock control @ $2.25 per acre	967.50
Total	$1,327.50

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PROPOSED RANGE FURROWING AREA NEAR ST. MICHAELS

This area consisting of approximately 125 acres is recommended for range furrowing. (See sketch for location).

The slope varies from 2 to 6% and is very irregular. Topography is somewhat rolling.

The Soil varies from clay loam to clay.

Present vegetation consists of a sparse stand of yellow brush, Russian thistles, and a little galleta.

Small finger gullies are forming throughout the area.

This area is near a location where there is a tendency for livestock to concentrate and should, therefore, be fenced. This would require about 2 miles of fence @ $320.00 per mile.

The seeding of a mixture of blue stem, galleta, and sacaton is recommended fn connection with the range furrowing.

Range furrowing is proposed for the entire area at 5 ft. intervals.

COST SUMMARY:

2 miles fence @ $320.00 per mile	$640.00
Range furrowing and seeding on 125 acres @ $2.40 per acre	330.00
Total Cost	$970.00

Area affected - 275 Acres.

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