Dismal Swamp Placer Deposit Elmore County Idaho

GEOLOGICAL SURVEY BULLETIN 1042-K

Armstrong, F. C.—DISMAL SWAMP PLACER DEPOSIT, ELMORE COUNTY, IDAHO—Geological Survey Bulletin 1042-K

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By Frank C. Armstrong

ABSTRACT

The Dismal Swamp placer deposit, Elmore County, Idaho, was explored for niobium-, tantalum-, and uranium-bearing minerals by the J. R. Simplot Company under a Defense Minerals Exploration Administration contract in the summer of 1953. Sixteen bulldozer trenches, 2 shafts, and 25 churn-drill holes were used to explore the deposit.

The deposit is underlain by granodiorite and related granitic rocks of the Idaho batholith. The gravels of the deposit are the product of local stream erosion and slope wash. Columbite and samarskite have been identified in the deposit and are believed to have been derived from small pegmatites associated with the Idaho batholith. Most of the uranium is believed to occur in uranium-bearing multiple oxide minerals.

Samples from the trenches, shafts, and drill holes were tabled and the heavy concentrates were then magnetically separated. Selected magnetic fractions were analyzed chemically for niobium, tantalum, and uranium. Most of the niobium, tantalum, and uranium is contained in the "weakly magnetic" fraction. In the aggregate, the gravel contains between 1.40 and 1.87 pounds of "weakly magnetic" material per cubic yard averaging between 14 and 20 percent $Nb_2O_5+Ta_2O_5$ and between 0.15 and 0.19 percent U_3O_8.

INTRODUCTION

The Dismal Swamp placer prospect is in secs. 22, 27, 33, 34, and 35, T. 5 N., R. 9 E., northeastern Elmore County, Idaho (fig. 44). It is not in an organized mining district but is just west of the Bear Creek mining district. The property is on the headwaters of Buck Creek, 1½ miles by jeep road from a point on the Rocky Bar-Cougar Creek road about 6½ miles northwest of Rocky Bar, Idaho. From the property through Rocky Bar toward Mountain Home, a distance of about 115 miles, there is a graded dirt road to about 20 miles north of Mountain Home; the remaining distance is paved. The main line of the Union Pacific Railroad and U. S. Highway 30 pass through Mountain Home. Boise, 44 miles northwest of Mountain Home, is the nearest source of mining supplies.

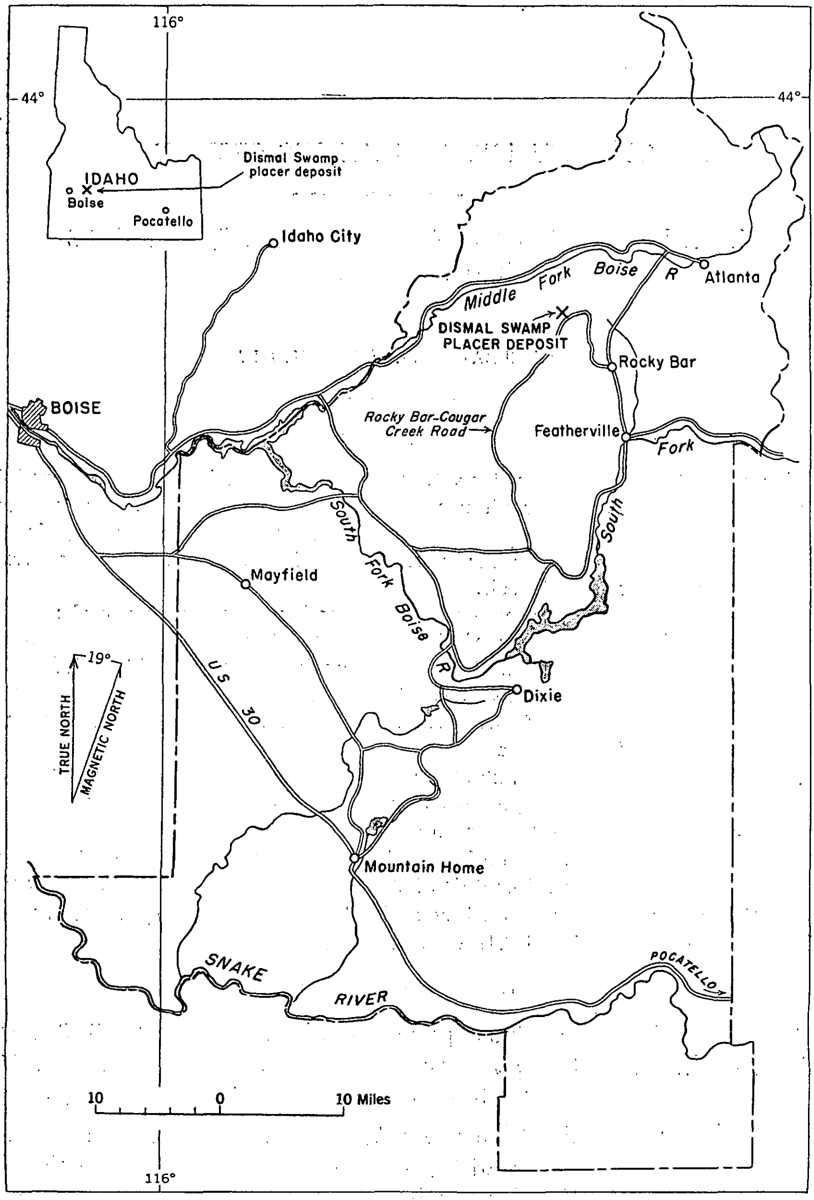

FIGURE 44.—Index map showing location of the Dismal Swamp placer deposit, Elmore County, Idaho.

The property is at an altitude of 6,900 feet in a mountainous terrain. The hills and valleys in the vicinity of the deposit are heavily forested, mostly with lodgepole pine. Dismal Swamp is at the headwaters of the westernmost principal fork of Buck Creek and only a few hundred yards northwest of the drainage divide between the Middle Fork of the Boise River and the Feather River. The winters are long and cold with moderately heavy snowfall and temperatures are frequently as low as 30° below zero. The summers are warm and afternoon showers are common. The property is inaccessible 6 to 7 months of the year.

EXTENT OF EXPLORATION

In the summer and fall of 1952 four prospect pits and one 10-foot shaft were dug on the Dismal Swamp property, and samples of the heavy concentrates from the gravels in the pits and shaft were taken for analysis. Analyses of the samples by commercial assay firms and the Bureau of Mines indicated that the samples contained niobium, tantalum, and uranium in large enough amounts to warrant a more thorough examination of the property. Subsequently the J. R. Simplot Company applied for a Defense Minerals Exploration Administration contract. This report is based on exploration done by the J. R. Simplot Company under Defense Minerals Exploration Administration contract No. Idm–E 545, docket No. DMEA–291, in cooperation with the U. S. Geological Survey and the Bureau of Mines.

Exploration under the Government contract was carried out between July 22 and the middle of September 1953, and consisted of the following:

1. 16 bulldozer trenches, 6 to 12 feet deep.
2. 25, 6-inch churn-drill holes from 6.5 to 18.5 feet deep. The total footage drilled was 329.4 feet.
3. Shaft No. 1, 10.5 feet deep and 5 by 5 feet in cross section and untimbered, sunk to bedrock around drill hole 8.
4. Shaft No. 2, 12.1 feet deep and 5 by 5 feet in cross section and untimbered, sunk to bedrock around drill hole 4.

The property explored consists of 10 contiguous, unpatented placer mining claims. The principal placer deposits are covered by only 2 of these claims; therefore, only those 2 claims, the Associated Gem groups Nos. 2 and 3 (pl. 18), were explored.

GEOLOGY

The Dismal Swamp prospect is a placer deposit of irregular outline lying at the head of a narrow valley at the junction of four minor tributaries. It is near the south end of the Idaho batholith, of Cretaceous age, about midway between its east and west margins. Outcrops are rare; the principal rock types in the vicinity of the property are granodiorite and related granitic rocks. The area does not appear to have been glaciated in late Wisconsin time, an impression confirmed by the moderately deep weathering of the granitic bedrock. In weathering, the granitic bedrock has broken into individual minerals to form a gruss. The moderately deep weathering has made the top foot or two of bedrock comparatively easy to strip with a bulldozer.

The gravels in Dismal Swamp are products of local stream erosion and slope wash of weathered granite from the small drainage basin.

In a sample of black sand concentrate from the Dismal Swamp placer, submitted by the J. R. Simplot Company, the Bureau of Mines laboratory at Albany, Oreg., identified the following minerals (S. W. Pressler, written communication): anatase, cassiterite, columbite, cyrtolite, feldspar, garnet, ilmenite, magnetite, monazite, quartz, rutile, samarskite, sericite, titaniferous magnetite, topaz, xenotime, and zircon.

Another mineral was recognized but not definitely identified. It appeared to be a multiple oxide containing niobium, thorium, rare earths, and a relatively small amount of uranium.

Columbite-tantalite and quartz in one sample from drill hole 3 and columbite-tantalite, rutile, anatase, and quartz in a sample from drill hole 9 were identified by X-ray analysis in the U. S. Geological Survey laboratory at Denver, Colo.

Analyses of the "weakly magnetic" (see p. 387) fractions from 12 drill holes (table 1) show that the approximate ratio of Nb_2O_5 to Ta_2O_5 ranges from 15 to 1 to 45 to 1. The high ratio of Nb_2O_5 to Ta_2O_5 indicates that the principal niobium-bearing mineral of these samples is very near the columbite end of the columbite-tantalite series. Columbite can contain uranium in amounts greater than those found in the above samples,[1] thus the columbite in this deposit could contain much or all of the uranium shown by these analyses. However, the small amount of uranium (table 1) in the black sand concentrates that are known to contain some samarskite and possibly some other uranium-bearing multiple oxides suggests that the uranium occurs in the uranium-bearing multiple oxides and not in the columbite.

It has been suggested that most of the niobium-bearing minerals occur immediately above bedrock and that a mixture of coarse and fine particles contain more niobium than a homogeneous fine-grained material. In the mixed gravels, the niobium-bearing minerals are found in the sand-sized particles interstitial to the pebbles. In the writer's opinion, the suggested relation between mixed particle size and niobium content was never proved, and it is doubtful that this relation exists. The results of the drilling suggest that most of the niobium-bearing minerals are concentrated near bedrock, as would be expected, but this condition was not proved conclusively.

[1] George, d'Arcy, 1949, Mineralogy of uranium and thorium-bearing minerals: U. S. Atomic Energy Comm. RMO-563, p. 69-73, Tech. Inf. Service, Oak Ridge, Tenn.

TABLE 1.—*Analyses of fractions of churn-drill samples from Dismal Swamp placer deposit, Elmore County, Idaho* [1]

Drill-hole No.	Footage	U. S. Geological Survey analyses, in percent				J. R. Simplot Co. analyses, in percent	Remarks	Thickness of dredgeable material [6]	Approximate percent of Nb_2O_5 [3] + Ta_2O_5 [4] in the "weakly magnetic" fraction	Approximate percent of U_3O_8 [5] in the "weakly magnetic" fraction	Approximate ratio of Nb_2O_5 to Ta_2O_5
		Nb	Ta	eU [2]	U	Nb_2O_5 + Ta_2O_5					
5	5–18½	5	0.2	0.68	0.13	--------	May be reject from black mineral separate of "weakly magnetic" fraction.				
5	5–18½	2	.08	.35	.084	--------	Sludge from above sample.	7	12	0.15	25:1
5	5–10	30	1	.46	.19	--------	Black minerals of "weakly magnetic" fraction.				
5	10–12	-----	-----	-----	-----	12.3	"Weakly magnetic" fraction.				
6	5–18	4	.1	.23	.080	--------	Reject from black mineral separate of "weakly magnetic" fraction?	9	6	.09	45:1
7	5–17	4	.1	.36	.10	--------	Reject from black mineral separate of "weakly magnetic" fraction?	10	6	.12	45:1
7	11–15	-----	-----	-----	-----	4.2	"Weakly magnetic" fraction.				
8	5–13	2	.08	.30	.080	--------	Reject from black mineral separate (below) of "weakly magnetic" fraction?				
8	5–13	10	-----	.13	-----	--------	Black minerals of "weakly magnetic" fraction.	5	7	.09	30:1
8	7–8	-----	-----	-----	-----	1.9	"Weakly magnetic" fraction.				
8	10–12	-----	-----	-----	-----	.4	"Weakly magnetic" fraction.				
9	5–13	13	.5	.35	.15	--------	"Weakly magnetic" fraction.				
9	5–13	.06	-----	.037	-----	--------	"Nonmagnetic" fraction.	7	19	.18	30:1
9	5–13	3	-----	.19	-----	--------	"Magnetic" fraction.				
10	5–11	3	.1	.34	.10	--------	Reject from black mineral separate (below) of "weakly magnetic" fraction?				
10	5–11	8	.6	.17	.11	--------	Black minerals of "weakly magnetic" fraction?	4	6	.12	25:1
10	5–9	-----	-----	-----	-----	.9	"Weakly magnetic" fraction.				
12	5–13	15	.7	.45	.12	--------	"Weakly magnetic" fraction.	6	22	.14	25:1

See footnotes at end of table.

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TABLE 1.—*Analyses of fractions of churn-drill samples from Dismal Swamp placer deposits. Elmore County, Idaho*—Continued

Drill-hole No.	Footage	U. S. Geological Survey analyses, in percent				J. R. Simplot Co. analyses, in percent	Remarks	Thickness of dredgeable material [6]	Approximate percent of Nb_2O_5[3] + Ta_2O_5[4] in the "weakly magnetic" fraction	Approximate percent of U_3O_8[5] in the "weakly magnetic" fraction	Approximate ratio of Nb_2O_5 to Ta_2O_5
		Nb	Ta	eU [2]	U	Nb_2O_5 + Ta_2O_5					
13	5-16	14	0.6	0.46	0.18	--------	"Weakly magnetic" fraction.				
13	5-16	.04	-----	.070	-----	--------	"Nonmagnetic" fraction.	9	21	0.21	25:1
13	5-16	4	-----	.16	-----	--------	"Magnetic" fraction..				
21	5-12	18	1.0	.40	.17	--------	"Weakly magnetic" fraction.				
21	5-12	.06	-----	.075	-----	--------	"Nonmagnetic" fraction.	6	27	.20	20:1
21	5-12	5	-----	.27	-----	--------	"Magnetic" fraction..				
22	5-15	8	.7	.53	.14	--------	"Weakly magnetic" fraction.	8	12	.16	15:1
23	5-14	12	.9	.45	.20	--------	"Weakly magnetic" fraction.	7	18	.24	15:1
24	0-10	18	1.0	.39	.15	--------	"Weakly magnetic" fraction.				
24	0-10	.1	-----	.055	-----	--------	"Nonmagnetic" fraction.	9	27	.18	25:1
24	0-10	4	-----	.10	-----	--------	"Magnetic" fraction..				
	Averages [7]							7.1	14	.15	

[1] All samples are of sand-sized material except the one indicated as sludge under "Remarks."
[2] Estimate only; insufficient sample for accurate routine analyses.
[3] The factor for converting Nb to Nb_2O_5 is 1.43.
[4] The factor for converting Ta to Ta_2O_5 is 1.22.
[5] The factor for converting U to U_3O_8 is 1.18.
[6] Taken from J. R. Simplot Co.'s logs of individual holes.
[7] Excluding drill-hole 24.

The niobium-tantalum minerals and uranium-bearing minerals were probably original constituents of the many small pegmatites that cut the Idaho batholith. Similar suites of minerals are known to be associated with such pegmatites in other parts of central Idaho (Fryklund, 1951;[2] Mackin and Schmidt, 1956[3]).

Evidence that most of the niobium-bearing minerals in the gravels were derived from the area west of the deposit consists of these facts: (1) the operator, during work done before this exploration, obtained his best samples from along the west margin of the swamp, and (2) there is a relatively high Nb_2O_5 and Ta_2O_5 content in drill hole 24 (table 1 and pl. 18).

[2] Fryklund, V. C., 1951, A reconnaissance of some Idaho feldspar deposits: Idaho Bur. Mines and Geol. Pamph. 91, p. 24-25.
[3] Mackin, J. H., and Schmidt, D. L., 1956, Uranium- and thorium-bearing minerals in placer deposits in Idaho: U. S. Geol. Survey Prof. Paper 300, p. 375-380.

MINERAL SEPARATION

After completion of the field work, mineral separations were made at the J. R. Simplot Company's plant in Boise, Idaho, and selected separated fractions were analyzed by J. R. Simplot Company and the U. S. Geological Survey.

The samples from the churn-drill holes, trenches, and shafts were screened to minus 16-mesh in the field. Examination by panning showed that the plus 16-mesh material contained few, if any, black minerals. Most of the grains of the plus 16-mesh material and a few grains of minus 16-mesh material were rock fragments not broken down into individual minerals. The minus 16-mesh material was run over a half-sized Wilfley table to separate heavy concentrates of each sample.

Magnetite was removed from the concentrates with a hand magnet. The remaining part of the concentrates was then passed through a magnetic separator in which the magnetic intensity was varied. Three fractions were made: (1) with the current off and only the residual magnetism of the separator acting to separate a "magnetic" fraction; (2) with the field strength at 1.5 amperes to separate a "weakly magnetic" fraction; and (3) the reject from (2) was the "nonmagnetic" fraction. The table concentrates from the first eight churn-drill holes were also separated on a high voltage electrostatic separator into conducting and nonconducting minerals. It was found that in this separation a considerable amount of the fine-grained part of the sample was lost; therefore, the rest of the samples were not separated on the high-voltage separator.

"Weakly magnetic" fractions of concentrate samples from 4 drill holes were analyzed for niobium and tantalum by J. R. Simplot Company. Also, certain fractions of concentrate samples from 12 drill holes were analyzed at the Geological Survey laboratory, Denver. The results of all these analyses are given in table 1.

The results of the analyses and the testing done by the Bureau of Mines Laboratory at Albany, Oreg., before the exploration contract, show that most of the niobium-, tantalum-, and uranium-bearing minerals in the concentrates are in the "weakly magnetic" fractions. The table also shows that the "magnetic" fractions of the samples contain a little niobium and uranium.

J. R. Simplot Company's churn-drill-hole-sample data indicate that the gravel in the dredgeable area contains about 1.40 pounds of "weakly magnetic" material per cubic yard (table 2). A comparison of the amount of "weakly magnetic" material in samples from drill hole 8 and from shaft 1 (fig. 45), which was sunk around the drill hole, shows that the drill-hole samples average 26.4 percent less "weakly magnetic" material per cubic yard than the shaft samples. A similar

TABLE 2.—*Thickness of dredgeable gravel and pounds of "weakly magnetic" material per cubic yard of gravel as indicated by 11 churn-drill holes*

Drill hole	Thickness of dredgeable gravel in drill hole (feet)	Pounds of "weakly magnetic" material per cubic yard of gravel [1]
5	7.0	0.92
6	9.0	1.10
7	10.0	.54
8	[2] 5.5	[2] 2.06
9	7.0	1.74
10	4.0	1.58
12	6.0	1.06
13	9.0	1.24
21	6.0	2.45
22	8.0	2.36
23	7.0	1.01
Average	7.1	1.40

[1] From J. R. Simplot Company's logs of individual drill holes.
[2] Corrected for depth to bedrock but not for grade as revealed in shaft 1.

comparison made by the operator between drill hole 4 and shaft 2 (fig. 46), also sunk around the drill hole, indicated the drill-hole samples to be about 30 percent lower than the shaft samples. The differences in the amount of "weakly magnetic" material contained in the drill-hole samples and the samples from the shafts suggest that the content of "weakly magnetic" material of all the drill-hole samples may be as much as 25 percent low. If 1.40 pounds represents only 75 percent of the "weakly magnetic" material in the gravel, then the gravel contains 1.87 pounds of "weakly magnetic" material per cubic yard.

Analyses (table 1) of "weakly magnetic" fractions from the drill-hole samples show that the "weakly magnetic" material in the dredgeable area contains approximately 14 percent combined Nb_2O_5 and Ta_2O_5 and about 0.15 percent U_3O_8. It is possible that the samples in table 1 most accurately representing "weakly magnetic" material are those from holes 9, 12, 13, 21, 22, and 23. Analyses of these samples average about 20 percent combined Nb_2O_5 and Ta_2O_5, and 0.19 percent U_3O_8. The average niobium-tantalum and uranium contents of "weakly magnetic" material from drill holes 5, 6, 7, 8, and 10 were more or less arbitrarily determined by using available information.

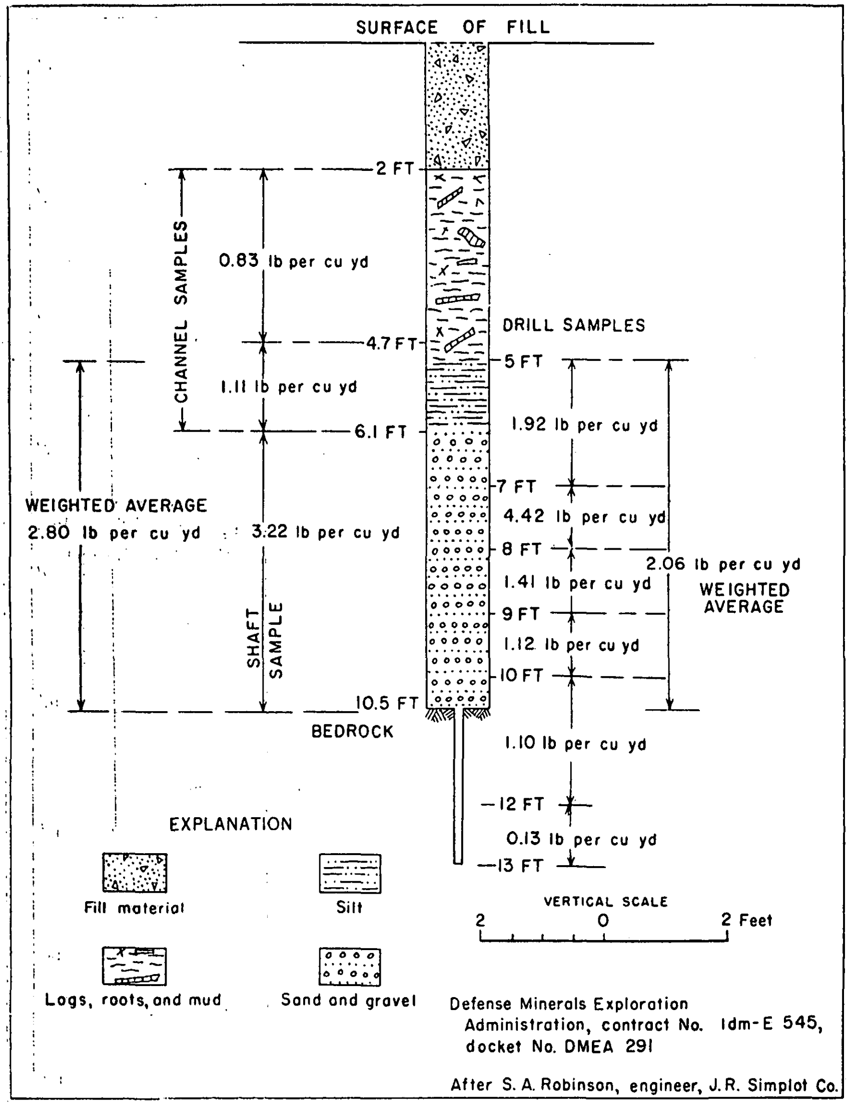

FIGURE 45.—Comparison of amounts of "weakly magnetic" material in samples from churn-drill hole 8 and shaft I.

Many analyses of samples from these holes are not of the "weakly magnetic" fraction, or are of only a part of the total footage of the hole or are of only a part of the "weakly magnetic" fraction of the sample. Moreover, all the average analyses for these holes are lower than for holes 9, 12, 13, 21, 22, and 23, although holes 5, 6, 7, 8, and 10 are close to and in part surrounded by holes 9, 12, 13, 21, 22, and

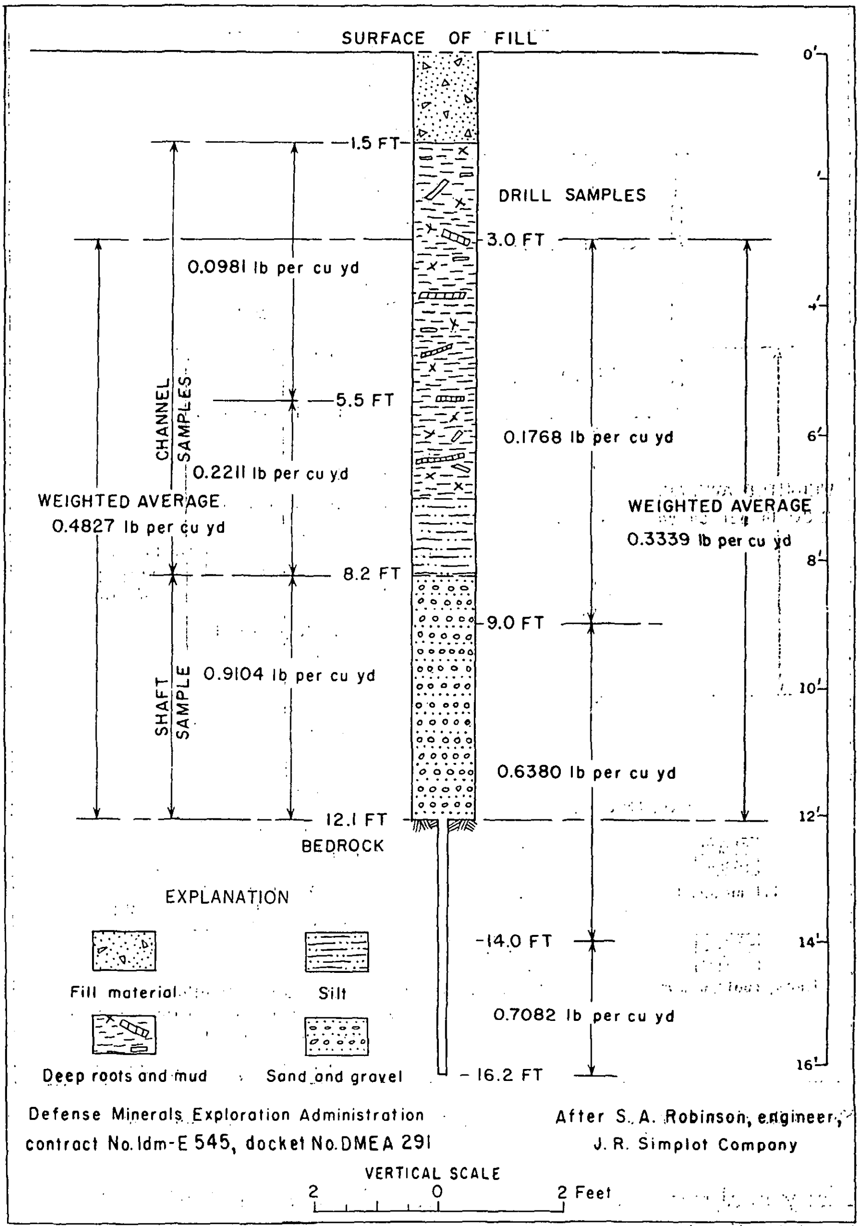

FIGURE 46.—Comparison of amounts of "weakly magnetic" material in samples from churn-drill hole 4 and shaft 2.

23. Therefore, it is thought that the "weakly magnetic" fraction of the gravel may contain more than 14 percent combined Nb_2O_5 and Ta_2O_5 and 0.15 percent U_3O_8.

U. S. GOVERNMENT PRINTING OFFICE: 1957