Associated Red Flats Mining Group
c/o Mr. William E. Walsh

First application 5/16/53 - Docket No. 3052

1. Access road
2. Cat + jeep trails
3. Auger + churn drilling
4. Bulldozer pits
5. Sampling + assaying
6. Survey, subdivide + map entire area

ESTIMATED COST = $77,495.00

Second application - March 1955 - Docket No. 3773

1. Access road
2. Cat + jeep trails.
3. Auger + churn drilling
4. Bulldozer pits.
5. Shallow shafts
6. Sampling + assaying.

ESTIMATED COST $49,750.00

Note: Breakdown of costs estimated in both applications compared in attached memo of 4/20/55 from N.E. Nelson.

400

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Department of the Interior
Defense Minerals Administration
RECEIVED
APR 21 1955

April 20, 1955

73

Re: DMEA-37[illegible]
Associated Red Flats
Mining Group
Curry County, Oregon
$47,750
Nickel, platinum, cobalt, tin

WBM

Copy retained 400

Memorandum

To: W. S. Martin, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of an application (Second)

This the second application of the Associated Red Flats Mining Group of Coos Bay, Oregon, is concerned with the exploration of a 4080 acre tract in Curry County, Oregon. Mr. W. H. Walsh of Coos Bay represents the Group, a partnership.

A similar application (DMEA-3052) was filed for the Group in May 1953, by Harry Hedderly of Gold Beach, Oregon. The 1953 application, which asked for a loan of $77,945, was denied June 23, 1953.

Since that time Report of Investigations 5072, Preliminary Investigation of Red Flats Nickel Deposit, has been issued by the U. S. Bureau of Mines and the applicant justifies the new request by the information in that report. Neither application sets forth an itemized program and it is not possible to do more than compare the figures in the "Estimates of Cost."

	Application of: 1955	1953
6(a) Independent contracts	None	None
6(b) Labor, supervisor, consultants	$23,500.00	$41,100.00
6(c) Operating materials and supplies	4,000.00	5,900.00
6(d) Operating equipment	15,750.00	19,900.00
6(e) Rehabilitation and repairs	2,000.00	5,545.00
6(f) New buildings, improvements, installations	None	None
6(g) Miscellaneous (See 6(e))		
6(h) Contingencies	4,500.00	5,500.00
Total Estimate of Costs	$49,750.00	$77,945.00

No new information is supplied by the new application which would tend to change the conclusions of the Report of Investigations but a belief persists that by testing a much larger part of the 4080 acre tract much more nickeliferous material would be proven and the status of the project advanced, perhaps to the point of economic feasibility.

Two types of nickeliferous material were found: (a) nickel-rich laterite and (b) nickel-rich serpentine. As stated in the Report of Investigations, 5072, the drilling did not delimit either type of material. (R. I. 5072, Pages 4, 7 and 15.) "The results of the 72-hour continuous test indicated that the selective smelting procedure developed by the Bureau for recovering nickel from siliceous nickel ores is applicable to the ore from the low-grade Red Flats deposit." (R.I. 5072 Conclusions, page 15.)

To determine more conclusively whether or not other significant areas of nickeliferous material exist in the large property will probably require further boring and drilling. To indicate if and where such testing should be done a field team report is needed. I recommend referral of the application to the Field Team.

W. E. Nelson

W. E. Nelson

Copy to: DMEA (3)

Copy submitted by Mr. Walsh
with application
DMEA-3773

Bureau of Mines
Report of Investigations 5072

DMEA 3773

PRELIMINARY INVESTIGATION OF THE RED FLATS NICKEL DEPOSIT, CURRY COUNTY, OREG.

BY R. J. HUNDHAUSEN, J. R. MCWILLIAMS, AND L. H. BANNING

United States Department of the Interior — September 1954

PRELIMINARY INVESTIGATION OF THE RED FLATS NICKEL DEPOSIT, CURRY COUNTY, OREG.

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* * * * * * * * * **Report of Investigations 5072**

UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary
BUREAU OF MINES
J. J. Forbes, Director

Work on manuscript completed May 1954. The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is made: "Reprinted from Bureau of Mines Report of Investigations 5072."

September 1954

PRELIMINARY INVESTIGATION OF THE RED FLATS NICKEL DEPOSIT, CURRY COUNTY, OREG.

by

R. J. Hundhausen,[1] J. R. McWilliams,[1] and L. H. Banning[2]

CONTENTS

	Page
Introduction and summary	1
Previous work and acknowledgments	1
Location and access	2
History and production	2
Property and ownership	3
Physical features and climate	3
Description of deposit	4
General	4
Nickeliferous laterite	4
Geologic setting	4
Nickeliferous laterite areas	4
Chemical and mineralogical composition of laterite	5
Nickeliferous serpentines	7
Field work by Bureau of Mines	7
Drilling	7
Sampling	8
Metallurgical research by Bureau of Mines	8
General	8
Equipment and facilities for smelting research	9
Materials handling	9
Description of smelting furnace	9
Description of ore and reductant	10
Analyses of soil and rock	10
Petrographic analysis	11
Reductant	11
Smelting procedure	12
Discussion of test results	13
Conclusions	15
Appendix	16

1/ Mining engineer, Mining Division, Region II, Bureau of Mines.
2/ Chief, Ferrous Metals Branch, Metallurgical Division, Region II, Bureau of Mines.

Report of Investigations 5072

TABLES

		Page
1.	Partial analyses of representative types of nickel ore.	6
2.	Weights and analyses of Red Flats ore as received, dry basis:.....	10
3.	Chemical analyses of composite samples.....	11
4.	Spectrographic analyses of composite samples.....	11
5.	Comparison of operating data for smelting nickel ore from Red Flats and Riddle deposits.....	14

ILLUSTRATIONS

Fig.		Follows page
1.	Relief map of southwestern Oregon, showing Red Flats nickel deposit.....	2
2.	Red Flats nickel deposit.....	2
3.	Drying ore from Red Flats deposit.....	12
4.	Weighing ore and reductant into charge mixer.....	12
5.	Tapping slag from ESA furnace.....	16

INTRODUCTION AND SUMMARY

The continued worldwide shortage and strategic value of nickel place great importance upon the continued development and exploitation of new sources of nickel in the United States. The deposits of nickel-bearing minerals in Oregon and Washington have attracted considerable attention, particularly since the Hanna Development Co. has engaged in development work aimed at producing ferronickel from the Nickel Mountain deposit, near Riddle, Douglas County, Oreg. 24 million [illegible] loan

The Red Flats nickel deposit in Curry County, Oreg., was first examined by the Bureau of Mines in June 1945, but it was not until 1952 that the deposit was drilled and sampled. In 1953, a 15-ton sample of Red Flats material was procured and subjected to continuous smelting tests in the Bureau's Northwest Electrodevelopment Laboratory, Albany, Oreg.

The sample of Red Flats nickel ore as received contained 31 percent moisture. It was dried to 18-percent moisture and stage-crushed to minus-1/2-inch for the smelting test. The ore charged to the furnace contained 0.74 percent nickel and 28.2 percent iron. The furnace charge was in the ratio of 100 pounds of ore to 17 pounds of wood chips. No fluxing constituents were added. Selective reduction and an arc smelting technique were used throughout the test. Overall recovery figures indicated that 82.2 percent of the nickel and 12.8 percent of the iron charged to the furnace were recovered in ferronickel products analyzing 9.29 to 14.0 percent nickel. The average power and graphite consumption was 1,073 kw.-hr. and 10.52 pounds of graphite, respectively, per ton of dry ore smelted.

Neither the field investigations nor the smelting tests are considered complete; nevertheless, a fairly large area of nickeliferous laterite and nickeliferous serpentine is indicated by the Bureau's drilling program; the preliminary smelting tests show that it is technically feasible to recover a low-carbon ferronickel product from the Red Flat ore.

Mining the deposit presents no special problems. Open-pit methods after stripping overburden would be satisfactory. Transportation of ore to railhead, seaport, or the nickel smelter at Riddle will be expensive and, considering the low grade of the ore, will be perhaps the largest handicap to utilization.

PREVIOUS WORK AND ACKNOWLEDGMENTS

The Red Flats area has been examined by the Oregon State Department of Geology and Mineral Industries several times, the first examination being in 1937. The deposit came to the attention of the Bureau of Mines in June 1945, when Bureau engineers[3] made a preliminary examination and drilled 16 hand-auger holes.

3/ H. G. Iverson and R. J. Hundhausen, mining engineers, Bureau of Mines, Mining Division.

In 1946 the Oregon State Department of Geology and Mineral Industries initiated a project on the laterite soils of southwestern Oregon and began[4] the work at the Red Flats deposit. In 1947 the department did some additional sampling.[5]

Special acknowledgment is due F. W. Libbey, director of the Oregon State Department of Geology and Mineral Industries, for his suggestions and criticism in preparing this report.

Funds for the mining investigations were provided by the California-Oregon Power Co., Medford, Oreg., in the interest of mineral development of southwestern Oregon. The metallurgical investigation was financed by funds from the project entitled, "Research on usability of Fe-Ni-Cr ores in Oregon and Washington."

This report describes the field investigations conducted by J. R. McWilliams[6] under the supervision of D. W. Butner[6] and the metallurgical investigations under the immediate supervision of Wallace E. Anable[7] and directed by L. H. Banning, chief, Ferrous Metals Branch.

LOCATION AND ACCESS

The deposit is in sec. 19 and 30, T. 37 S., R. 13 W., 8 miles airline, or 17 miles by road, east of Gold Beach, Curry County, Oreg., in the extreme southwest corner of the State. The Oregon coast highway (U.S. 101) follows along the narrow coastal plain connecting the small towns of Brookings, Gold Beach, and Port Orford. The rugged upland interior is accessible by a few Forest Service roads and is sparsely populated. The Red Flats deposit is on the narrow, unsurfaced Forest Service road leading to the Snow Camp Mountain lookout. This road leaves U. S. Highway 101 at Hunters Creek, 3 miles south of Gold Beach (fig. 1).

The nearest railroad connection is at Coquille, Oreg., which is 77 miles north of Gold Beach and 94 miles by road from the deposit. Transportation is a serious handicap to development of mineral resources in this relatively inaccessible region of Oregon. Now expect harbor improvement at Gold Beach P.M.

HISTORY AND PRODUCTION

The Red Flats deposit was located as a gold-mercury placer prospect in the early thirties. Small mills and retorts have been set up on the property at different times. A few shallow hand trenches and a 32-foot shaft comprised

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4/ Libbey, F. W., Lowry, W. O., and Mason, R. S., Nickel-Bearing Laterite, Red Flat, Curry County, Oreg. The Ore Bin, vol. 9, No. 3, March 1947, pp. 19-27.

5/ Dole, Hollis, Libbey, F. W., and Mason, R. S., Nickel-Bearing Laterite Areas of Southwestern Oregon: The Ore Bin, vol. 10, No. 5, May 1948, pp. 33-38.

6/ Mining engineers, Bureau of Mines, Mining Division.

7/ Metallurgist, Bureau of Mines, Metallurgical Division, Region II.

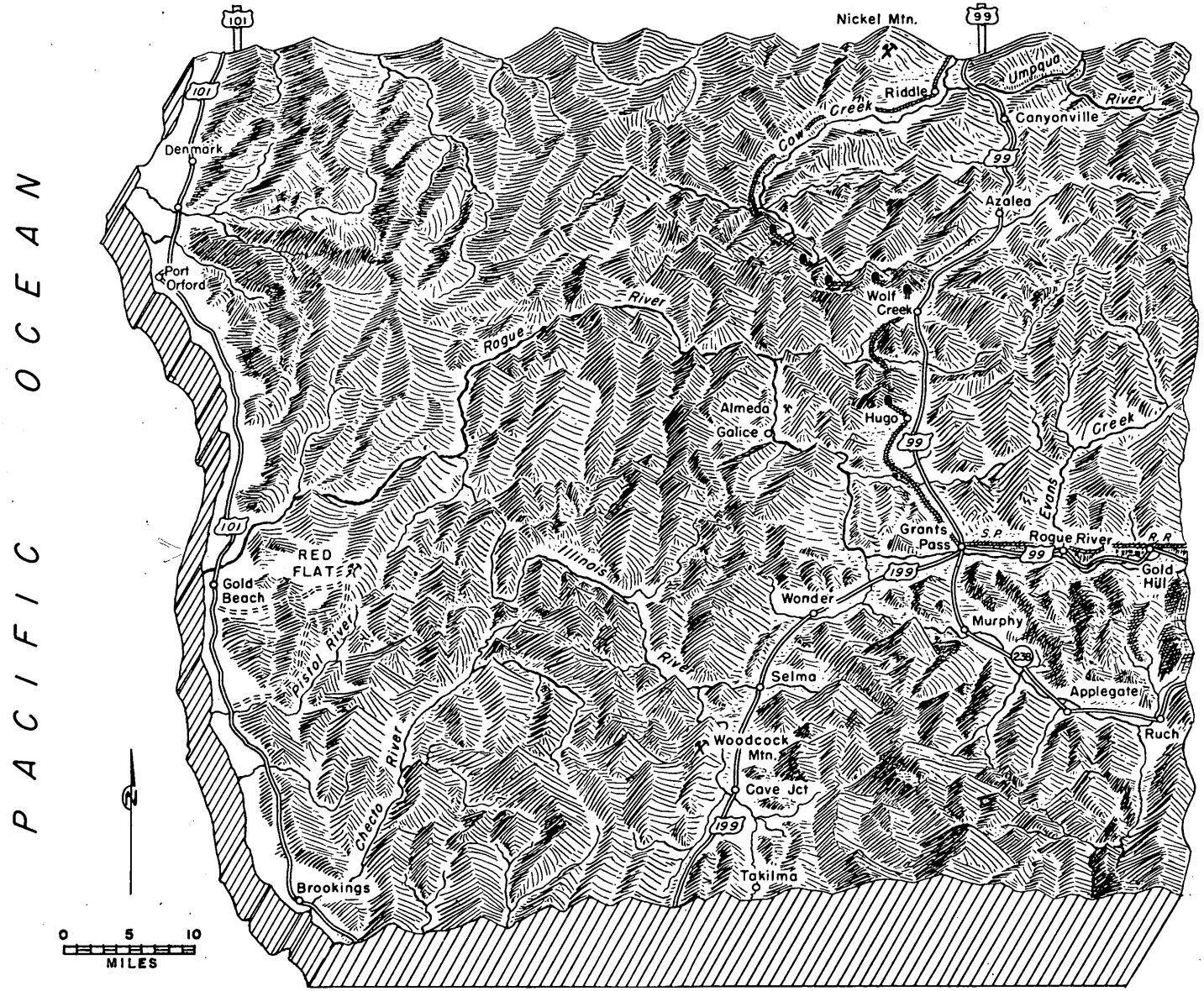


Figure 1. - Relief map of southwestern Oregon showing Red Flats nickel deposit.

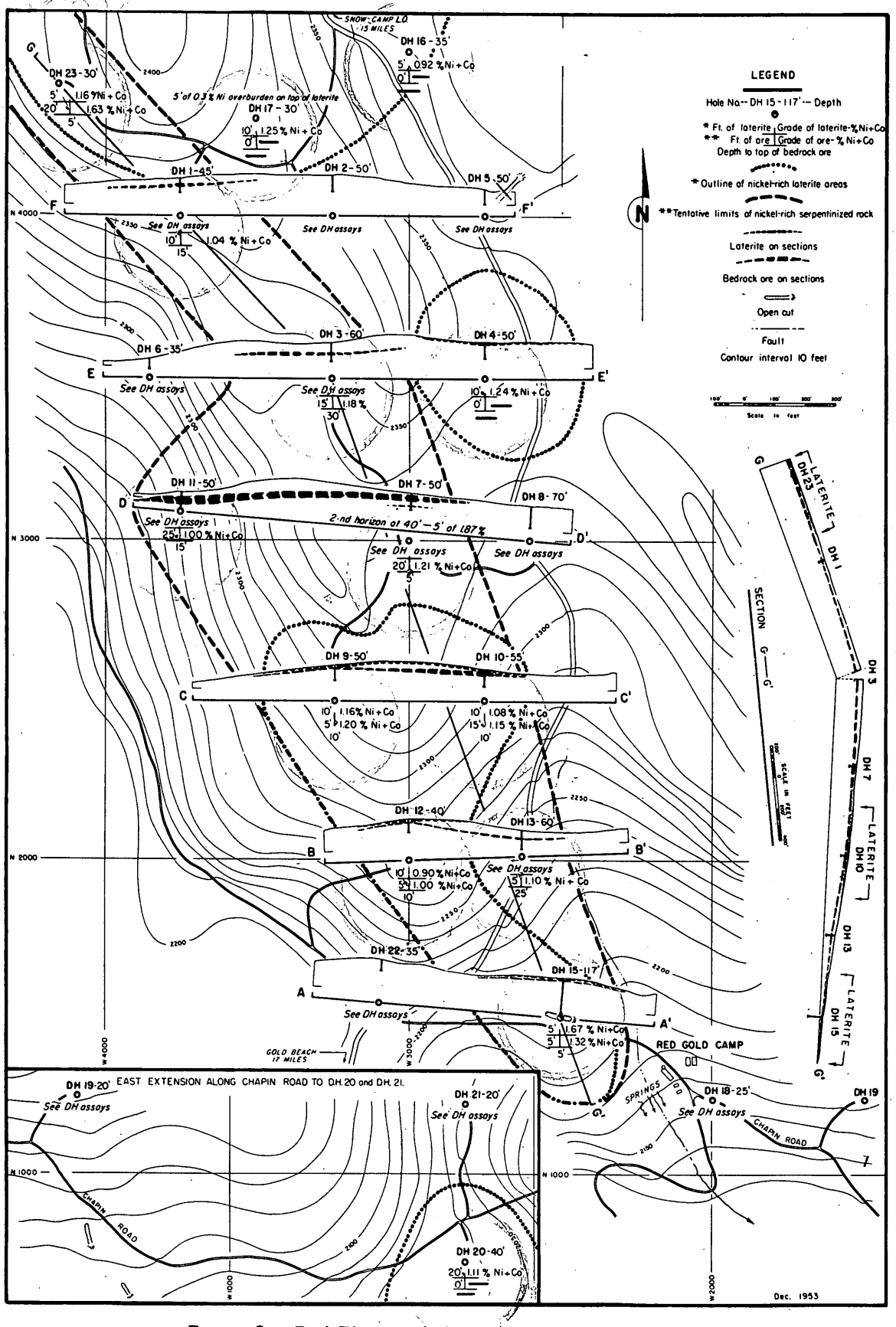


Figure 2. - Red Flats nickel deposit, Curry County, Oreg.

the early development work. In 1945 and 1946, 4 or 5 shallow bulldozer trenches were excavated, and 3 or 4 small camp building were constructed by the operators. The property has been relatively dormant since 1947.

None of the operations in the past have proved successful, and most of the equipment has been removed. There is no record of any production from the property.

PROPERTY AND OWNERSHIP

Less than 150 acres explored

The deposit is covered by several groups of claims, the boundaries of which are not accurately known. The largest area claimed consists of 9 unpatented placer claims, covering 1,600 acres, owned by the Red Flats Association, of which Mrs. Mary Smedburg, Gold Beach, and J. A. Walsh, Coos Bay, are the principal representatives.

The Red Ridge Mining Co., represented by Harry Hedderley and Associates of Gold Beach, owns a group of unpatented placer claims adjoining the Red Flats Association property on the north. In 1943, the Pistol River Mercury Mining Co., James Gensler, trustee, Portland, Oreg., controlled a large group of placer claims known as the Glade Creek Placer Association property. This property adjoins that of the Red Flats Association on the east.

A number of fringe claims are owned by various individuals and groups.

PHYSICAL FEATURES AND CLIMATE

The Red Flats deposit is on a relatively flat topped ridge between Hunters Creek on the west and Pistol River on the east. The lower slopes of the ridge are deeply dissected, rugged, and steep. The summit of the ridge is terraced or benched, but undissected. The altitude of the deposit ranges between 2,150 and 2,500 feet above sea level.

Large areas of the deposit are relatively barren of timber and covered only by dense brush. Scattered patches of knob cone pine, stunted oaks, and manzanita are elsewhere on the deposit but have little value for mining purposes. West of the deposit, timber of excellent quality is found in large quantity.

Typical Oregon coastal climate prevails with heavy rainfall, fog, and storms common during the winter and spring months. Snow and freezing temperatures are exceptional. Annual precipitation averages about 50 inches. The summers are dry and mostly clear, and there is little temperature variation, the yearly mean average temperature being around 50° F.

Water is available from Pistol River or Hunters Creek at all times. The higher slopes of the ridge are comparatively dry. One permanent spring near the summit of the ridge supplies enough water for domestic and limited industrial use.

DESCRIPTION OF DEPOSIT

General

The Red Flats nickel deposit contains areas of nickel-rich brick-red soil, termed nickeliferous laterite, and an underlying zone of weathered nickeliferous serpentine. There are large differences in chemical composition between the two types of nickeliferous materials.

Nickeliferous Laterite

Geologic Setting

The general geology of this region is described by Butler and Mitchell.8/

The nickeliferous laterite rests on a weathered bedrock of ultrabasic rocks, principally peridotite and serpentinized peridotite. These rocks are part of the Josephine peridotite intrusives common in southwestern Oregon and northern California.9/ The nickeliferous laterite is confined to the surface of the peridotite and has been derived from it under certain conditions of weathering, particularly where there are alternating cycles of hot dry climate followed by a prolonged rainy season. Where the peridotite contacts Colebrooke schists (pre-Jurassic) and the Dothan formation (Jurassic) immediately south of the Red Flats area, the laterite is absent.

The comparatively low iron content and the high magnesium and silicon contents of the laterite in the Red Flats area indicate a relatively youthful stage of weathering. If more mature laterites, high in iron content, were ever developed in this area, they have since been eroded, and there is nothing to indicate their former presence. The iron content of the laterite ranges in grade from 25 to 45 percent. Residual boulders of undecomposed peridotite are scattered throughout the laterite. The laterite has accumulated along the axis of the ridge and in small basins on the east slopes sheltered or rimmed by resistant dikes or ledges. The west slope of the ridge is covered with only a thin veneer of red soil (laterite).

Nickeliferous Laterite Areas

The nickel-rich laterite areas have not been completely delimited by the Bureau of Mines drilling program. Apparently more of this laterite is present north of the area explored. The nickeliferous laterite areas are outlined in figure 2. A cutoff grade of 0.90 percent combined nickel and cobalt was used to establish the boundaries of higher grade laterite areas. The

8/ Butler, G. M., and Mitchell, G. J., Preliminary Survey of the Geology and Mineral Resources of Curry County, Oreg.: Oregon Bureau of Mines and Geology, Mineral Resources of Oregon, vol. 2, No. 2 October 1916, 136 pp.

9/ Wells, F. G., Hotz, P. E. and Cater, F. W., Jr., Preliminary Description of the Geology of the Kerby Quadrangle, Oregon: Oregon State Department of Geology and Mineral Industries Bull. 40, 1949, 23 pp.

depth of nickel-rich laterite and the grade are shown for each hole. None of the areas contain overburden except hole 17, in which 5 feet of relatively barren laterite is on top of the nickel-rich laterite.

The shape and form of the nickel-rich laterite areas are variable; the nickel content of the laterite is variable, and some of the material is a mixture of residual laterite and transported laterite.

The nickel content of the laterite cannot be estimated by visual examination but must be determined by analytical methods. The nickel content does not necessarily depend on the degree of weathering or the depth of laterite soil. A few surface indications have been recognized that roughly aid in prospecting for nickel-rich laterites, but these are not infallible guides. Surface accumulations of rounded, shot-size pellets of iron oxides in the soil are fair indicators of a relatively higher nickel content in the laterite. Furthermore, a loosely consolidated, porous, soft, well-drained, residual-type laterite generally contains more nickel than a clayey, dense, compact, transported-type laterite. Residual laterite usually has a higher specific gravity than a clayey type or transported laterite.

Chemical and Mineralogical Composition of Laterite

No discrete nickel minerals were observed in the laterite. The nickel is believed to be in a finely divided form as hydrated nickel oxides; some is chemically combined in the limonite mineral structure; a little may be with magnetite and chromite. It is not possible to improve the grade of nickeliferous laterite by handsorting nor has beneficiation by ore dressing been successful to date.

The chemical composition of nickeliferous laterites is surprisingly uniform throughout the world. These laterites are only formed on or derived from serpentinized ultrabasic rocks, which apparently are relatively uniform in composition. The nickeliferous laterites are quite different in composition from laterites derived from the more highly differentiated silicic rocks.

Serpentine rocks generally lack vegetation. A serpentine rock must undergo a certain amount of chemical decomposition before mechanical disintegration and laterite formation. The ultramafic silicate minerals, such as olivine, have iron, nickel, chromium, aluminum, calcium, and magnesium tied up in their chemical structures. These minerals lack chemical stability under surface weathering, oxidizing conditions, but they do not disintegrate immediately. They hydrolyze and become partly hydrated and recrystallize, forming more stable hydrous silicates. This is a gradual rock-softening process, with very little change in net composition. As this reaction proceeds, the soluble bases and silicic acid are more easily removed by solution in ground water, and more complete chemical decomposition follows. Colloidal-size particles then may be removed rapidly by mechanical means, together with the chemical solution of the soluble bases. Under favorable topographic and climate conditions, the insoluble bases and heavy minerals accumulate to form residual laterite deposits.

For the reasons mentioned above, the contact between the nickeliferous laterite and the underlying bedrock is sharp, although extremely irregular. There are abrupt changes in color, in hardness, in physical appearance, and, most important of all, in chemical composition.

Table 1 gives the partial analyses of some representative samples of nickeliferous laterites and nickeliferous serpentine deposits throughout the world. Analyses of the Red Flats material are shown also for purpose of comparison.

TABLE 1. - Partial analyses of representative types of nickel ores

	Nickeliferous laterites				Nickeliferous serpentines				
	1	2	3	4	5	6	7	8	9
Fe	46.81	52.08	49.36	38.5	10.2	18.01	9.7	12.21	11.52
Cr	2.05	2.04	1.68	2.12	.77	.91	.74	.66	.73
Ni	.72	1.02	.30-.64	.92	1.29	1.08	1.50	3.48	6.17
Co	.13	.08	unavail-able	.29	.17	.08	unavail-able	.11	.12
SiO_2	1.62	2.76	2.04	1/7.58	37.5	41.94	45.8	41.55	41.4
Al_2O_3	9.41	6.61	5.04	10.76	2.0	3.48	3.4	.16	.92
CaO	-	.15	.74	-	1.1	.25	1.0	-	.08
MgO	.80	.72	.07	1/5.47	17.2	12.09	19.9	22.97	22.8

Note. - Column heads: (1) Oriente Province, Cuba - average nickel laterite. Assays by Bureau of Mines; (2) Oriente Province, Cuba - medium-grade nickel laterite. Assays by Bureau of Mines; (3) Celebes iron ore - lake district near Larona.2/; (4) Red Flats laterite. Assays by Bureau of Mines; (5) Red Flats Nickeliferous altered serpentine. Assays by Bureau of Mines. (6) altered serpentine - Oriente Province, Cuba. Assays by Bureau of Mines; (7) Riddle nickel deposit, Riddle, Oreg. - 310-ton sample assayed by Bureau of Mines; (8) sorted ore - Celebes3/; (9) sorted ore - New Caledonia4/.

1/ Shows incomplete breakdown of magnesium silicates, compared to other more highly developed laterites.

2/ Ter Braake, Alex L., Mining in the Netherlands East Indies: Netherlands and Netherlands Indies Council of the Institute of Pacific Relations, Bull. 4, New York, N. Y., 1944, p. 96.

3/ See work cited in footnote 2, above p. 83.

4/ Report of the Royal Ontario Nickel Commission, Toronto, Canada. No. 62, 1917, p. 248.

From the analyses shown above, the nickeliferous laterites are enriched in iron, alumina, chromium, and probably cobalt contents, compared to the nickeliferous serpentines. The magnesia and silica contents in the laterites are heavily depleted in comparison to the serpentines. These relationships generally are valid, no matter how the nickel content varies in the laterite. The nickel content of most laterites is higher than that of most of the serpentine on which it forms. The amount of nickel that can be accumulated in the soil apparently is limited by its solubility. After a certain maximum

degree of residual enrichment is obtained, the nickel no longer accumulates but instead is leached out of the soil, judging from the fact that many of the enormous nickel laterites of the world have uniform nickel contents averaging close to 0.6 or 0.7 percent nickel. Assuming that most serpentines average close to 0.10 percent nickel over large areas, the ratio of concentration of nickel in the soil due to weathering is generally about 6 or 7 to 1. Some relatively small areas of serpentine average 0.3 to 0.5 percent nickel. When these areas are laterized, the nickel content in the resulting residual laterite may accumulate to an average maximum of 1.8 to 3.5 percent nickel, calculated at the same ratio of concentration as before. These richer areas of laterite constitute the minable deposits in Cuba. Most residual laterites show variations in nickel content that reflect to a marked degree the primary differences in the nickel content of the serpentinized rock that has been weathered. Transported laterite of course would not exhibit this relationship with the underlying bedrock.

Nickeliferous Serpentines

The nickel-rich serpentinized bedrock in the Red Flats area, as determined by assays of the Bureau of Mines drill-hole samples, is outlined on figure 2. A cutoff grade of 1 percent combined nickel and cobalt was used to delimit the boundaries. The depth of overburden on this nickeliferous serpentine is shown for each hole. Overburden may consist of barren laterite, nickel-rich laterite, or relatively barren rock.

Lack of development of this bedrock deposit precludes accurate description. The nickeliferous area may be more irregular than is indicated. The general trend of the nickeliferous zone is in a northerly direction, coincident with the axis of the ridge. This zone has an explored length of 3,900 feet, as determined by the drilling; the zone may extend farther to the north beyond the area explored. The extension of the zone to the south is limited. The average width is 590 feet and the average thickness is 12.5 feet.

Garnierite (hydrous nickel silicate) is exposed in the serpentinized peridotite in the trench by drill hole 15 near the south end of the zone. This trench is a few hundred feet north of the permanent springs that supply the Red Gold mining camp. The moist soil in the vicinity of the springs supports a luxuriant growth of Darlingtonia (pitcher, cobra, or fly-catcher plants). Garnierite was found at Woodcock Mountain in a similar environment just above a side hill springs area supporting a conspicious growth of Darlintonia. These plants may be indicators of nickel-rich zones in the serpentinized ultrabasics of southern Oregon.

FIELD WORK BY THE BUREAU OF MINES

Drilling

The Red Flats area was drilled on a grid system using a Star churn drill mounted on a 6-wheel-drive truck. Twenty-two holes, 6 inches in diameter and ranging from 20 to 117 feet and averaging 35 feet deep, were drilled in 8 lines 500 feet apart. The holes were drilled in order of their accessibility, and

this accounts for the somewhat erratic numbering system. The cutoff point in drilling was generally determined by the increased hardness of the rock, discernible in drilling.

The area was surveyed with a Brunton compass and tape. Elevations were obtained by rod and hand-level method.

Sampling

The drill holes were sampled in 5-foot sections. A thin slurry of sludge was maintained by water control. The sludge volume per section varied from 4 gallons near the surface to 14 to 20 gallons below 10 feet. Each sample was split at the drill site. Samples were dried over an open fireplace and split again, one split being submitted for analyses and the other split again. One of the second splits was panned in the field, and the other was saved to combine with other rejects from the same hole to provide a composite sample for analyses. Composite samples from four holes were sun-dried and assayed for mercury.

At the beginning, each 5-foot sample was assayed for nickel and gold; early returns showed no gold detected, consequently gold assays were discontinued. A number of the nickel-rich samples were assayed for Fe, Mg, Cr_2O_3, and Co. The complete assays of the drill holes are shown in the appendix.

XX from 2 holes only

To check the mercury content, a composite sample was treated by table concentration to produce a concentrate and a tailing. Assays of concentrates showed less than 1 pound of mercury per ton. Assuming a recovery of 100 percent, the mercury content of the original material would be less than 0.00002 pounds per ton.

METALLURGICAL RESERACH BY BUREAU OF MINES

General

The Red Flats deposit contains both nickeliferous laterite and nickeliferous serpentine. The 15-ton sample used in the smelting test was apparently a mixture of these two types of material as the SiO_2 content was higher than most laterites and the MgO content was lower than most serpentines.

Nickel is recovered from a mixture of Cuban laterites and serpentines in a plant at Nicaro, Cuba, by a roasting and ammonia-leaching process.10/ Only limited amounts of serpentine are used in this process because plant operating difficulties arise when excessive amounts are used.

Electric smelting research at Albany, Oreg., has indicated that nickel can be recovered from either laterites or serpentines as a low-carbon ferronickel product. This smelting research has been described in a previous publication.11/

10/ Caron, M. H., Ammonia Leaching of Nickel and Cobalt Ores: Trans. Am. Inst. Min. and Met. Eng., vol. 188, January 1950, pp. 67-90.

11/ Cremer, Herbert, Continuous Electric Smelting of Low-Grade Nickel Ores: Bureau of Mines Rept. of Investigations 5021, 1954, 36 pp.

The object of the smelting test on Red Flats material was to determine whether or not the selective reduction technique developed by the Bureau for the production of low-carbon ferronickel from Riddle and Cle Elum ores could be successfully applied to the Red Flats ore.

Equipment and Facilities for Smelting Research

The Northwest Electrodevelopment Laboratory, Albany, Oreg., has a laboratory completely equipped for electric smelting research. In addition to two steelmaking furnaces and other necessary auxiliary equipment, the laboratory has two 3-phase electric smelting furnaces of Bureau design. The larger smelting furnace uses 6- or 8-inch graphite electrodes at power inputs of between 400 and 1,000 kw. The smaller furnace uses 3- or 4-inch graphite electrodes at power inputs ranging from 100 to 300 kw.

Materials Handling

When the sample of Red Flats nickel ore was received at Albany, the four truckloads were dumped into separate piles on a large concrete storage pad adjacent to the smelter building. A Ford tractor equipped with a Dearborn industrial-type loader was used to transport the ore from the storage pad to the feed end of the drier. The rock was hand-sorted from the earthy material, weighted, sampled, and analyzed. The earthy material was dried in a 23-foot long by 18-inch-diameter rotary-type propane gas-fired drier. Figure 3 shows the drier in operation. The dried material was discharged into a raw materials bin, then fed through an 8- by 15-inch jaw crusher, and down a chute to a bucket elevator, which was used to elevate the material onto a vibrating screen with 1/2-inch square openings. The screen undersize was sampled by an automatic sampler and discharged onto an endless conveyor belt for distribution into one of six 25-ton, steel storage bins. The screen oversize was funneled into a model CF-3-26 Pennsylvania impactor. The discharge from the impactor was combined with the jaw-crusher discharge and returned to the bucket elevator for recycling over the screen. Each load was dried, crushed, and sampled separately, drawn from the receiving bin, and bedded in a crib in successive layers in the smelter building. The furnace charge was made up of bedded ore and wood chips. The ore and reductant were weighed and mixed in a 6-cubic foot concrete mixer. This operation is illustrated in figure 4. The mixed charge was loaded into a charge bucket, hoisted to the charge deck, and stored adjacent to the furnace. The charge was then hand-shoveled into the furnace at regular intervals.

Description of Smelting Furnace

The continuous smelting test on Red Flats nickel ore was conducted in the small furnace, designated "ESA". This furnace is a round, open-top, pit-type, 3-phase unit. The electrode clamps are cable-suspended with special provisions for readily changing the electrode spacing. The graphite electrodes are placed at the corners of an equilateral triangle. The furnace is backed by a 1,000-kv.-a. Westinghouse transformer, the secondary busses of which may be connected in parallel or series. The transformer has six voltage taps, the series-connected voltage being approximately twice the parallel-connected voltage.

The open circuit phase-to-phase voltages range from 38 to 106 volts with parallel connection and from 80 to 220 volts with series connection.

The steel shell of the ESA furnace has a 50-inch inside diameter and is divided into two sections. The bottom section is 31 inches high and is provided with two tap holes at different levels; the lower tap hole is designed to drain the furnace. The top section is 24 inches high and, with its refractory lining, is removable as a unit. The lower section is lined with magnesite brick to form a 32-inch-diameter smelting crucible. The hearth is rammed magnesite.

Description of Ore and Reductant

Four truckloads of Red Flats nickel ore were taken from an area adjacent to three drill holes selected by the Mining Division to be representative of the deposit. The identity of each of these samples was maintained until the ore was dried, sampled, crushed, and bedded in a crib in the smelter building. The ore as received consisted of a small amount of rock mixed with weathered earthy material. The rock was hand-sorted from the first load, in an attempt to remove gangue material and upgrade the ore. A composite sample of this rock assayed only 0.39 percent Ni. Therefore, the rock was sorted out of the three subsequent loads and was not used in this smelting test. However, a composite sample of all rock removed from the 4 loads assayed 0.77 percent nickel; this is equivalent to the nickel content of the earthy material used in the smelting tests. The weight and nickel content of the rock removed from the four truck loads are shown in table 2. In actual practice it would not be necessary to remove the rock from the earthy material because nickel may be removed from either one or both types of ore in the smelting furnace.

Analyses of Soil and Rock

The drill holes from which each load of ore originated, the dry weights, and Ni analyses of the earthy material and rock are shown in table 2.

TABLE 2. - Weights and analyses of Red Flats ore as received, dry basis

Samples of loose surface material

Load	Drill hole	Earthy material			Rock		
		Weight, pound	Percent Ni	Percent Fe	Weight, pound	Percent Ni	Percent Fe
1	15 and 16	5,861	0.68	42.0	533.3	0.39	14.6
2	15	8,071	.86	31.3	1,022.4	.67	10.0
3	16	8,714	.78	17.4	770.3	.72	9.3
4	23	6,415	.84	25.1	1,416.0	.98	13.1

Table 3 gives complete analyses on Red Flats nickel-ore samples. The first earthy material sample is a weighted composite of the four truck load samples taken by the automatic sampler. The second sample was taken by saving a small scoop of earthy material, in a closed container, as each 300 pounds of ore was weighed into the furnace charge. The analyses of the composite Red Flats rock sample closely resemble that of typical serpentines. Complete

chemical analyses on Riddle lot F ore are included for comparison. Spectrographic analyses on the composite sample of Red Flats rock, Red Flats earthy material, and Riddle lot F nickel ores are shown in table 4.

TABLE 3. - Chemical analyses of composite samples, percent

Ore	Fe	Ni	Co	Al_2O_3	Cr_2O_3	CaO	MgO	SiO_2	S	P	L.O.I.
Red Flats 1/.....	29.8	0.70	0.06	6.2	2.53	3.3	8.6	24.2	0.03	0.18	11.4
Red Flats 2/.....	28.2	.74	.07	6.4	2.44	3.2	4.6	28.2	-	-	10.2
Red Flats, rock.	12.7	.77	.06	2.0	.90	3.2	26.9	37.2	.01	.08	10.6
Riddle, lot F...	12.0	1.4	-	3.5	1.05	1.0	19.2	48.1	.01	.04	7.8

1/ Earthy material, composite of 4 truckloads.
2/ Earthy material, head sample for smelting tests.

TABLE 4. - Spectrographic analyses of composite samples

Ore	Fe	Ni	Al	Cr	Ca	Mg	Si	Mn	Co	Ti	K	V	Na
Red Flats, rock	A	D-	C	D	E	A	A	E-	D	E	D	E	-
Red Flats, soil	A	D-	C	C	E	C	B	D	D-	E	D	E	E
Riddle, lot F..	A	C	C	C	D	A	A	D	E	E	-	F	-

Legend: A- over 10 percent; B- 5 to 10 percent; C- 1 to 5 percent; D- 0.1 to 1 percent; E- 0.01 to 0.1 percent; F- 0.001 to 0.01 percent

Petrographic Analysis

Petrographic examinations of the test sample revealed that the rocky material consists of nickeliferous serpentine, with some highly altered fragments of peridotite and less amphibolite. Associated with the serpentine are relatively small amounts of chrysotile, chromite, magnetite, and a trace of pyrolusite. The altered fragments of peridotite and amphibolite contain serpentine, olivine, ortho- and clinopyroxene, amphibole, chlorite, feldspar, limonite, minor amounts of quartz, chromite, and magnetite. The serpentine and rock fragments are coated with a limonitic clayey soil.

The earthy material is similar mineralogically to the rocky material, except that it contains much more of the limonitic soil.

No discrete nickel mineral was observed in either of the samples. Spectroscopic examinations of selected concentrates showed minor amounts of nickel in the serpentine, peridotite, magnetite, and limonitic soil.

Reductant

Previous experience in smelting Riddle and Cle Elum nickel ores indicated that these ores could be smelted selectively best by using hogged fuel as the reductant. The hogged fuel not only provided the carbon necessary for reduction but also maintained a porous, nonconducting, heat-insulating charge over the molten bath. The porous nature of the charge allowed gases generated in the smelting reaction to escape freely, thus preventing violent gas blows and loss of dust and metal vapors.

Hogged fuel is a mixture of wood chips, sawdust, and splinters resulting from feeding ends of logs, slabs, and other waste products of the lumber industry through a machine called a hog. Hogged fuel is generally used for industrial and home heating. The wood chips used in this test contained no sawdust and were obtained from a local plywood plant. They were produced by feeding waste plywood veneer through a machine called a chipper. They were uniform in size, being about 1/8 inch thick and 5/8 inch square. The wood chip charge, used in smelting Red Flats nickel ore, promoted a uniform smelting operation.

Smelting Procedure

The furnace charge proportions were 100 pounds of ore to 17 pounds of wood chips. No fluxing constituents were used. The wood chips were calculated to furnish 2 pounds of fixed carbon. This was 48.5 percent of the stoichiometric carbon requirement for reduction of all nickel, iron, and chromium oxides in the ore and was equivalent to 12.8 times the amount necessary to reduce the nickel; it reduced enough iron to yield a ferronickel alloy containing 10 to 15 percent nickel.

The test was begun by covering the magnesite hearth with 200 pounds of ore; then 4.7 pounds of minus-1/2-inch petroleum coke was placed under the electrodes. The electrodes were lowered onto the coke, and a steady arc was established. The ore under the coke gradually melted and formed a molten pool on the furnace hearth. Charge was then fed around the periphery of the furnace until a dry top was established over the entire molten pool. The charge was banked against the wall of the furnace to such an extent that it rolled down a steep incline to fan out between the electrodes. A shallow dry top was maintained on the molten pool at all times.

An arc-resistant, dry-top smelting technique was used throughout the test; that is, the heat for the smelting reaction was furnished by arcing on the molten bath and the arcs were covered with charge at all times. The phase-to-phase voltage was maintained at 200, and the current averaged approximately 650 amperes per phase. Occasionally some wet charge caved into the smelting zone, cooling the slag and decreasing its electrical conductivity. The electrodes then lowered and dipped into the slag causing boiling and considerable turbulence in the furnace. These occurrences were minimized by maintaining a shallow but uniform dry-top.

Slag was tapped from the upper tap hole at intervals of about 1-1/2 hours. The ferronickel was tapped from the drain tap hole at the end of each shift. The tap holes were usually opened with an iron rod. Occasionally an oxygen lance had to be used when solidified slag and metal blocked the tap holes. The slag was tapped into a conical cast-iron mold of about 400 pounds capacity (fig. 5). An iron hook was frozen into the slag to facilitate weighing and handling. The slag was sampled by dipping a cast-iron spoon into the molten slag and pouring its contents onto a clean graphite plate. Ferronickel and a small amount of slag were tapped from the drain tap hole into a 12-inch-diameter ladle, the supernatant slag was decanted into a conical, cast-iron mold, and the alloy was poured into cast-iron pig molds. Each alloy pig weighed about 15 pounds. The alloy pigs were sampled by drilling.

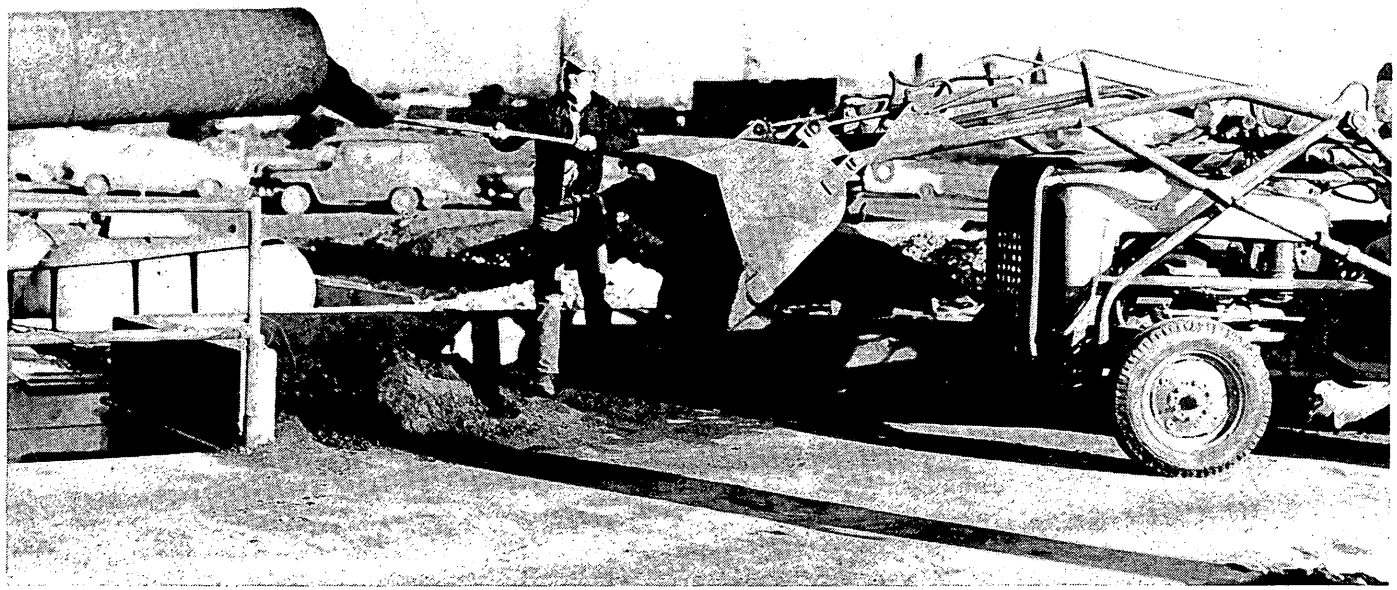


Figure 3. - Drying ore from Red Flats deposit.

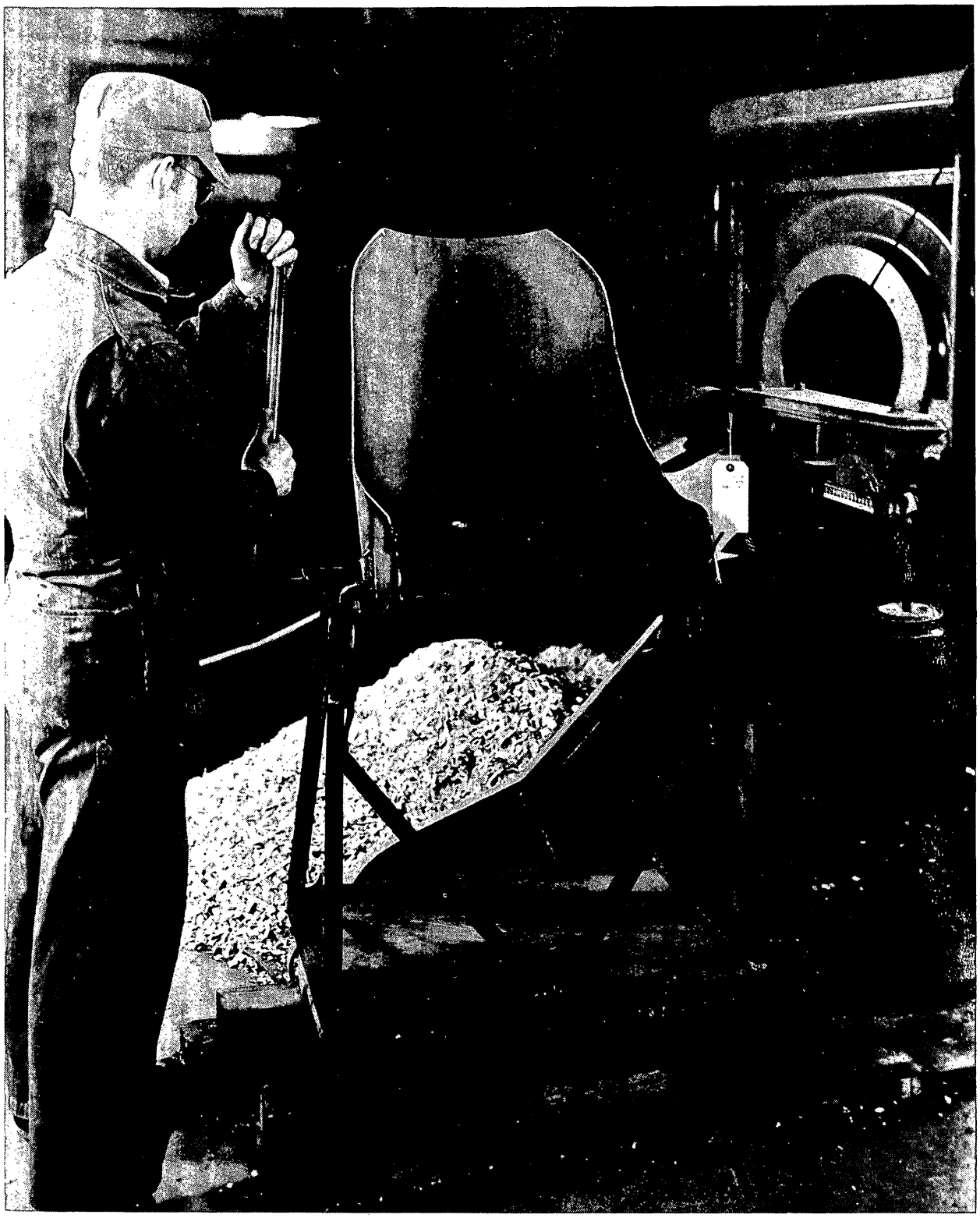


Figure 4. - Weighing the ore and reductant into charge mixer.

Discussion of Test Results

The test was divided into four periods. The complete results are presented in table 5. The results of a continuous pilot-plant test on Riddle ore are included for comparison. Riddle test results were described in an earlier publication12/ and are not discussed here.

The smelting technique used for selective reduction of nickel from the Red Flats ore was similar to that used in smelting Riddle ore, except that wood chips were used as the reductant. A more uniform furnace operation was evident with wood chips.

The results show that the nickel content of the ferronickel, as well as the nickel content of the slag, increased progressively during the four periods of the test. The highest nickel-content alloy, 14 percent, was produced during the fourth period. The slag with the lowest nickel content, 0.07 percent, was produced during the first period. These results indicate, as have previous test results, that nickel recovery decreases as the nickel content of the ferronickel product increases. Additional research to definitely establish the relationship between the nickel content of the metal product and the slag when these low-grade nickel ores are smelted would be worthwhile.

In the tabulated results, nickel recovered in the various periods does not include the nickel that gradually accumulated in the furnace or the molten ferronickel that slowly penetrated the porous, rammed magnesite hearth. However, the data indicate that these conditions were coming to equilibrium. In the fourth period, 85.3 percent of the nickel charged to the furnace was accounted for in the slag and metal products. At the conclusion of the test, a large salamander was removed from the furnace. It contained an appreciable amount of nickel, and 94.5 percent of the nickel charged to the furnace was then accounted for.

In previous smelting tests there had been some difficulty in accounting for the nickel charged to the furnace. Therefore, in this Red Flats test the accuracy of the spoon-sampling procedure was checked by comparison with several composite slag cone samples. A spoon sample analyzed 0.13 percent nickel. For the same period, a composite slag cone sample analyzed 0.14 percent nickel. To determine whether or not nickel was concentrating in the lower portion of the slag mold, the lower 6-inch zone of a number of slag cones was collected, crushed, sampled, and analyzed. This slag sample analyzed 0.21 percent nickel and 32 percent iron. Examination of this slag under a binocular microscope revealed numerous ferronickel prills, ranging from the smallest visible particles up to 1/8 inch in diameter. These prills were concentrated near the outer surface of the slag cones. It is reasonable to assume that the nickel contained in the prills was not necessarily accounted for in the slag spoon samples. Nevertheless, 94.5 percent of the nickel charged to the furnace was accounted for in the slag and metal products.

A refractory magnesite-brick lining was used in the furnace for this test. The 1 inch of insulation material normally placed between the brick refractory and the steel furnace shell was omitted to permit more effective cooling of the refractory and thus minimize refractory erosion.

12/ See work cited in footnote 11.

TABLE 5. - Comparison of operating data for smelting nickel ore from Red Flats and Riddle deposits

	For Red Flats ore					For Riddle ore										
Periods	1	2	3	4	Whole run	1	2	3	4	5	6	7	8	9	10	Whole run
Lb. charged per 100 lb. ore																
Wood chips 2/	17	17	17	17												
Sawdust 1/								12	8	6	6	10	8	18		
Coos Bay char						5.5	1.67									
Coos Bay coal															2.5	
Alsifer											0.33	0.33	0.33			
Materials charged, lb.																
Riddle ore						38,100	21,600	11,700	11,100	13,800	10,800	11,100	11,400	9,000	10,695	142,295
Red Flat ore, dry	4,830	9,240	9,830	5,764	29,664											
Sawdust								1,404	888	810	648	1,110	912	1,620		7,392
Wood chips	950	1,950	2,000	1,100	6,000											
Coos Bay char						2,057	350									2,407
Coos Bay coal															253	253
Alsifer											36	37	38			111
Ratio of stoichiometric C 3/	13.7	12.4	12.0	13.2		12.3	3.0	3.2	1.8	1.0	1.6	2.9	2.3	4.9	2.6	
Duration of test, hr.	12.3	236	24.3	11.7	71.9	72.1	47.6	27.0	22.2	27.7	21.3	22.8	23.7	23.7	23.7	311.8
Feeding rate, lb. ore/hr.	394	392	405	503	409	528.4	453.8	433.3	500.0	498.2	507.0	486.8	481.0	379.7	451.3	478.8
Power conditions																
Voltage, phase-to-phase	200	200	200	200		205	205	205	205	205	205	205	205	205	205	
Current per phase, amp.	615	615	624	758	653	652	546	567	612	545	592	586	574	563	571	
Power input, kw.	211	213	216	260	225	231	194	201	217	193	210	208	203	200	203	
Power factor	99	100	100	99		99	99	99	99	99	99	99	99	99	99	
Power consumption, kw.-hr.																
Per period	2,590	5,020	5,250	3,058	15,918	16,680	9,220	5,430	4,820	5,350	4,470	4,740	4,820	4,730	4,800	65,060
Per ton of dry ore	1,072.4	1,086	1,068	1,058	1,072	876	854	928	869	775	828	854	846	1,051	898	872
Per lb. of metal	12.3	21.9	50.0	15.6	13.9											9.0
Per lb. of Ni in metal	131.3	203.0	378.8	111.4	88.1											46.7
Electrode consumed, lb.																
Per period					156 4/	363.9	126.0	69.5	55.5	63.3	53.5	50.3	55.3	77.0	74.3	988.6
Per ton of dry ore					10.5	19.1	11.7	11.9	10.0	9.2	9.9	9.1	9.7	17.6	13.9	13.2
Per lb. of metal					.14											.14
Per lb. of Ni in metal					.87											.71
Products, lb.																
Metal	210	229	105	195.5	1,144.5	3,711	442	681	55	60	25	412	128	1315	371	7,199
Slag	3,683	6,834	6,898	4,109	21,524	24,059	16,257	8,470	8,595	10,679	8,555	8,336	9,001	6,032	8,336	108,322
Metal analyses, percent																
Fe	86.80	86.80	85.50	84.50		74.21	65.80	75.60	56.86	48.49	46.23	54.00	54.00	76.63	73.10	
Ni	9.39	10.8	13.2	14.0		8.90	25.20	23.0	40.8	48.20	50.00	42.50	45.20	30.25	27.30	
Cr	1.41	.19	.07	.04		2.99	.96	.25	.13	.08	.03	.05	.03	.18	.08	
C	.06	.06	.17	.10		1.74	.65	.17	.06	.07	.11	.04	.02	.06	.07	
Si	.93	.09	.02	.02		8.50	7.05	.05	.02	.03	.06	.10	.01	.03	.02	
S	.14	.20	.01	.01		.04	.02	.10	.12	.19	.32	.29	.13	.14	.23	
P	.23	.27	.20	.19		.11	.21	.09	.28	.19	.31	.34	.28	.31	.18	
Co	.26	.24	.29	.22												
Slag analyses, percent																
Fe	27.3	29.0	33.0	37.3		3.47	11.39	12.07	13.98	15.06	14.97	13.71	14.00	9.36	10.03	
Ni	.07	.08	.14	.22		.05	.31	.09	.26	.56	.46	.18	.26	.08	.14	
Co	<.02	<.02	<.02	<.02												
Nickel accounted for, percent																
In the metal	55.17	36.16	22.08	64.15	82.23 5/	61.91	36.79	95.56	14.57	13.97	7.78	105.23	33.89	185.01	63.08	64.77
In the slag	7.22	8.00	13.28	21.19	12.28	2.21	16.67	4.66	14.38	28.89	24.29	9.01	13.68	3.71	7.27	11.45
Total in slag and metal	62.39	44.16	35.36	85.34	94.51	64.12	53.46	100.22	28.95	42.86	32.07	114.24	47.57	188.72	70.35	76.22

1/Average fixed carbon 10.1%.
2/Average fixed carbon 11.3.
3/Ratio of stoichiometric C for reduction of the Ni in the ore.
4/Electrode consumption data was determined for the whole run.
5/Includes 705 lb. of furnace and ladle cleanout.

** Note: 17.48% better recovery from Red Flats ore

Refractory erosion is a serious problem when a highly siliceous charge is smelted in a basic lining. Only the earthy material, containing 7.75 percent CaO plus MgO, was smelted in this test. The CaO plus MgO content of the rocky portion was 30.1 percent. If nickel is to be recovered economically from this deposit, the rocky portion, of sufficient Ni content, might be blended with the earthy material to produce a neutral slag and minimixe the fluxing effect of the molten slag on the basic furnace lining.

CONCLUSIONS

Further drilling and exploration should be planned to delimit areas of nickel-rich laterite and serpentine indicated by the investigations reported herein.

The results of the 72-hour continuous test indicated that the selective smelting procedure developed by the Bureau for recovering nickel from siliceous nickel ores is applicable to the ore from the low-grade Red Flats deposit.

Highest nickel recoveries were obtained when producing a ferronickel containing 9 to 10 percent nickel. Previous Bureau tests indicate that this grade of ferronickel can be upgraded to any desired nickel content by blowing with air, or a mixture of air and oxygen, in a converter.

Eighty-two percent of the nickel charged to the furnace was recovered in the 1,444.5 pounds of ferronickel produced during the test. Only 5.49 percent of the nickel charged to the furnace was unaccounted for. These results are considered satisfactory for preliminary testing. Indications are that even better recovery could be anticipated if the nickel content of the ferronickel product is kept below 10 percent.

There was considerable erosion of the furnace refractory by the highly acid slag, since no flux was used in the furnace charge. If further exploration of the deposit reveals that there is a considerable amount of nickel contained in the underlying serpentine, proper blending of earthy material with this more basic rock would partly solve the problem of rapid erosion of basic furnace lining.

Power and electrode consumption (88.1 kw.-hr. and 0.87 pound of graphite per pound of nickel produced, respectively) was not excessive considering the low grade of the ore, the small scale, and the short duration of the test. Power and electrode consumption would decrease in proportion to any increase in the grade of the ore.

The cobalt contained in the ore is partly recovered in the ferronickel product. The ferronickel contained approximately 0.25 percent cobalt, and the slag contained less than 0.02 percent. This cobalt probably would not be deleterious to the ferronickel for most commercial uses.

The results of the test indicate that it is technically feasible to recover a low-carbon ferronickel product from the Red Flats nickel ore. For a commercial operation a grade of ore considerably higher in nickel than the sample tested is indicated.

APPENDIX

Assay Logs of Drill Holes 1 to 23
(Excluding Hole 14)

Assays of Drill Hole No. 1 — Depth 60'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	4-2	0.43	30.3			
5-10	4-3	.40				
10-15	4-4	.31				
15-20	4-5	.83	9.8	14.7	0.62	0.12
20-25	4-6	1.01	7.2			
25-30	4-7	.50	7.2			
30-35	4-8	.42				
35-40	4-9	.37				
40-45	4-10	.29				

Assays of Drill Hole No. 2 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	4-23	0.65			
5-10	4-24	.42			
10-15	4-25	.46			
15-20	5-1	.71			
20-25	5-2	.51			
25-30	5-3	.51			
30-35	5-4	.51			
35-40	5-5	.44			
40-45	5-6	.41			
45-50	5-7	.25			

Assays of Drill Hole No. 3 — Depth 60'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5'	3-15	0.52	26.6			
5-10'	3-16	.61				
10-15'	3-17	.52				
15-20'	3-18	.60				
20-25'	3-19	.50				
25-30'	3-20	.49				
30-35'	3-21	.91	8.8	14.9	0.62	0.04
35-40'	3-22	1.26	10.6			
40-45'	3-23	1.27	10.6			
45-50'	3-24	.88				
50-55'	3-25	.52				
55-60'	4-1	.51	7.5			

Assays of Drill Hole No. 4 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	2-20	1.13	45.0			
5-10	2-21	1.35	32.4	8.96	3.66	0.10
10-15	2-22	.50	14.3			
15-20	2-23	.30				
20-25	2-24	.83				
25-30	2-25	.55				
30-35	3-14	.51				
35-40	3-1	.73				
40-45	3-2	.56				
45-50	3-3	.84	6.4	7.58		

Assays of Drill Hole No. 5 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	6-21	0.19			
5-10	6-22	.67			
10-15	7-1	.45			
15-20	7-2	.62			
20-25	7-3	.68			
25-30	7-4	.56			
30-35	7-5	.39			
35-40	7-6	.24			
40-45	7-7	.22			
45-50	7-8	.21			

Assays of Drill Hole No. 6 — Depth 35'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	8-25	0.43			
5-10	9-1	.61			
10-15	9-2	.61			
15-20	9-3	.71			
20-25	9-4	.51			
25-30	9-5	.64			
30-35	9-6	.42			

Composite sample of Hole 6 showed 0.06 % Hg

1-20 pounds per ton

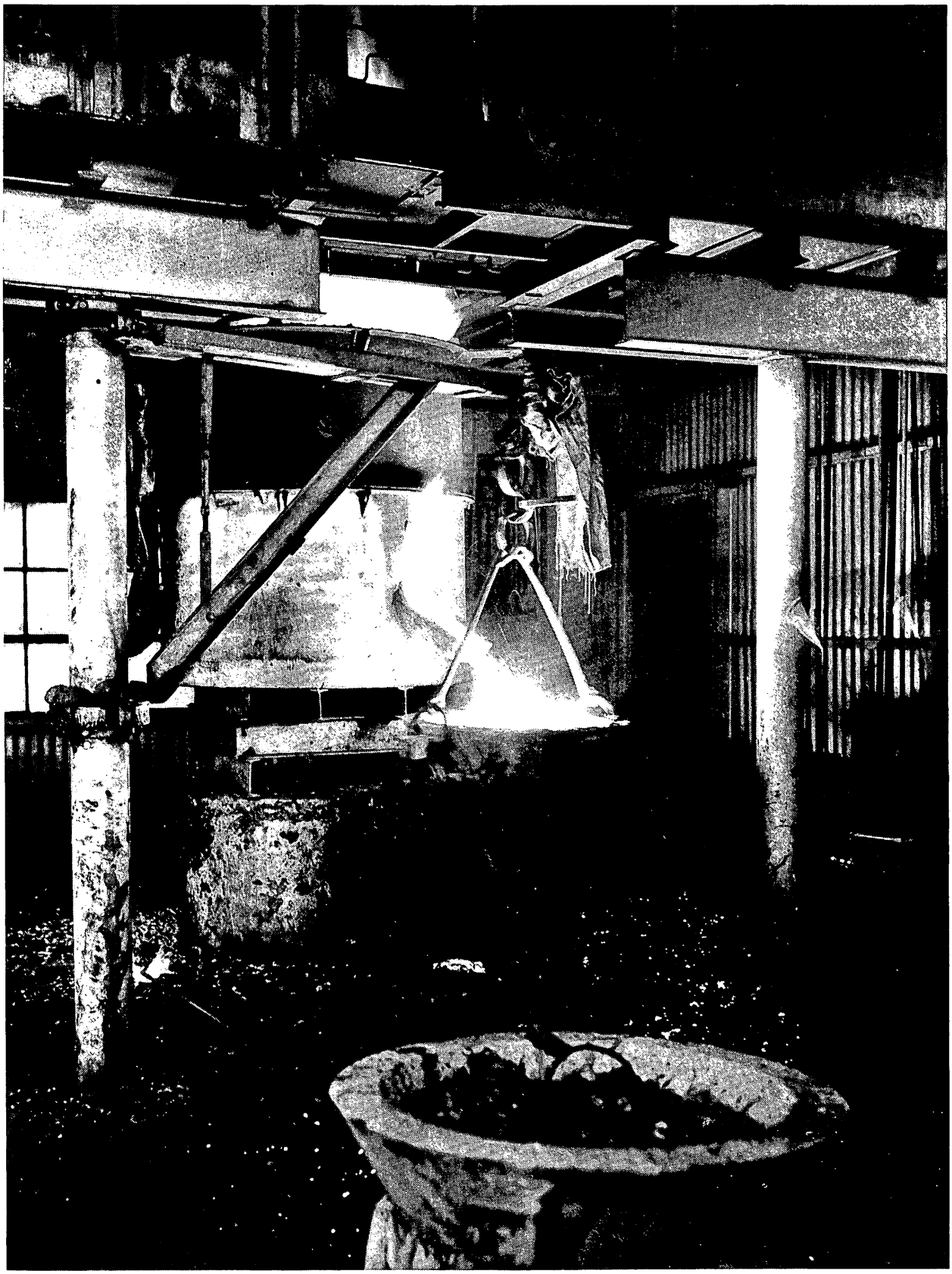


Figure 5. - Tapping slag from ESA furnace.

Assays of Drill Hole No. 7 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	2-10	0.51	31.0			
5-10	2-11	1.13	10.8		0.89	0.15
10-15	2-12	1.15	11.8			
15-20	2-13	1.16	10.0	15.2		
20-25	2-14	.81	7.8		.65	.15
25-30	2-15	.49	5.9			
30-35	2-16	.50				
35-40	2-17	.34				
40-45	2-18	1.87	5.4			.12
45-50	2-19	.20				

Assays of Drill Hole No. 8 — Depth 70'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	5-18	0.48			
5-10	5-19	.48			
10-15	5-20	.26			
15-20	5-21	.40			
20-25	5-22	.35			
25-30	5-23	.38			
30-35	5-24	.44			
35-40	5-25	.32	8.18		
40-45	6-1	.18			
45-50	6-2	.24			
50-55	6-3	.24			
55-60	6-4	.28			
60-65	6-5	.26			
65-70	6-6	.25			

Assays of Drill Hole No. 9 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	3-4	0.83	31.6			
5-10	3-5	1.35	25.8			
10-15	3-6	1.13	6.4	15.7	1.66	0.07
15-20	3-7	.84	12.2			
20-25	3-8	.43	6.4			
25-30	3-9	.38				
30-35	3-10	.27				
35-40	3-11	.25				
40-45	3-12	.61				
45-50	3-13	.50	17.4			

Assays of Drill Hole No. 10 — Depth 55'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	10-1	0.75	36.6			
5-10	10-2	1.24	35.5			
10-15	2-1	1.13	10.8		0.66	0.08
15-20	2-2	1.20	23.4	8.88		.08
20-25	2-3	.87	18.8			.09
25-30	2-4	.58				
30-35	2-5	.34				
35-40	2-6	.26				
40-45	2-7	.24				
45-50	2-8	.23				
50-55	2-9	.26				

Assays of Drill Hole No. 11 — Depth 50'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	9-8	0.33	25.6			
5-10	9-9	.67				
10-15	9-10	.64				
15-20	9-11	.97	19.4			
20-25	9-12	.95	11.0			
25-30	9-13	.84	10.4		0.74	
30-35	9-14	1.25	10.4	13.2		0.13
35-40	9-15	.97	8.8			
40-45	9-16	.59				
45-50	9-17	.58	7.6			

Assays of Drill Hole No. 12 — Depth 40'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	5-8	0.73	21.9			
5-10	5-9	.62	24.4	13.2	1.63	0.13
10-15	5-10	.87	15.8			
15-20	5-11	.46	10.0			
20-25	5-12	.47				
25-30	5-13	.39				
30-35	5-14	.58				
35-40	5-15	.24				

Assays of Drill Hole No. 13 — Depth 60'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	6-7	0.71	17.0			
5-10	6-8	.42				
10-15	6-9	.70	7.4			
15-20	6-10	.88	7.6	20.4	0.52	0.02*
20-25	6-11	.89	7.9			
25-30	6-12	1.08	6.4			
30-35	6-13	.61	6.5			
35-40	6-14	.38				
40-45	6-15	.28				
45-50	6-16	.39				
50-55	6-17	.50				
55-60	6-18	.55	6.7	8.41		

* less than

Assays of Drill Hole No. 15 — Depth 117'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	1-1	1.67	43.0		4.2	
5-10	1-2	1.32	20.1		1.5	
10-15	1-3	.57	8.6		.75	
15-20	1-4	.44	8.3		.67	
20-25	1-5	.47	6.0		.45	
25-30	1-6	.40	5.2		.45	
30-35	1-7	.29	5.6		.37	
35-40	1-8	.32	5.75		.45	
40-45	1-9	.31	5.05		.45	
45-50	1-10	.30	4.9		.45	
50-55	1-11	.31	5.35		.45	
55-60	1-12	.28	5.35		.45	
60-65	1-13	.28	5.3		.37	
65-70	1-14	.28				
70-75	1-15	—				
75-80	1-16	—				
80-85	1-17	.26				
85-90	1-18	.26				
90-95	1-19	.28				
95-100	1-20	.28	6.0	1.71	2.58	0.17
100-105	1-21	.57				
105-110	1-22	.20				
110-115	1-23	.23				
115-117	1-24	.24				

Assays of Drill Hole No. 16 — Depth 35'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	4-11	0.92	29.8	6.26	2.46	0.27
5-10	4-12	.65	14.6			
10-15	4-13	.33				
15-20	4-14	.41				
20-25	4-15	.44				
25-30	4-16	.29				
30-35	4-17	.32				

Assays of Drill Hole No. 17 — Depth 30'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	7-10	0.30	18.6		
5-10	7-11	1.35	18.8	7.32	0.02*
10-15	7-12	1.16	16.4		.07
15-20	7-13	.81	10.8		
20-25	7-14	.57			
25-30	7-15	.56	7.0		

* less than

Assays of Drill Hole No. 18 — Depth 25'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	7-17	0.48			
5-10	7-18	.52			
10-15	7-19	.45			
15-20	7-20	.41			
20-25	7-21	.42			

Assays of Drill Hole No. 19 — Depth 20'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	7-23	0.26			
5-10	7-24	.46			
10-15	7-25	.51			
15-20	8-1	.32			

Assays of Drill Hole No. 20 — Depth 40'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	8-3	0.98	41.4			
5-10	8-4	.83	41.6	6.47		
10-15	8-5	.98	35.0		1.05	0.11
15-20	8-6	1.22	20.2		.80	.10
20-25	8-7	.73	13.2			
25-30	8-8	.39				
30-35	8-9	.42				
35-40	8-10	.29	7.6			

1.00 % Ni

Assays of Drill Hole No. 21 — Depth 20'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	8-20	0.62			
5-10	8-21	.48			
10-15	8-22	.41			
15-20	8-23	.51			

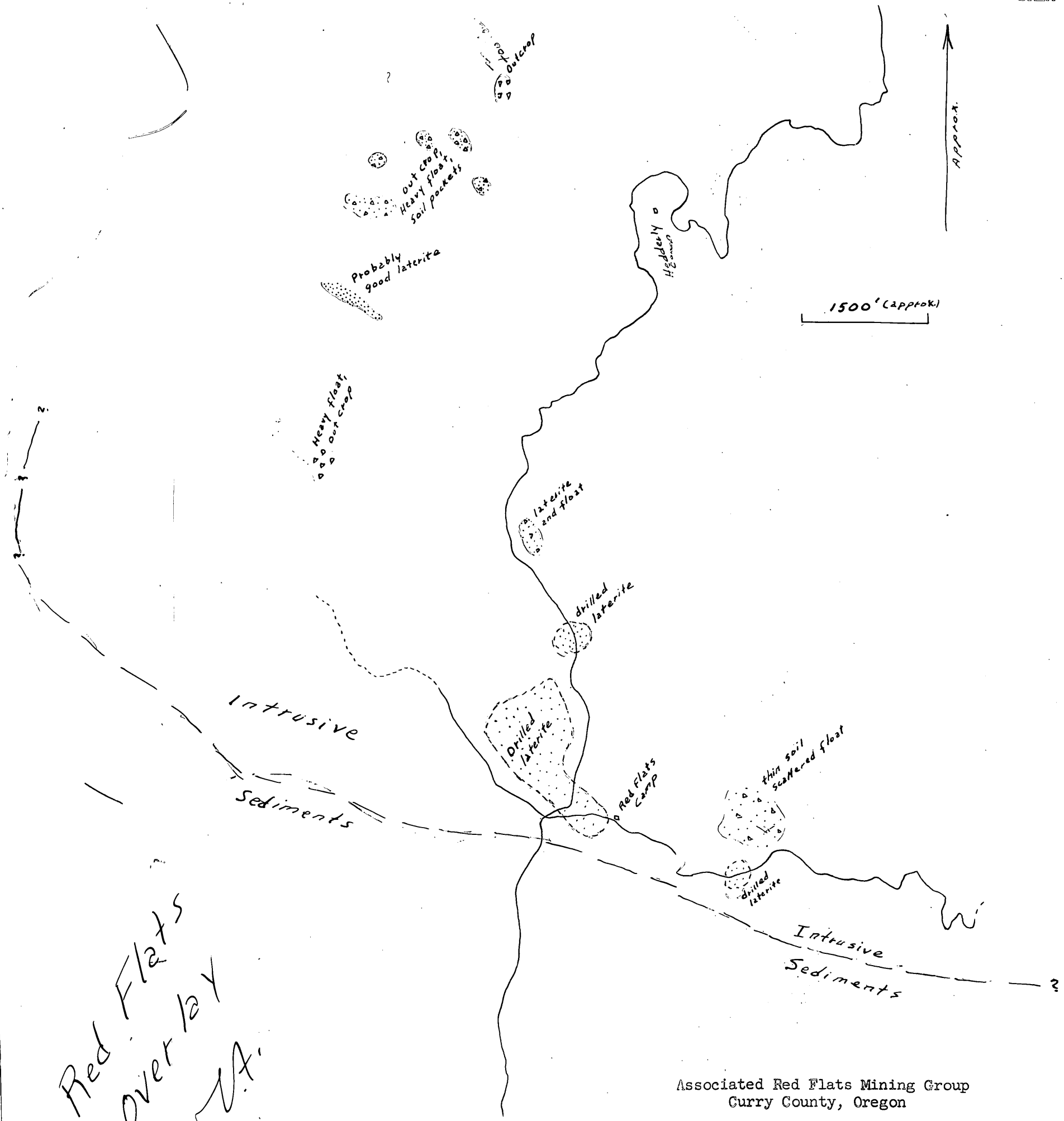
Assays of Drill Hole No. 22 — Depth 35'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3
0-5	8-12	0.23			
5-10	8-13	.23			
10-15	8-14	.25			
15-20	8-15	.29	6.9		
20-25	8-16	.23			
25-30	8-17	.23	6.05		
30-35	8-18	.22			

Assays of Drill Hole No. 23 — Depth 30'

Interval	Sample No.	% Ni	% Fe	% Mg	% CrO_3	% Co
0-5	9-19	0.87	38.0	5.7	1.82	0.29
5-10	9-20	2.43	14.4			
10-15	9-21	1.07	10.6			
15-20	9-22	1.29	9.8	17.2	0.77	.17
20-25	9-23	1.16	10.0			
25-30	9-24	.51	6.6			

Composite sample of hole 23 is 0.01 % Hg



Associated Red Flats Mining Group
Curry County, Oregon

(Photograph overlay)

JUL 14 1955

400

Associated Red Flats Mining Group
c/o Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Nickel
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above-noted property have been carefully reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Based upon a reexamination of your property and review of all of the available data relating thereto, the probability of disclosing minable ore reserves by your proposed exploration project does not appear sufficiently promising to justify Government participation. Under the circumstances, I regret to advise you that the previous denial of your request for exploration assistance is reaffirmed.

Your interest in the Defense Minerals Exploration Administration program is sincerely appreciated. I wish to thank you for giving us the opportunity of considering your proposal.

Sincerely yours,

C. O. Mittendorf

Administrator

cc: Docket
Code 400
Adm. Read.File
Oper. Comm.
T. Kiilsgaard, USGS
H. W. Davis, USBM
FT, Reg. I-Spokane

WSMartin/FEJohnson/ls
7/12/55

July 7, 1955

MEMORANDUM

To: Administrator, DMEA

From: Iron and Ferro-Alloys Division, DMEA

Subject: Denial of application for exploration assistance by this Division in the amount of $49,750.00
Docket No. DMEA 3773 - Nickel
Associated Red Flats Mining Group, (a partnership)
Red Flats, et al. association claims
Curry County, Oregon

Denial of the subject application is recommended by this Division and is based on the following information:

1. The applicant, Associated Red Flats Mining Group, % Mr. Wm. E. Walsh, Box 359, Coos Bay, Oregon, requested exploration assistance to the amount of $49,750.00 for access road, cat and jeep trails, auger and churn drilling, bulldozer pits and shallow shafts.

2. Twenty six lode mining claims are held under mining rights by the applicant and are recorded at Gold Beach, Curry County, Oregon. These claims are about 8 miles southeast of Gold Beach.

3. This same property is covered by an application for exploration assistance dated May 29, 1953, (Docket No. DMEA 3052). This application was denied on June 18, 1953.

4. A nickeliferous laterite rests on a weathered bed of ultrabasic rock. The laterite is confined to the surface of peridotite from which it has been derived under certain conditions of weathering. The laterite has a relatively low iron content and a high magnesium and silicon content.

5. The property was originally located as a gold-mercury prospect about 1932. In June 1946 the property was examined by the Bureau of Mines and 25 samples were taken. These samples showed only traces of gold and mercury, and from 0.12 to 1.35 percent nickel. In 1952 the Bureau of Mines drilled 22 churn drill holes in the main laterite area. On the basis of this drilling it is inferred the deposit contains 2,300,000 tons of serpentine averaging 1.19 percent nickel and up to 1,000,000 tons of laterite averaging 1.1 percent nickel. Additional

drilling in the area drilled by the Bureau of Mines would probably change tonnage and grade figures only slightly.

6. Small scale batch metallurgical tests by the Bureau of Mines in an electrolytic furnace showed a fair nickel recovery but only at a low ratio of concentration. These tests indicated that this method of treatment could be applied to Red Flat ores, but would be uneconomical because of the high cost of power and electrodes. For scattered ore deposits of such low grade the ore tonnage indicated is relatively too small to justify the installation of the costly plant that would be needed. In any event, laterite containing this percentage of nickel, as determined by a Bureau of Mines project, cannot be used as a commercial ore with present technology.

7. The Field Team recommends denial and the Commodity Divisions of the Geological Survey and the Bureau of Mines concur in the recommendation.

W. S. Martin, Chief
Iron and Ferro-Alloys Division

TLChapman:foc
7-7-55
cc to: Docket
Code 400
Adm. Read. File
Operating Comm.

Dugywell such blockers for that the phrase appears somewhat too fictitious.

Based upon a careful examination of your property and review of all the available data relating thereto, the probability of disclosing minerals or resources by your proposed exploration program does not appear sufficiently promising to justify Government participation. Under the circumstances, I regret to advise, that the permits clearly of your request for exploration consideration to reaffirmed.

You interest in the Defense Minerals Exploration program is sincerely appreciated. I wish to extend my apologies for giving insufficient opportunity of considering your proposals.

Sincerely yours,

Secretary

rewrite

Original mail

3773

#2 N.G.

7-11-55

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Associated Red Flats Mining Group
% Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Nickel
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above noted property have been carefully reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgement, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of the local mineralization and comparison with related types of mineral deposition, suggest that the laterite reserves are too small and scattered to encourage Government exploration of the subject deposit. There seems to be a somewhat larger tonnage of serpentine slightly enriched with nickel, but the overburden on this bedrock deposit although including nickeliferous laterite in part, also consists of barren laterite or relatively barren rock. Our estimates of grade indicate that the enriched serpentine rock will average below the minimum grade that would be needed before such material could be considered ore, and also that the laterite is even lower in nickel grade. We regret to advise you, therefore, that your application for exploration assistance is denied.

At some future date, substantial improvements in metallurgical processes may make it practicable and not merely "technically feasible" to recover a low-carbon ferronickel product from the material discussed above, or economic conditions may change enough to convert such submarginal nickel mineralization into marginal ore. If you should then wish to re-apply for exploration aid please refer to the subject docket number, include a geologic map or your claims, and give specific details of your exploration program. In that event, may we suggest that you consult a registered professional mining engineer for assistance in preparing any such revised application.

Sincerely yours,

Administrator

DOCKET
SURNAME
400 Martin
Davis
~~Lechan~~
~~Selfridge~~

Associated Red Flats Mining Group
% Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Nickel
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above noted property have been carefully reviewed.

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Sincerely yours,

Administrator

cc to: Ft. Reg. I - BM Dist
Messrs. Davis, USBM
Kilsgaard, USGS

WSMartin:foc 7-11-55
cc to: Docket
Code 400
Adm. Read. File
Operating Comm.

3773

Deed Rec #1 N.G.

7-7-55

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Returned

Associated Red Flats Mining Group
% Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Nickel
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above noted property have been carefully reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgement, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting the occurrence of low grade nickel mineralization on your property, indicates to us that the probability of disclosing minable ore reserves by your proposed program is not sufficiently promising to justify Government participation. We regret to advise you, therefore, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Exploration Administration program and for bringing your property to our attention.

Sincerely yours,

Administrator

DOCKET
SURNAME

400
Chapman

Associated Red Flats Mining Group
% Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Michael
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above noted property have been carefully reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgement, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting the occurrence of low grade nickel mineralization on your property, indicates to us that the probability of disclosing minable ore reserves by your proposed program is not sufficiently promising to justify Government participation. We regret to advise you, therefore, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Exploration Administration program and for bringing your property to our attention.

TLChapman:fec / 7-7-55

Sincerely yours,

cc to: Docket
Code 400
Adm. Read. File
Oper. Comm.
FT. REG. I - NW Dist.
Messrs. Davis, USBM
Kiilsgaard, USGS

Administrator

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED 400
JUL - 6 1955

July 5, 1955

Re: DMEA 3773
Associated Red Flats
Mining Group
Red Flats Group
Curry Co., Oregon

Memorandum

To: W. S. Martin, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of Field Team report.

The Field Team report and analysis gives quantitative estimates of the maximum possibilities of the Red Flats deposit. Based on such estimates the conclusions are justified and the recommendation correct.

I concur with the recommendation of denial.

N. E. Nelson

N. E. Nelson

NENelson:iml
G-7/5/55

cc: Directors reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
K. W. Davis, 3519

Copy Retained 400

400

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
~~WASHINGTON 25, D.C.~~
So. 157 Howard Street
Spokane 4, Washington

RECEIVED
JUN 29 1955

June 22, 1955

Mr. George C. Selfridge, Chairman
Operating Committee, DMEA
Department of the Interior
Washington 25, D. C.

Re: Docket No. DMEA-3773 (nickel)
Associated Red Flats Mining Group
Red Flats, et al. association claims
Curry County, Oregon

Dear Mr. Selfridge:

We are enclosing a report by Verne C. Fryklund, Geological Survey, and J. R. Williams, Bureau of Mines, on the proposal to explore the Red Flats nickel deposit in Curry County, Oregon. Also enclosed are two stereo-pair photographs of the property; these with the accompanying overlay may be of interest.

The conclusion is that the possibility is very remote of finding sufficient lateritic ore to amortize the plant that would be required to treat it. Very little geologic work or prospecting has been done by the applicant. In our opinion, it would be up to the applicant through further geologic study, topographic mapping, and test pitting to present evidence that the possibilities of finding sufficient lateritic ore to amortize the plant before the Government could consider participating in the exploration. In any event, laterite containing this percentage of nickel, as determined by a Bureau of Mines project, cannot be used as a commercial ore with present technology.

We therefore recommend that the project be denied.

By Field Team, Region I, NW District

A. E. Weissenborn, Exec. Officer
(U. S. Geological Survey)

Wing G. Agnew, Member
(U. S. Bureau of Mines)

Enclosures(4)
Distribution:
DMEA(Orig.&3)
USBM(2)
Fryklund

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
~~WASHINGTON 25, D.C.~~
So. 157 Howard Street
Spokane 4, Washington

400

June 22, 1955

Mr. George C. Gallridge, Chairman
Operating Committee, DMEA
Department of the Interior
Washington 25, D. C.

WSM

re: Project No. [illegible]-3773 (nickel)
Associated Red Flats Mining Group
Red Flats, et al. association claims
Curry County, Oregon

Dear Mr. Gallridge:

We are enclosing a report by Verne S. Fryklund, Geological Survey, and J. R. Gillings, Bureau of Mines, on the proposal to explore the Red Flats nickel deposit in Curry County, Oregon. Also enclosed are two stereo-pair photographs of the property; those with the accompanying overlay may be of interest.

The conclusion is that the possibility is very remote of finding sufficient laterite ore to amortize the plant that would be required to treat it. Very little geologic work or prospecting has been done by the applicant. In our opinion, it would be up to the applicant through further geologic study, topographic mapping, and test pitting to present evidence that the possibilities of finding sufficient laterite ore to amortize the plant before the Government could consider participating in the exploration. In any event, laterite containing the percentage of nickel, as determined by a bureau of this project, cannot be used as a commercial ore with present technology.

We therefore recommend that the project be denied.

Ivy Hall Dean, Region 1, DMEA District

W. S. Weissenborn, Exec. Officer
(U. S. Geological Survey)

Irving G. Agnew, Member
(U. S. Bureau of Mines)

Enclosures(4)
Distribution:
DMEA(Orig.&3)
USBM(2)
Fryklund

P.S. The two stereo-pair photographs and one copy of the overlay are being sent under separate cover.

RECEIVED
JUN 27 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
So. 157 Howard Street
Spokane 4, Washington

June 1, 1955

MEMORANDUM

To: DMEA Field Team, Region I, Northwest District

From: Verne C. Fryklund, Jr., Geologist, Geological Survey and J. R. McWilliams, Mining Engineer, Bureau of Mines

Subject: Docket No. DMEA 3773 (nickel), Examination of Associated Red Flats nickel deposit, Associated Red Flats Mining Group, Curry County, Oregon.

INTRODUCTION

We visited the property the afternoon of May 10, 1955, and all day May 11, 1955. We were accompanied by H. F. Hedderly and J. A. Walsh, two of the principal property owners. Mr. Hedderly is a resident of Gold Beach, and Mr. Walsh of Coos Bay, Oregon.

SUMMARY

The deposit at Red Flats is nickeliferous laterite that has formed at an erosion surface, some 800 to 1,000 feet below the Klamath peneplain, by the weathering of serpentinized peridotite. The Bureau of Mines has explored the largest area of laterite by 21 churn drill holes; the area is believed to contain about 600,000 dry tons of laterite that has a grade of 1.14 percent nickel.

Benches and shoulders at even lower altitudes may have some laterite. As a very rough estimate there may be 1,000,000 tons of laterite in the entire property with a grade probably not much in excess of 1.0 percent nickel. There is no known geologic justification for increasing our estimate.

On the basis of Bureau of Mines drilling it is believed that there are 2,300,000 dry tons of enriched serpentine rock having a grade of about 1.19 percent nickel.

Except for the area explored by the Bureau of Mines there has been no systematic prospecting of the property. There are no topographic or geologic maps of the property, or of surrounding areas.

If an exploration contract were approved, it would have to include preliminary geologic and topographic mapping, as well as soil sampling and test pitting before any comprehensive exploration by drilling could be planned or started. Additional drilling in the area drilled by the Bureau of Mines probably would change tonnage and grade figures only slightly.

Metallurgical tests on Red Flats laterite containing 0.8 percent nickel indicates that this nickel content is not of ore grade.

CONCLUSIONS

(1) The known reserve tonnage of laterite is small, 600,000 tons of 1.1+ percent nickel.

(2) There does not seem to be much chance of even doubling this tonnage by further exploration in the area.

(3) Metallurgical data indicates that a grade of about 1.5 percent nickel would be needed before this could be considered ore.

(4) The Riddle plant is too remote for economical transportation of ore from Red Flats and is designed mainly to treat a nickel silicate (garnierite) ore. It would therefore be necessary to construct a treatment plant near the property, say at Gold Beach. Large reserves would be required to amortize this plant.

RECOMMENDATIONS

Metallurgical research may permit the use of laterite of this nickel grade to be used as an ore some time in the future. However, available geologic information suggests that the laterite reserves are too small, and scattered, to encourage Government exploration of the deposit, and for this reason alone, the application should be denied.

If the applicant is able to demonstrate the geologic possibility of considerably larger tonnages of laterite, the applicant should be encouraged to reapply for an exploration project. Any new application, however, should be accompanied by adequate geologic data.

We would say that there should be at least the possibility of finding 5,000,000 to 10,000,000 tons of laterite before extensive exploration is warranted.

PUBLICATIONS THAT DESCRIBE THE AREA

This quadrangle, Gold Beach (?), is the only one in southwest Oregon with no geology or topography. There are, however, several publications that describe the Red Flats area, or are of general value.

(1) R. J. Hundhausen, J. R. McWilliams, and L. H. Banning, Preliminary investigation of the Red Flats nickel deposit, Curry County, Oregon: U. S. Bureau of Mines R. I. 5072, September 1954. This should be referred to for a general description of the area as well as the metallurgical work done on the ore.

(2) F. W. Libbey, W. D. Lowry, and R. S. Mason, Nickel-bearing laterite, Red Flat, Curry County, Oregon: The Ore-Bin, v. 9, no. 3, 1947. This appears to be an excellent geologic description of the deposit.

(3) Hollis Dole, F. W. Libbey, and R. S. Mason, Nickel-bearing laterite areas of southwestern Oregon: The Ore-Bin, v. 10, no. 5, 1948. This describes samples from Red Flats.

(4) W. T. Pecora and S. W. Hobbs, Nickel deposit near Riddle, Douglas County, Oregon: U. S. Geol. Survey Bull. 931-I, 1942. The bulletin describes a somewhat similar nickel deposit.

(5) F. W. Cater, Jr., and F. G. Wells, Geology and mineral resources of the Gasquet quadrangle California-Oregon: U. S. Geol. Survey Bull. 995-C, 1953. The general geology, particularly the geomorphology, of this quadrangle is similar to that of the Red Flats area.

(6) W. D. McMillan and H. W. Davis, Nickel-Cobalt resources of Cuba, U. S. Bureau of Mines R. I. 5099, Feb. 1955. Describes the metallury and geology of the Cuban nickeliferous laterites.

LOCATION AND ACCESSIBILITY

The property includes all of secs. 18, 19, and 30; W½ of secs. 20, 29, and 32; and the E½, E½W½ of sec. 31, all in T. 37 S., R. 13 W.; S½, S½N½, NE¼NE¼, NW¼, NW¼ of sec. 24; and SE¼, sec. 13, all of T. 37 S., R. 14 W., W.M., Curry County, Oregon. According to the application this totals 4,080 acres.

The property may be reached from U. S. Highway 101 by dirt roads that start at the Pistol River (16 miles) or from Hunter Creek (14 miles). The Hunters Creek road was closed by slides when we were there, and it was necessary to make a 30-mile trip from Gold Beach to reach the property. The dirt roads are one lane and

maintained by logging companies. Snow covers the area in the winter. Rainfall is heavy, and the area not covered by Douglas fir forest and heavy brush is covered by small second-growth pine and heavy brush.

DESCRIPTION OF PROPERTY

According to the application, maps of the property were submitted with the earlier application. We presume there were pencil sketch maps, but we have not seen copies. No copies were available during our visit. A map of a small portion of the property is in Bureau of Mines R. I. 5072. There are 21 churn drill holes and five or six shallow trenches on the property; a 40-foot shaft, now caved, is in the Bureau area; there are a number of auger holes, sampled only for mercury and gold. The applicants have made some minor effort to concentrate gold and mercury on the property, and there is some milling equipment. There are three habitable cabins on the property as well as several other buildings. Except for the area explored by the Bureau this property must be considered as merely a prospect.

Since our visit we obtained enlarged stereo-pair photographs of the area. These photographs and an overlay accompany one copy of this memorandum. A print of the overlay accompanies each other copy of this memorandum.

GEOLOGY

The nickel deposits of the world can be classified as:

(1) Sulfide vein deposits.

(2) Nickel-silicate deposits.

(3) Nickeliferous laterite deposits.

(4) Nickeliferous serpentine rock deposits.

The New Caledonia and Riddle, Oregon, deposits are examples of nickel-silicate deposits. The principal nickel-bearing mineral in both deposits is garnierite, a hydrous nickel-silicate of indefinite composition. The Nicaro and Red Flats deposits are examples of nickeliferous laterite deposits; the nickel-bearing mineral, or minerals, has never been identified, but it is not garnierite. Some of the Riddle ore is of this type. Nickeliferous serpentine rock is present at all the localities mentioned. At Nicaro, it is mined with the laterite in the ratio of two parts laterite to one part serpentine.

Formation of the nickel silicate-type deposits (New Caledonia, Riddle) and the nickeliferous iron-ore type deposits (Nicaro, Red Flats) depended upon two geologic phenomena common to all.

(1) The presence of ultrabasic intrusives such as peridotite or one of the pyroxenites that contain nickel (and cobalt) in either olivine or a pyroxene. The ultrabasic rock may have been altered to serpentine.

* wide, flat, river valley (from the Gaelic)

(2) The ultrabasic rock must have been suitably exposed to chemical weathering in such a manner as to reduce the removal of weathering products to a minimum. A peneplain surface, formed in a warm, humid climate, seems to be the best place for these nickel deposits to form. Riddle appears to be the only known example in this area. It is on a remnant of the Klamath peneplain (Late Miocene in age). Weathering on strath*, or other erosion surfaces, may also produce nickeliferous soils, as is the case at Red Flats, but weathering on such surfaces can never be deep. The weathering products are readily removed, and for that matter the surfaces themselves destroyed.

According to Libby (p. 21), "Red Flats is not a large nearly flat area, as might be assumed from its name. However, as compared to most of the surrounding area, which is rugged and steep, it is relatively flat and undissected with a relief of two hundred or three hundred feet...Red Flat is well below the summit ridges which are remnants of the Klamath peneplain at an elevation of about 3500."

The top of the Red Flats ridge, according to the Bureau of Mines report, is about 2,500 feet, considerably below the Klamath surface. There are also slightly lower benches and shoulders below the ridge top representing periods of still stand younger than the Red Flats ridge.

Weathering in the Red Flats area drilled by the Bureau has produced 0 to 20 feet of laterite with an average probably less than 5 feet. Benches lower in elevation than the drilled area have local pockets of deep soil, but they are largely covered with very abundant float and, in some cases, the underlying rock actually crops out. All of the soil seen is residual.

To summarize these geomorphic aspects, Red Flats is not on the Klamath peneplain but on much younger surfaces. Soil or laterite thicknesses are not great, although they are not everywhere definitely known.

The underlying rock at Red Flats has been described as peridotite or serpentinized peridotite. Much, or most, of the rock exposed has been altered to a serpentine-rich rock; and much of this rock was pyroxene rich.

The olivine and pyroxene of the original intrusive contained minor amounts of nickel and cobalt; alteration of these minerals to serpentine retained the nickel and cobalt in the serpentine-rich rock. According to Bureau assays, this rock probably contains 0.3 to 0.4 percent combined nickel and cobalt (in all cases the Co content is believed to be very much less than Ni content).

Chemical weathering of the serpentine-rich rock has produced a red soil that is somewhat enriched in nickel and cobalt. The nickel-bearing mineral in the red soil is not known, but it is not garnierite. Thus, the metallurgy of these deposits should be similar to Nicaro ore but not to Riddle ore. The nickel grade of this material averages about 1.14 percent.

Bureau of Mines drilling has shown that there is an enriched zone in the serpentine rock along the crest of the Red Flats ridge. This zone averages about 10 feet in thickness and is underlain by barren serpentine rock assaying much lower in nickel. According to drill logs, the grade of enriched serpentine is similar to the red soil (R.I. 5072, p. 16-19). One or two float specimens of serpentine rock with surface films of what appeared to be garnierite were visible and possibly the enriched zone in the serpentine rock may have formed by a concentration of nickel as garnierite by groundwater.

RESERVE DATA

On the basis of the Bureau of Mines drilling it is believed that there are about 600,000 dry tons of laterite assaying 1.14 percent combined nickel and cobalt in the indicated-inferred category. Drilling was done on 500-foot centers.

There are about 2,300,000 dry tons of enriched serpentine rock in the area drilled by the Bureau of Mines that contained about 1.19 percent combined nickel and cobalt. This tonnage is also in the indicated-inferred category. Such material mixed with laterite is used at Nicaro though nickel recovery from serpentine is somewhat less than from laterite.

Additional reserves of red soil, or laterite, are on lower benches and shoulders. The depth of weathering, however, should be less than on the upper surface already drilled. It is judged that the total area of such benches (without maps this depends on a visual inspection) would be less by perhaps one-fourth or one-third than the area already drilled. (See photograph and overlay.)

It would seem then that further exploration might not be able to double the present laterite reserve figure. In other words, a hasty reconnaissance would indicate the possibility of about a total of 1,000,000 tons of laterite in the area.

The owners, particularly Mr. John Walsh, are certain the property is a potential producer of mercury and gold. This is in spite of the fact that no gold was detected by the Bureau of Mines in drill-hole samples and that the Oregon Bureau of Mines and Geology and the U. S. Bureau of Mines have assayed Red Flats samples for mercury with essentially negative results.

EXPLORATION OF THE PROPERTY

We were unable to find out how the applicant proposes to explore the property. The company wants to explore by bulldozer trenching and auger holes at least five different benches and, we think, the area already drilled by the Bureau. As Mr. Walsh said, they were just prospectors and were quite "amenable" to suggestions from the Government.

Following are what we consider to be the necessary steps in evaluating this property.

(1) Prepare a topographic and geologic map of the high elevations of this property which are underlain by periodite. This would be possible, assuming a competent plane-table man, in 3 to 4 weeks. Map scale should be 500 feet to the inch. Soil samples should be collected during mapping, and hand-shovel test pits dug to see if soil is more than about 2 feet deep.

(2) If soil samples and preliminary pits warranted, benches could be drilled by jeep-mounted auger along longitudinal and cross sections at fairly wide intervals. Drilling on a close grid would seem to be development and not warranted. The extent and costs of this drilling could be estimated only after further geologic information is available.

(3) If so desired, there could be redrilling of the area explored by the Bureau, but we doubt that this would greatly change the present estimate of grade and tonnage, and there would be little or no justification for Government participation.

The applicants have apparently made no concerted attempt to prospect the property. Geologists from a number of companies have visited the property thus encouraging the applicant. We read a letter, dated in April 1955, from George W. Rust of Bear Creek Mining Company, requesting claim maps--for the second time--so that an option could be

prepared. This, of course, greatly encourages the applicant, but it has not encouraged the company sufficiently to employ a consulting geologist or otherwise systematically prospect the property.

METALLURGICAL PROBLEMS

Two metallurgical processes have been developed to treat nickeliferous iron ores. The reducing roast-ammonia leach process is used to treat the Cuban laterite-serpentine ores and would probably be technically satisfactory for the Red Flats ore. The principal drawback both here and in Cuba is the deleterious effect of excessive serpentine. At Nicaro a ratio no greater than one part serpentine to two parts laterite provides optimum nickel recovery; larger amounts of serpentine cause operational difficulties. This is the only process that has been successfully operated on a production basis to recover nickel from laterites.

The Bureau of Mines conducted metallurgical tests on the Red Flats ore to determine whether the selective reduction process developed for Riddle and Cle Elum ores would be applicable to the Red Flats ore.

The tests are described in detail in R.I. 5072 (p. 8-15), the concluding paragraph of which reads, "The results of the test indicate that it is technically feasible to recover a low-carbon ferronickel product from the Red Flats nickel ore. For a commercial operation a grade of ore considerably higher in nickel than the sample tested is indicated."

The test sample was a mixture of laterite and serpentine in the approximate ratio of 9 to 1. The nickel content averaged about 0.8 percent, or about 0.3 percent lower than the average grade of the deposit. Iron content, because of the high laterite-serpentine ratio, was fairly high, about 29 percent. Serpentine will normally run less than 10 to 15 percent iron.

In order to determine what grade of ore might be considered commercial, Lloyd H. Banning, chief, Branch of Pyrometallurgy, and director of the Red Flats research, was asked for an opinion. His reply states: "It is my opinion that a grade of ore containing less than 1.5 percent nickel is not a commercial ore at the present time if only the nickel is to be recovered from the ore in the ferronickel product, containing 25 percent or more nickel. However if the ore contains appreciable amounts of iron, recent tests at Albany have indicated that a low nickel, about 4 percent alloy, can be recovered from the ore which would have value for its iron and nickel content. These tests were made on Cle Elum ore. Apparently, part of the Red Flats nickel ore also contains appreciable percentages of iron. It may be feasible to produce a nickel-iron alloy containing 6 to 8 percent nickel

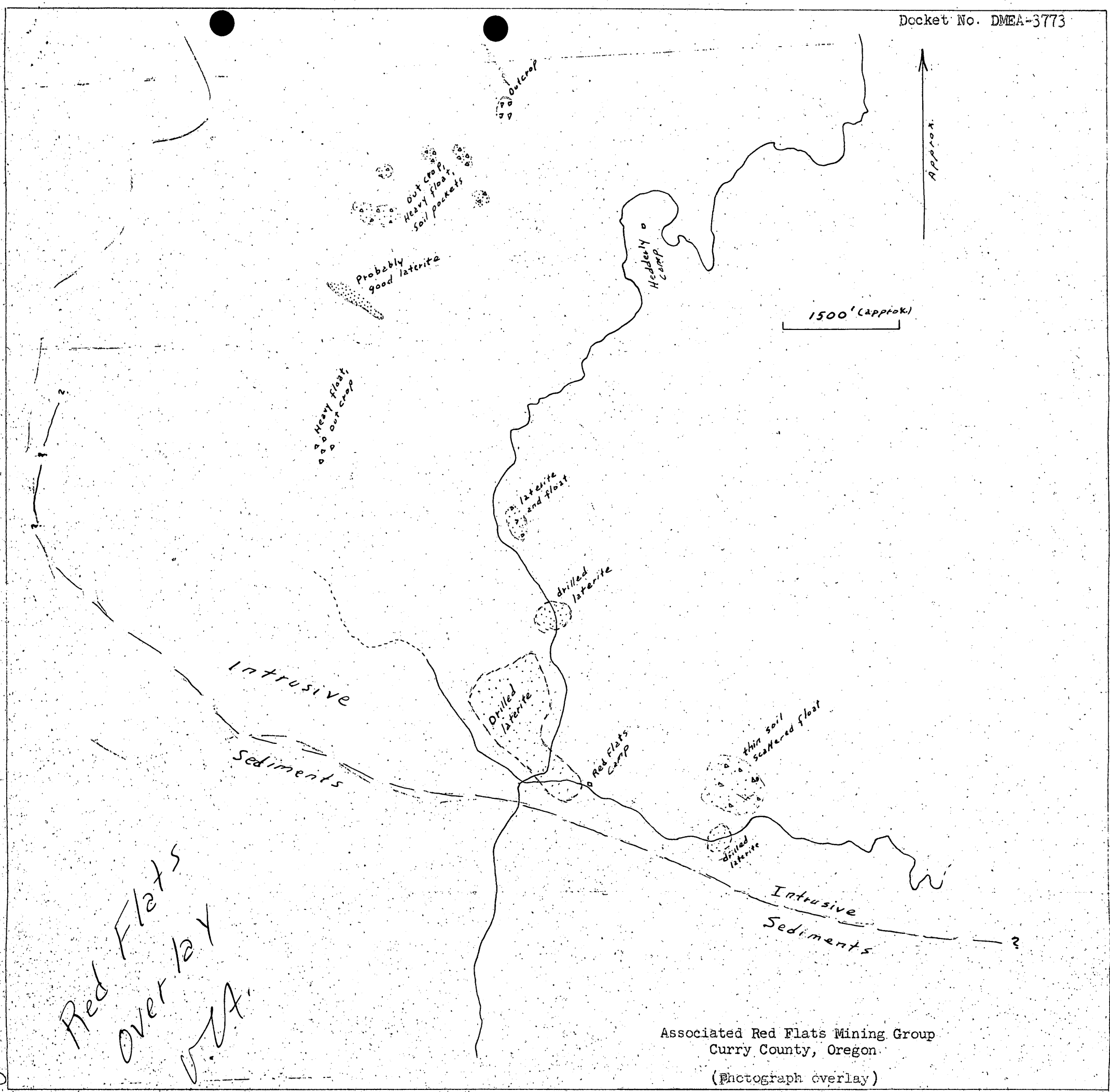
and less than 1 percent chromium which would be valuable in the production of low nickel alloy in either the open hearth furnace or the electric steel making furnace. The minimum nickel content of an ore for producing such an alloy should be not less than one percent nickel and probably not less than 25 percent iron." The value of such an alloy would be 77 cents per pound of contained nickel plus $32.00 per ton for the iron.

The Red Flats ore cannot meet specifications for the low nickel alloy, because of the low iron content of the serpentine. The laterite would be acceptable but is relatively scarce in terms of the tonnage needed to amortize even a small electric furnace.

Enclosures(2 photographs and overlay w/1 copy)
(overlay only with the other copies)

Distribution:
DMEA(4)
USBM(5)
USGS(SRO)
Docket
Fryklund

Docket No. DMEA-3773



Associated Red Flats Mining Group
Curry County, Oregon

(Photograph overlay)

400

APR 22 1955

Mr. A. E. Weissenborn, Executive Officer
DMEA Field Team, Region I - Northwest District
South 157 Howard Street
Spokane 4, Washington

Re: Docket No. DMEA 3773 - Michel,
Fleishman, Yin, et al.
Associated Red Flake Mining Group
Red Flake, et al. association claims
Curry County, Oregon

Dear Mr. Weissenborn:

Reference is made to the above-docketed application for exploration assistance that is being referred to your office for review and a field examination of the property if required.

The subject property was the object of a prior application for exploration assistance by the same applicant under Docket No. DMEA 3052. This application was denied by letter dated June 23, 1953.

For your information we are enclosing copies of the following:

1. Letter dated March 7, 1955, from J. A. Walsh to Mr. William E. Walsh.

2. Letter dated January 25, 1955, from J. A. Walsh to Mr. Wing G. Agnew, Bureau of Mines.

3. Bureau of Mines Report of Investigations 5072: "Preliminary Investigation of the Red Flake Nickel Deposit, Curry County, Oregon" by R. J. Sundhoussen, J. R. McWilliams, and L. H. Banning, with comments and notations by the applicant.

4. Relevant memorandum dated April 20, 1955, by H. E. Nelson, Geological Survey.

FARutledge:foe
cc: Docket
Code 400
Adm. Read. File
Oper. Comm.
FT. REG. I MMD
H. W. Davis, USBM
T. H. Kiilsgaard, U.S.G.S.
4-22-55

Sincerely yours,

George C. Selfridge
Chairman, Operating Committee

Enclosures

APPROVED:

J. H. Hedges
Member, Bureau of Mines

Thor H. Kiilsgaard
Member, Geological Survey

400

APR 22 1955

Associated Red Flake Mining Group
c/o Wm. R. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Michel,
Platinum, Tin, et al.
Red Flake, et al. association claims
Coquille County, Oregon

Gentlemen:

Reference is made to the above-docketed application for exploration assistance which has been reviewed by the Iron and Ferro-Alloys Division of the Defense Minerals Exploration Administration and referred to Mr. A. K. Weissenborn, Executive Officer, DMEA Field Team, Region I - Northwest District, South 157 Howard Street, Spokane 4, Washington, for review and possibly a field examination of the property.

Any assistance that you can render the members of the Field Team will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

FARutledge:fcc
4-22-55
cc to: Docket
Code 400
Adm. Reading File
Operating Comm.
FT. REG. I - NWD
H. W. Davis, USBM
T. H. Kilsgaard, USGS

DMEA 3773
(Associated Red Flats Mining Company)

400

January 25, 1955

Mr. Wing G. Agnew
U. S. Bureau of Mines
1201 North Division Street
Spokane 2, Washington

Dear Mr. Agnew:

I wish to thank you for the report on the Red Flats nickel deposits. Two more copies would be greatly appreciated.

While we do not necessarily agree with the findings of said report, we must admit that as far as nickel and cobalt are concerned on the limited area explored. It represents a job well done. We hope you will accept the commendations of all the claim holders.

Our principal objections are based on the fact that so little was done on so limited an area to establish the presence of other strategic minerals. While we understand that gold is not strategic, we cannot help but contend that gold, platinum and mercury are present in all of the laterite soils in substantial quantities. Traces of tin, monazite and several other important minerals compel all of us to feel that a more complete analysis of future samples is imperative.

I should also like to stress the fact that there are several hundred acres of deep laterite formations within the boundaries of our claims that have never been explored. These areas consist of benches and more or less closed-in basins lying far below the area upon which your report is based. (Commercial assays of samples from these acreas have always shown greater values in the minerals with which we are concerned). If Paragraph 4, Page IV-12, MINERALS SURVEY-NICKEL, can be used as a criterion, it would seem that we would be fully justified in planning to make a comprehensive survey of said areas.

It is our intention to again seek financial assistance under the provisions of the Defense Minerals Exploration Program. Would you please, therefore, mail the necessary forms, preferably seven sets, for this purpose to the writer.

Thanking you again, I am

Very truly yours,

/s/ J. A. WALSH

cc: Mr. Harry Hedderly
Gold Beach, Oregon

DMEA 3773
(Associated Red Flats Mining Company)

400

1090 Ingersoll Ave.

J. A. WALSH
Coos Bay, Oregon

March 7, 1955

Mr. William E. Walsh
American Bank Building
Coos Bay, Oregon

Dear Bill:

In connection with our new application for a government loan with which to continue exploration work on our Red Flats nickel deposit, I should like to stress the fact that since the Bureau of Mines have already worked out a satisfactory method for recovering nickel from our ore, there are no longer any metallurgical problems involved. Study of the Bureau's Report No. 5072, a copy of which I am enclosing, will confirm this statement.

Our application is being made strictly in accordance with the provisions of the Defense Minerals Exploration Act. We are seeking aid only to prove that we do have millions of tons of commercial grade nickel ore. Once this is done there will be little difficulty in arranging for the proper development of the property. The proposed and, as I understand, approved harbor improvement at Gold Beach would solve all transportation problems, not only for Red Flats nickel ore, but for a number of other highly commercial ores in Curry County.

Regarding the above mentioned report, I should like to point out that the 15 ton sample used in the smelting test was loose, surface material taken from the vicinity of Drill Holes No. 15, 16 and 23, and was of considerably lower grade than the ore encountered to certain depths in two of the drill holes named. To be explicit, samples taken to a depth of 10 feet in Drill Hole No. 15 averaged 1.49% nickel, from Drill Hole No. 23 to a depth of 200 feet 1.63% nickel.

While it is true that a number of drill holes failed to reveal commercial grade ore, it is worth while to note that several were drilled too close to the contact with more or less barren formations, others on outcrops of low-nickel serpentine. This is not stated as a criticism of the Bureau's work. It was merely the result of following a plan which required drilling at exact 500 foot intervals, with little or no advance reconnaisance. However, the assay results from these holes, plus the inclusion of assay results from the marginal depths of others, are reflected in the overall results from the area explored. It is our contention that had certain rock formations been bypassed, and drill holes delimited to the proper depth, a much higher grade of ore would have been indicated.

Only a fraction of the ore body has been explored. Should our application be favored, it is our intention to accurately delimit the nickel-rich areas by preliminary auger drilling, and to confine all exploration to said areas.

Very truly yours,

/s/ J. A. Walsh

DOCKET COPY
Surname:
Martin
Davis
Geehan
Kiilsgaard
FEJohnson
Selfridge

400

JUL 14 1955

Associated Red Flats Mining Group
c/o Mr. William E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Nickel
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Your application for aid for an exploration project and other data available to us in Washington relating to the above-noted property have been carefully reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Based upon a reexamination of your property and review of all of the available data relating thereto, the probability of disclosing minable ore reserves by your proposed exploration project does not appear sufficiently promising to justify Government participation. Under the circumstances, I regret to advise you that the previous denial of your request for exploration assistance is reaffirmed.

Your interest in the Defense Minerals Exploration Administration program is sincerely appreciated. I wish to thank you for giving us the opportunity of considering your proposal.

Sincerely yours,

C. O. Mittendorf

Administrator

cc: Docket
Code 400
Adm. Read.File
Oper. Comm.
T. Kiilsgaard, USGS
H. W. Davis, USBM
FT, Reg. I-Spokane

WSMartin/FEJohnson/ls
7/12/55

cc Docket not attached

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

July 7, 1955

MEMORANDUM

To: Administrator, DMEA

From: Iron and Ferro-Alloys Division, DMEA

Subject: Denial of application for exploration assistance by this Division in the amount of $49,750.00
Docket No. DMEA 3773 - Nickel
Associated Red Flats Mining Group,(a partnership)
Red Flats, et al. association claims
Curry County, Oregon

Denial of the subject application is recommended by this Division and is based on the following information:

1. The applicant, Associated Red Flats Mining Group, % Mr. Wm. E. Walsh, Box 359, Coos Bay, Oregon, requested exploration assistance to the amount of $49,750.00 for access road, cat and jeep trails, auger and churn drilling, bulldozer pits and shallow shafts.

2. Twenty six lode mining claims are held under mining rights by the applicant and are recorded at Gold Beach, Curry County, Oregon. These claims are about 8 miles southeast of Gold Beach.

3. This same property is covered by an application for exploration assistance dated May 29, 1953, (Docket No. DMEA 3052). This application was denied on June 18, 1953.

4. A nickeliferous laterite rests on a weathered bed of ultrabasic rock. The laterite is confined to the surface of peridotite from which it has been derived under certain conditions of weathering. The laterite has a relatively low iron content and a high magnesium and silicon content.

5. The property was originally located as a gold-mercury prospect about 1932. In June 1946 the property was examined by the Bureau of Mines and 25 samples were taken. These samples showed only traces of gold and mercury, and from 0.12 to 1.35 percent nickel. In 1952 the Bureau of Mines drilled 22 churn drill holes in the main laterite area. On the basis of this drilling it is inferred the deposit contains 2,300,000 tons of serpentine averaging 1.19 percent nickel and up to 1,000,000 tons of laterite averaging 1.1 percent nickel. Additional

drilling in the area drilled by the Bureau of Mines would probably change tonnage and grade figures only slightly.

6. Small scale batch metallurgical tests by the Bureau of Mines in an electrolytic furnace showed a fair nickel recovery but only at a low ratio of concentration. These tests indicated that this method of treatment could be applied to Red Flat ores, but would be uneconomical because of the high cost of power and electrodes. For scattered ore deposits of such low grade the ore tonnage indicated is relatively too small to justify the installation of the costly plant that would be needed. In any event, laterite containing this percentage of nickel, as determined by a Bureau of Mines project, cannot be used as a commercial ore with present technology.

7. The Field Team recommends denial and the Commodity Divisions of the Geological Survey and the Bureau of Mines concur in the recommendation.

W S Martin

W. S. Martin, Chief
Iron and Ferro-Alloys Division

DOCKET
SURNAME
400 Chapman
Martin

July 7, 1955

MEMORANDUM

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From: Iron and Ferro-Alloys Division, DMEA

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7. The Field Team recommends denial and the Commodity Divisions of the Geological Survey and the Bureau of Mines concur in the recommendation.

W. S. Martin, Chief
Iron and Ferro-Alloys Division

TLChapman:foc
7-7-55
cc to: Docket
Code 400
Adm. Read. File
Operating Comm.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

July 5, 1955

Copy retained 400

Re: DMEA 3773 - Nickel
Associated Red Flats
Mining Group
Red Flats Group
Curry Co., Oregon

Memorandum

To: W. S. Martin, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of Field Team report.

The Field Team report and analysis gives quantitative estimates of the maximum possibilities of the Red Flats deposit. Based on such estimates the conclusions are justified and the recommendation correct.

I concur with the recommendation of denial.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

July 5, 1955

Re: DMEA 3773
Associated Red Flats
Mining Group
Red Flats Group
Curry Co., Oregon

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N. E. Nelson

N. E. Nelson

NENelson:iml
G-7/5/55

cc: Directors reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
H. W. Davis, 3519

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

July 5, 1955

Re: DMEA 3773
Associated Red Flats
Mining Group
Red Flats Group
Curry Co., Oregon

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NENelson:iml
G-7/5/55

cc: Directors reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
M. W. Davis, 3519

Docket

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

~~WASHINGTON 25, D.C.~~
So. 157 Howard Street
Spokane 4, Washington

June 22, 1955

Mr. George C. Selfridge, Chairman
Operating Committee, DMEA
Department of the Interior
Washington 25, D. C.

WSM

Re: Docket No. DMEA-3773 (nickel)
Associated Red Flats Mining Group
Red Flats, et al. association claims
Curry County, Oregon

Dear Mr. Selfridge:

We are enclosing a report by Verne C. Fryklund, Geological Survey, and J. R. Williams, Bureau of Mines, on the proposal to explore the Red Flats nickel deposit in Curry County, Oregon. Also enclosed are two stereo-pair photographs of the property; these with the accompanying overlay may be of interest.

The conclusion is that the possibility is very remote of finding sufficient lateritic ore to amortize the plant that would be required to treat it. Very little geologic work or prospecting has been done by the applicant. In our opinion, it would be up to the applicant through further geologic study, topographic mapping, and test pitting to present evidence that the possibilities of finding sufficient lateritic ore to amortize the plant before the Government could consider participating in the exploration. In any event, laterite containing this percentage of nickel, as determined by a Bureau of Mines project, cannot be used as a commercial ore with present technology.

We therefore recommend that the project be denied.

By Field Team, Region I, NW District

A. E. Weissenborn per J. J. U.
A. E. Weissenborn, Exec. Officer
(U. S. Geological Survey)

Wing G. Agnew
Wing G. Agnew, Member
(U. S. Bureau of Mines)

Reviewed by
DMEA OPERATING COMMITTEE
7-1-55
(date)

Enclosures(4)
Distribution:
DMEA(Orig.&3)
USBM(2)
Fryklund

P.S. The two stereo-pair photographs and one copy of the overlay are being sent under separate cover.

D-Mea

RECEIVED
JUN 27 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
So. 157 Howard Street
Spokane 4, Washington

June 1, 1955

MEMORANDUM

To: DMEA Field Team, Region I, Northwest District

From: Verne C. Fryklund, Jr., Geologist, Geological Survey and J. R. McWilliams, Mining Engineer, Bureau of Mines

Subject: Docket No. DMEA 3773 (nickel), Examination of Associated Red Flats nickel deposit, Associated Red Flats Mining Group, Curry County, Oregon.

INTRODUCTION

We visited the property the afternoon of May 10, 1955, and all day May 11, 1955. We were accompanied by H. F. Hedderly and J. A. Walsh, two of the principal property owners. Mr. Hedderly is a resident of Gold Beach, and Mr. Walsh of Coos Bay, Oregon.

SUMMARY

The deposit at Red Flats is nickeliferous laterite that has formed at an erosion surface, some 800 to 1,000 feet below the Klamath peneplain, by the weathering of serpentinized peridotite. The Bureau of Mines has explored the largest area of laterite by 21 churn drill holes; the area is believed to contain about 600,000 dry tons of laterite that has a grade of 1.14 percent nickel.

Benches and shoulders at even lower altitudes may have some laterite. As a very rough estimate there may be 1,000,000 tons of laterite in the entire property with a grade probably not much in excess of 1.0 percent nickel. There is no known geologic justification for increasing our estimate.

On the basis of Bureau of Mines drilling it is believed that there are 2,300,000 dry tons of enriched serpentine rock having a grade of about 1.19 percent nickel.

Except for the area explored by the Bureau of Mines there has been no systematic prospecting of the property. There are no topographic or geologic maps of the property, or of surrounding areas.

Reviewed by
DMEA OPERATING COMMITTEE

7-1-55
(date)

If an exploration contract were approved, it would have to include preliminary geologic and topographic mapping, as well as soil sampling and test pitting before any comprehensive exploration by drilling could be planned or started. Additional drilling in the area drilled by the Bureau of Mines probably would change tonnage and grade figures only slightly.

Metallurgical tests on Red Flats laterite containing 0.8 percent nickel indicates that this nickel content is not of ore grade.

CONCLUSIONS

(1) The known reserve tonnage of laterite is small, 600,000 tons of 1.1+ percent nickel.

(2) There does not seem to be much chance of even doubling this tonnage by further exploration in the area.

(3) Metallurgical data indicates that a grade of about 1.5 percent nickel would be needed before this could be considered ore.

(4) The Riddle plant is too remote for economical transportation of ore from Red Flats and is designed mainly to treat a nickel silicate (garnierite) ore. It would therefore be necessary to construct a treatment plant near the property, say at Gold Beach. Large reserves would be required to amortize this plant.

RECOMMENDATIONS

Metallurgical research may permit the use of laterite of this nickel grade to be used as an ore some time in the future. However, available geologic information suggests that the laterite reserves are too small, and scattered, to encourage Government exploration of the deposit, and for this reason alone, the application should be denied.

If the applicant is able to demonstrate the geologic possibility of considerably larger tonnages of laterite, the applicant should be encouraged to reapply for an exploration project. Any new application, however, should be accompanied by adequate geologic data.

We would say that there should be at least the possibility of finding 5,000,000 to 10,000,000 tons of laterite before extensive exploration is warranted.

PUBLICATIONS THAT DESCRIBE THE AREA

This quadrangle, Gold Beach (?), is the only one in southwest Oregon with no geology or topography. There are, however, several publications that describe the Red Flats area, or are of general value.

(1) R. J. Hundhausen, J. R. McWilliams, and L. H. Banning, Preliminary investigation of the Red Flats nickel deposit, Curry County, Oregon: U. S. Bureau of Mines R. I. 5072, September 1954. This should be referred to for a general description of the area as well as the metallurgical work done on the ore.

(2) F. W. Libbey, W. D. Lowry, and R. S. Mason, Nickel-bearing laterite, Red Flat, Curry County, Oregon: The Ore-Bin, v. 9, no. 3, 1947. This appears to be an excellent geologic description of the deposit.

(3) Hollis Dole, F. W. Libbey, and R. S. Mason, Nickel-bearing laterite areas of southwestern Oregon: The Ore-Bin, v. 10, no. 5, 1948. This describes samples from Red Flats.

(4) W. T. Pecora and S. W. Hobbs, Nickel deposit near Riddle, Douglas County, Oregon: U. S. Geol. Survey Bull. 931-I, 1942. The bulletin describes a somewhat similar nickel deposit.

(5) F. W. Cater, Jr., and F. G. Wells, Geology and mineral resources of the Gasquet quadrangle California-Oregon: U. S. Geol. Survey Bull. 995-C, 1953. The general geology, particularly the geomorphology, of this quadrangle is similar to that of the Red Flats area.

(6) W. D. McMillan and H. W. Davis, Nickel-Cobalt resources of Cuba, U. S. Bureau of Mines R. I. 5099, Feb. 1955. Describes the metallury and geology of the Cuban nickeliferous lateritos.

LOCATION AND ACCESSIBILITY

The property includes all of secs. 18, 19, and 30; W½ of secs. 20, 29, and 32; and the E½, E½W½ of sec. 31, all in T. 37 S., R. 13 W.; S½, S½N½, NE¼NE¼, NW¼, NW¼ of sec. 24; and SE¼, sec. 13, all of T. 37 S., R. 14 W., W.M., Curry County, Oregon. According to the application this totals 4,080 acres.

The property may be reached from U. S. Highway 101 by dirt roads that start at the Pistol River (16 miles) or from Hunter Creek (14 miles). The Hunters Creek road was closed by slides when we were there, and it was necessary to make a 30-mile trip from Gold Beach to reach the property. The dirt roads are one lane and

maintained by logging companies. Snow covers the area in the winter. Rainfall is heavy, and the area not covered by Douglas fir forest and heavy brush is covered by small second-growth pine and heavy brush.

DESCRIPTION OF PROPERTY

According to the application, maps of the property were submitted with the earlier application. We presume there were pencil sketch maps, but we have not seen copies. No copies were available during our visit. A map of a small portion of the property is in Bureau of Mines R. I. 5072. There are 21 churn drill holes and five or six shallow trenches on the property; a 40-foot shaft, now caved, is in the Bureau area; there are a number of auger holes, sampled only for mercury and gold. The applicants have made some minor effort to concentrate gold and mercury on the property, and there is some milling equipment. There are three habitable cabins on the property as well as several other buildings. Except for the area explored by the Bureau this property must be considered as merely a prospect.

Since our visit we obtained enlarged stereo-pair photographs of the area. These photographs and an overlay accompany one copy of this memorandum. A print of the overlay accompanies each other copy of this memorandum.

GEOLOGY

The nickel deposits of the world can be classified as:

(1) Sulfide vein deposits.

(2) Nickel-silicate deposits.

(3) Nickeliferous laterite deposits.

(4) Nickeliferous serpentine rock deposits.

The New Caledonia and Riddle, Oregon, deposits are examples of nickel-silicate deposits. The principal nickel-bearing mineral in both deposits is garnierite, a hydrous nickel-silicate of indefinite composition. The Nicaro and Red Flats deposits are examples of nickeliferous laterite deposits; the nickel-bearing mineral, or minerals, has never been identified, but it is not garnierite. Some of the Riddle ore is of this type. Nickeliferous serpentine rock is present at all the localities mentioned. At Nicaro, it is mined with the laterite in the ratio of two parts laterite to one part serpentine.

Formation of the nickel silicate-type deposits (New Caledonia, Riddle) and the nickeliferous iron-ore type deposits (Nicaro, Red Flats) depended upon two geologic phenomena common to all.

(1) The presence of ultrabasic intrusives such as peridotite or one of the pyroxenites that contain nickel (and cobalt) in either olivine or a pyroxene. The ultrabasic rock may have been altered to serpentine.

(2) The ultrabasic rock must have been suitably exposed to chemical weathering in such a manner as to reduce the removal of weathering products to a minimum. A peneplain surface, formed in a warm, humid climate, seems to be the best place for these nickel deposits to form. Riddle appears to be the only known example in this area. It is on a remnant of the Klamath peneplain (Late Miocene in age). Weathering on strath, or other erosion surfaces, may also produce nickeliferous soils, as is the case at Red Flats, but weathering on such surfaces can never be deep. The weathering products are readily removed, and for that matter the surfaces themselves destroyed.

According to Libby (p. 21), "Red Flats is not a large nearly flat area, as might be assumed from its name. However, as compared to most of the surrounding area, which is rugged and steep, it is relatively flat and undissected with a relief of two hundred or three hundred feet...Red Flat is well below the summit ridges which are remnants of the Klamath peneplain at an elevation of about 3500."

The top of the Red Flats ridge, according to the Bureau of Mines report, is about 2,500 feet, considerably below the Klamath surface. There are also slightly lower benches and shoulders below the ridge top representing periods of still stand younger than the Red Flats ridge.

Weathering in the Red Flats area drilled by the Bureau has produced 0 to 20 feet of laterite with an average probably less than 5 feet. Benches lower in elevation than the drilled area have local pockets of deep soil, but they are largely covered with very abundant float and, in some cases, the underlying rock actually crops out. All of the soil seen is residual.

To summarize these geomorphic aspects, Red Flats is not on the Klamath peneplain but on much younger surfaces. Soil or laterite thicknesses are not great, although they are not everywhere definitely known.

The underlying rock at Red Flats has been described as peridotite or serpentinized peridotite. Much, or most, of the rock exposed has been altered to a serpentine-rich rock; and much of this rock was pyroxene rich.

The olivine and pyroxene of the original intrusive contained minor amounts of nickel and cobalt; alteration of these minerals to serpentine retained the nickel and cobalt in the serpentine-rich rock. According to Bureau assays, this rock probably contains 0.3 to 0.4 percent combined nickel and cobalt (in all cases the Co content is believed to be very much less than Ni content).

Chemical weathering of the serpentine-rich rock has produced a red soil that is somewhat enriched in nickel and cobalt. The nickel-bearing mineral in the red soil is not known, but it is not garnierite. Thus, the metallurgy of these deposits should be similar to Nicaro ore but not to Riddle ore. The nickel grade of this material averages about 1.14 percent.

Bureau of Mines drilling has shown that there is an enriched zone in the serpentine rock along the crest of the Red Flats ridge. This zone averages about 10 feet in thickness and is underlain by barren serpentine rock assaying much lower in nickel. According to drill logs, the grade of enriched serpentine is similar to the red soil (R.I. 5072, p. 16-19). One or two float specimens of serpentine rock with surface films of what appeared to be garnierite were visible and possibly the enriched zone in the serpentine rock may have formed by a concentration of nickel as garnierite by groundwater.

RESERVE DATA

On the basis of the Bureau of Mines drilling it is believed that there are about 600,000 dry tons of laterite assaying 1.14 percent combined nickel and cobalt in the indicated-inferred category. Drilling was done on 500-foot centers.

There are about 2,300,000 dry tons of enriched serpentine rock in the area drilled by the Bureau of Mines that contained about 1.19 percent combined nickel and cobalt. This tonnage is also in the indicated-inferred category. Such material mixed with laterite is used at Nicaro though nickel recovery from serpentine is somewhat less than from laterite.

Additional reserves of red soil, or laterite, are on lower benches and shoulders. The depth of weathering, however, should be less than on the upper surface already drilled. It is judged that the total area of such benches (without maps this depends on a visual inspection) would be less by perhaps one-fourth or one-third than the area already drilled. (See photograph and overlay.)

It would seem then that further exploration might not be able to double the present laterite reserve figure. In other words, a hasty reconnaissance would indicate the possibility of about a total of 1,000,000 tons of laterite in the area.

The owners, particularly Mr. John Walsh, are certain the property is a potential producer of mercury and gold. This is in spite of the fact that no gold was detected by the Bureau of Mines in drill-hole samples and that the Oregon Bureau of Mines and Geology and the U. S. Bureau of Mines have assayed Red Flats samples for mercury with essentially negative results.

EXPLORATION OF THE PROPERTY

We were unable to find out how the applicant proposes to explore the property. The company wants to explore by bulldozer trenching and auger holes at least five different benches and, we think, the area already drilled by the Bureau. As Mr. Walsh said, they were just prospectors and were quite "amenable" to suggestions from the Government.

Following are what we consider to be the necessary steps in evaluating this property.

(1) Prepare a topographic and geologic map of the high elevations of this property which are underlain by periodite. This would be possible, assuming a competent plane-table man, in 3 to 4 weeks. Map scale should be 500 feet to the inch. Soil samples should be collected during mapping, and hand-shovel test pits dug to see if soil is more than about 2 feet deep.

(2) If soil samples and preliminary pits warranted, benches could be drilled by jeep-mounted auger along longitudinal and cross sections at fairly wide intervals. Drilling on a close grid would seem to be development and not warranted. The extent and costs of this drilling could be estimated only after further geologic information is available.

(3) If so desired, there could be redrilling of the area explored by the Bureau, but we doubt that this would greatly change the present estimate of grade and tonnage, and there would be little or no justification for Government participation.

The applicants have apparently made no concerted attempt to prospect the property. Geologists from a number of companies have visited the property thus encouraging the applicant. We read a letter, dated in April 1955, from George W. Rust of Bear Creek Mining Company, requesting claim maps--for the second time--so that an option could be

prepared. This, of course, greatly encourages the applicant, but it has not encouraged the company sufficiently to employ a consulting geologist or otherwise systematically prospect the property.

METALLURGICAL PROBLEMS

Two metallurgical processes have been developed to treat nickeliferous iron ores. The reducing roast-ammonia leach process is used to treat the Cuban laterite-serpentine ores and would probably be technically satisfactory for the Red Flats ore. The principal drawback both here and in Cuba is the deleterious effect of excessive serpentine. At Nicaro a ratio no greater than one part serpentine to two parts laterite provides optimum nickel recovery; larger amounts of serpentine cause operational difficulties. This is the only process that has been successfully operated on a production basis to recover nickel from laterites.

The Bureau of Mines conducted metallurgical tests on the Red Flats ore to determine whether the selective reduction process developed for Riddle and Cle Elum ores would be applicable to the Red Flats ore.

The tests are described in detail in R.I. 5072 (p. 8-15), the concluding paragraph of which reads, "The results of the test indicate that it is technically feasible to recover a low-carbon ferronickel product from the Red Flats nickel ore. For a commercial operation a grade of ore considerably higher in nickel than the sample tested is indicated."

The test sample was a mixture of laterite and serpentine in the approximate ratio of 9 to 1. The nickel content averaged about 0.8 percent, or about 0.3 percent lower than the average grade of the deposit. Iron content, because of the high laterite-serpentine ratio, was fairly high, about 29 percent. Serpentine will normally run less than 10 to 15 percent iron.

In order to determine what grade of ore might be considered commercial, Lloyd H. Banning, chief, Branch of Pyrometallurgy, and director of the Red Flats research, was asked for an opinion. His reply states: "It is my opinion that a grade of ore containing less than 1.5 percent nickel is not a commercial ore at the present time if only the nickel is to be recovered from the ore in the ferronickel product, containing 25 percent or more nickel. However if the ore contains appreciable amounts of iron, recent tests at Albany have indicated that a low nickel, about 4 percent alloy, can be recovered from the ore which would have value for its iron and nickel content. These tests were made on Cle Elum ore. Apparently, part of the Red Flats nickel ore also contains appreciable percentages of iron. It may be feasible to produce a nickel-iron alloy containing 6 to 8 percent nickel

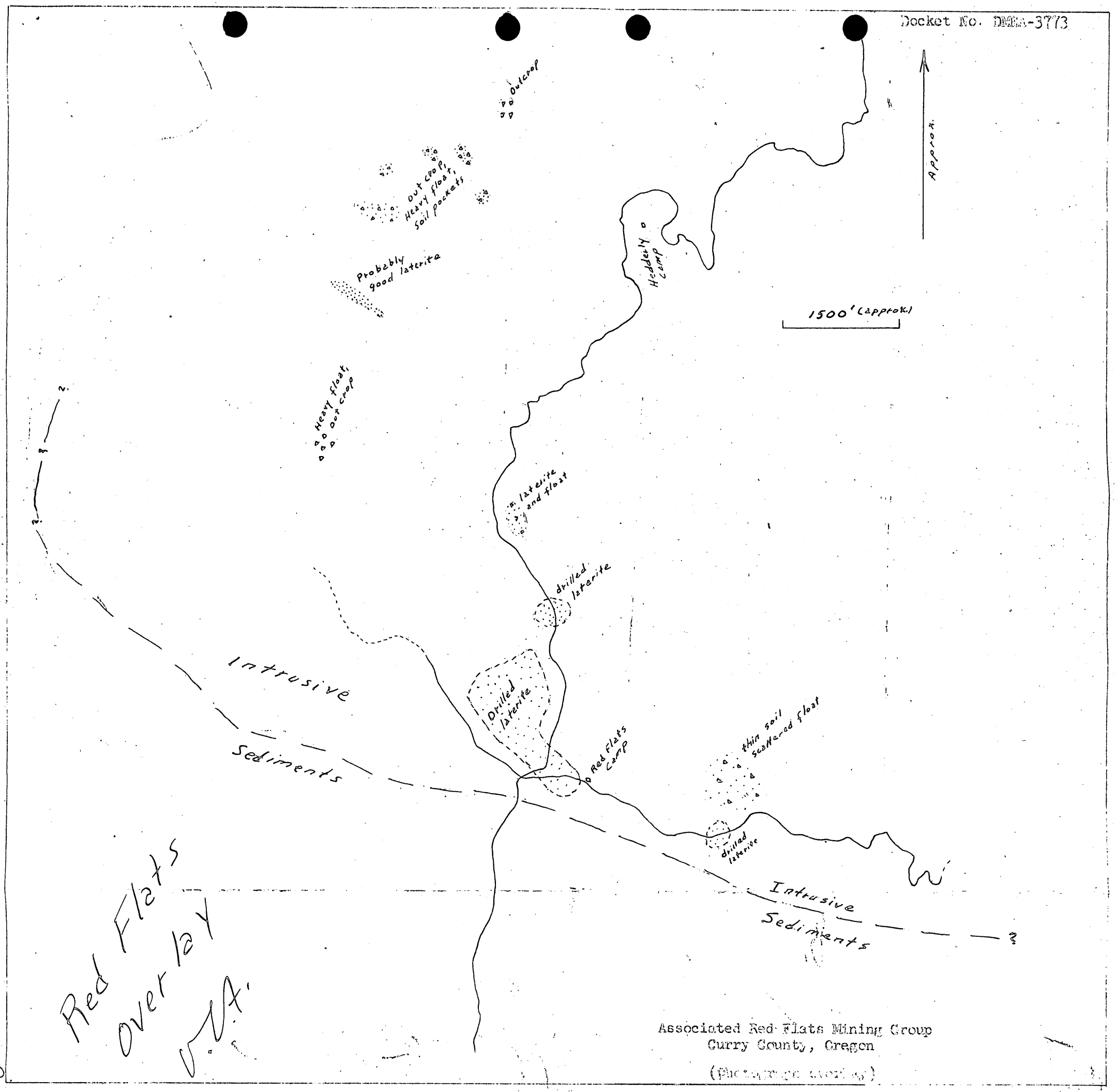
and less than 1 percent chromium which would be valuable in the production of low nickel alloy in either the open hearth furnace or the electric steel making furnace. The minimum nickel content of an ore for producing such an alloy should be not less than one percent nickel and probably not less than 25 percent iron." The value of such an alloy would be 77 cents per pound of contained nickel plus $32.00 per ton for the iron.

The Red Flats ore cannot meet specifications for the low nickel alloy, because of the low iron content of the serpentine. The laterite would be acceptable but is relatively scarce in terms of the tonnage needed to amortize even a small electric furnace.

Enclosures(2* photographs and overlay w/1 copy)
(overlay only with the other copies)
Distribution:
DMEA(4)
USBM(5)
USGS(SRO)
Docket
Fryklund

*Being forwarded under separate cover.

Docket No. DMSA-3773



Associated Red Flats Mining Group
Curry County, Oregon

(Photographer unknown)

DOCKET
SURNAME

400
Rutledge
Davis
Selfridge
Kiilsgaard
Hedges
E Johnson

APR 22 1955

Associated Red Flats Mining Group
c/o Mr. E. Walsh
Box 359
Coos Bay, Oregon

Re: Docket No. DMEA 3773 - Michal,
Platinum, Tin, et al.
Red Flats, et al. association claims
Curry County, Oregon

Gentlemen:

Reference is made to the above-docketed application for exploration assistance which has been reviewed by the Iron and Ferro-Alloys Division of the Defense Minerals Exploration Administration and referred to Mr. A. E. Weissenborn, Executive Officer, DMEA Field Team, Region I - Northwest District, South 157 Howard Street, Spokane 4, Washington, for review and possibly a field examination of the property.

Any assistance that you can render the members of the Field Team will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

FARutledge:fec
4-22-55
cc to: Docket
Code 400
Adm. Reading File
Operating Comm.
FT. REG. I - NWD
H. W. Davis, USBM
T. H. Kiilsgaard, USGS

400

DOCKET
SURNAME
Rutledge
Davis
Hedges
Kiilsgaard
Selfridge

APR 22 1955

Mr. A. E. Weissenborn, Executive Officer
DMEA Field Team, Region I - Northwest District
South 157 Howard Street
Spokane 4, Washington

Re: Docket No. DMEA 3773 - Nickel,
Platinum, Tin, et al.
Associated Red Flats Mining Group
Red Flats, et al. association claims
Curry County, Oregon

Dear Mr. Weissenborn:

Reference is made to the above-docketed application for exploration assistance that is being referred to your office for review and a field examination of the property if required.

The subject property was the object of a prior application for exploration assistance by the same applicant under Docket No. DMEA 3052. This application was denied by letter dated June 23, 1953.

For your information we are enclosing copies of the following:

1. Letter dated March 7, 1955, from J. A. Walsh to Mr. William E. Walsh.

2. Letter dated January 25, 1955, from J. A. Walsh to Mr. Wing G. Agnew, Bureau of Mines.

3. Bureau of Mines Report of Investigations 5072: "Preliminary Investigation of the Red Flats Nickel Deposit, Curry County, Oregon" by R. J. Sundhoussen, J. R. McWilliams, and L. H. Banning, with comments and notations by the applicant.

4. Relevant memorandum dated April 20, 1955, by H. E. Nelson, Geological Survey.

Sincerely yours,

George C. Selfridge
Chairman, Operating Committee (JHB)

Thor H. Kiilsgaard (JHB)
Member, Geological Survey

Enclosures

APPROVED:

J. H. Hedges (JHB)
Member, Bureau of Mines

FARutledge:foo
ec: Docket
Code 400
Adm. Read. File
Oper. Comm.
FT. REG. I NWD
H. W. Davis, USBM
T. H. Kiilsgaard, U.S.G.A.

4-22-55

R.C.H.

Dorbert

IN REPLY REFER TO:

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 21 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Copy retained 400

April 20, 1955

Re: DMEA-37~~67~~ 73
Associated Red Flats
Mining Group
Curry County, Oregon
$47,750
Nickel, platinum, cobalt, tin

Memorandum

To: W. S. Martin, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of an application (Second)

This the second application of the Associated Red Flats Mining Group of Coos Bay, Oregon, is concerned with the exploration of a 4080 acre tract in Curry County, Oregon. Mr. W. E. Walsh of Coos Bay represents the Group, a partnership.

A similar application (DMEA-3052) was filed for the Group in May 1953, by Harry Hedderly of Gold Beach, Oregon. The 1953 application, which asked for a loan of $77,945, was denied June 23, 1953.

Since that time Report of Investigations 5072, Preliminary Investigation of Red Flats Nickel Deposit, has been issued by the U. S. Bureau of Mines and the applicant justifies the new request by the information in that report. Neither application sets forth an itemized program and it is not possible to do more than compare the figures in the "Estimates of Cost."

	Application of: 1955	1953
6(a) Independent contracts	None	None
6(b) Labor, supervisor, consultants	$23,500.00	$41,100.00
6(c) Operating materials and supplies	4,000.00	5,900.00
6(d) Operating equipment	15,750.00	19,900.00
6(e) Rehabilitation and repairs	2,000.00	5,545.00
6(f) New buildings, improvements, installations	None	None
6(g) Miscellaneous (See 6(e))		
6(h) Contingencies	4,500.00	5,500.00
Total Estimate of Costs	$49,750.00	$77,945.00

No new information is supplied by the new application which would tend to change the conclusions of the Report of Investigations but a belief persists that by testing a much larger part of the 4080 acre tract much more nickeliferous material would be proven and the status of the project advanced, perhaps to the point of economic feasibility.

Two types of nickeliferous material were found: (a) nickel-rich laterite and (b) nickel-rich serpentine. As stated in the Report of Investigations, 5072, the drilling did not delimit either type of material. (R. I. 5072, Pages 4, 7 and 15.) "The results of the 72-hour continuous test indicated that the selective smelting procedure developed by the Bureau for recovering nickel from siliceous nickel ores is applicable to the ore from the low-grade Red Flats deposit." (R.I. 5072 Conclusions, page 15.)

To determine more conclusively whether or not other significant areas of nickeliferous material exist in the large property will probably require further boring and drilling. To indicate if and where such testing should be done a field team report is needed. I recommend referral of the application to the Field Team.

N. E. Nelson

N. E. Nelson

April 15, 1955
Subject: DMEA 3773
Re: Exploration Assistance
Red Flats

Associated Red Flats Mining Company
C/o Mr. Wm. E. Walsh
Box 359
Coos Bay, Oregon

Gentlemen:

The receipt of your application dated April 11, 1955 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA 3773 and referred to the Iron and Ferro-Alloys Division.

Kindly identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Robert E. Adams, Chief
Operations Control and
Statistics Division

1090 Ingersoll Ave.

J. A. WALSH
Coos Bay, Oregon

Minerals Administration
RECEIVED
APR 15 1955

March 7, 1955

Mr. William E. Walsh
American Bank Building
Coos Bay, Oregon

Dear Bill:

In connection with our new application for a government loan with which to continue exploration work on our Red Flats nickel deposit, I should like to stress the fact that since the Bureau of Mines have already worked out a satisfactory method for recovering nickel from our ore, there are no longer any metallurgical problems involved. Study of the Bureau's Report No. 5072, a copy of which I am enclosing, will confirm this statement.

Our application is being made strictly in accordance with the provisions of the Defense Minerals Exploration Act. We are seeking aid only to prove that we do have millions of tons of commercial grade nickel ore. Once this is done there will be little difficulty in arranging for the proper development of the property. The proposed and, as I understand, approved harbor improvement at Gold Beach would solve all transportation problems, not only for Red Flats nickel ore, but for a number of other highly commercial ores in Curry County.

Regarding the above mentioned report, I should like to point out that the 15 ton sample used in the smelting test was loose, surface material taken from the vicinity of Drill Holes No. 15, 16 and 23, and was of considerably lower grade than the ore encountered to certain depths in two of the drill holes named. To be explicit, samples taken to a depth of 10 feet in Drill Hole No. 15 averaged 1.49% nickel, from Drill Hole No. 23 to a depth of 20 feet 1.63% nickel.

While it is true that a number of drill holes failed to reveal commercial grade ore, it is worth while to note that several were drilled too close to the contact with more or less barren formations, others on outcrops of low-nickel serpentine. This is not stated as a criticism of the Bureau's work. It was merely the result of following a plan which required drilling at exact 500 foot intervals, with little or no advance reconnaisance. However, the assay results from these holes, plus the inclusion of assay results from the marginal depths of others, are reflected in the overall results from the area explored. It is our contention that had certain rock formations been bypassed, and drill holes delimited to the proper depth, a much higher grade of ore would have been indicated.

Only a fraction of the ore body has been explored. Should our application be favored, it is our intention to accurately delimit the nickel-rich areas by preliminary auger drilling, and to confine all exploration to said areas.

Very truly yours,

/s/ J. A. Walsh

4-18-55
Copy forwarded to BM. GS
File 77.

January 25, 1955

Mr. Wing G. Agnew
U. S. Bureau of Mines
1201 North Division Street
Spokane 2, Washington

Dear Mr. Agnew:

I wish to thank you for the report on the Red Flats nickel deposit. Two more copies would be greatly appreciated.

While we do not necessarily agree with the findings of said report, we must admit that as far as nickel and cobalt are concerned on the limited area explored, it represents a job well done. We hope you will accept the commendations of all the claim holders.

Our principal objections are based on the fact that so little was done on so limited an area to establish the presence of other strategic minerals. While we understand that gold is not strategic, we cannot help but contend that gold, platinum and mercury are present in all of the laterite soils in substantial quantities. Traces of tin, monazite and several other important minerals compel all of us to feel that a more complete analysis of future samples is imperative.

I should aos like to stress the fact that there are several hundred acres of deep laterite formations within the boundaries of our claims that have never been explored. These areas consist of benches and more or less closed-in basins lying far below the area upon which your report is based. (Commercial assays of samples from these acreas have always shown greater values in the minerals with which we are concerned). If Paragraph 4, Page IV-12, MINERALS SURVEY-NICKEL, can be used as a criterion, it would seem that we would be fully justified in planning to make a comprehensive survey of said areas.

It is our intention to again seek financial assistance under the provisions of the Defense Minerals Exploration Program. Would you please, therefore, mail the necessary forms, preferably seven sets, for this purpose to the writer.

Thanking you again, I am

Very truly yours,

J. A. WALSH

cc: Mr. Harry Hedderly
Gold Beach, Oregon

4-18-55
Copies made & sent to BM. G.S.
A.F.J.

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

Defense Minerals Administration
RECEIVED
APR 15 1955

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 3773
Metal or Mineral Nickel, Platinum, Cobalt, Tin
Date Received 4-15-55
Estimated Cost $49,750
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Associated Red Flats Mining Group, c/o Wm. E. Walsh, Box 359, Coos Bay, Oregon, a partnership

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract All of Sections 18, 19 & 30, W½ Sections 20, 29 & 32, E½, E½W½, Section 31, Town. 37 South, Range 13 West. S½, S½N½, NE¼NE¼, NW¼NW¼, Sec. 24, SE¼ Sec. 13, Town. 37 South, Range 14 West Willamette Meridian, Curry County, Oregon (4080 acres).

(*b*) State any mine name by which the property is known. Red Flats

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Owners

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property.

(*e*) If you own the land, describe any liens or encumbrances on it None

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. Claim records attached.

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes.

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades.

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. Maps of area previously sent.

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. These facts known to Bureau.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. All available.

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Nickel, platinum, cobalt, tin and other strategic minerals

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc. See exhibit 5(b)

(*c*) The work will start within 30 days and be completed within 12 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. See exhibit 5(d)

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.). None

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. See exhibit 6

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel. See exhibit 6

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be. See exhibit 6

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project. See exhibit 6

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project. None

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes. See exhibit 6(e)

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs. See exhibit 6

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs? Money, use of equipment and contributed labor.

☐ Money ☐ Use of equipment owned by you ☐ Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated April 11, 1955

Associated Red Flats Mining Group
(Applicant)

By J C Falsh

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

Minerals Administration
RECEIVED

Associated Red Flats Mining Group
Gold Beach, Oregon (c/o Wm. E. Walsh, Box 359, Coos Bay, Oregon)

Instruction 1 (d) List of Partners

Al LaChance, Agness, Oregon
G. F. Anderson, Coos Bay, Oregon
LaVern Chesley, Coos Bay, Oregon
J. L. Kingery, Coos Bay, Oregon
Philip Lehl, Coos Bay, Oregon
Ida Matson, Coos Bay, Oregon
Joseph McKeown, Coos Bay, Oregon
George Ross, Coos Bay, Oregon
E. G. Sampson, Coos Bay, Oregon
Harold Savage, Coos Bay, Oregon
Robert Seip, Coos Bay, Oregon
George Spady, Coos Bay, Oregon
George Stout, Coos Bay, Oregon
J. F. Wallace, Coos Bay, Oregon
J. A. Walsh, Coos Bay, Oregon
Wm. E. Walsh, Coos Bay, Oregon
Don Alcorn, Gold Beach, Oregon
Paul Connet, Gold Beach, Oregon
H. Crossen, Gold Beach, Oregon
Edna Hedderly, Gold Beach, Oregon
H. F. Hedderly, Gold Beach, Oregon
John Hill, Gold Beach, Oregon
Albert R. Myers, Jr., Gold Beach, Oregon
George Myers, Gold Beach, Oregon
David Shaw, Gold Beach, Oregon
Mary Smedberg, Gold Beach, Oregon
Grady Younce, Gold Beach, Oregon
George Yost, North Bend, Oregon
Ivah R. Edwards, Portland, Oregon
Charles A. Skinner, Portland, Oregon
Paul Sibley, Portland, Oregon

Associated Red Flats Mining Group
c/o Wm. E. Walsh, Box 359, Coos Bay, Oregon

Instruction 3 (f)

Mining claims held under mineral rights by the Associated Red Flats Mining Group and recorded with the County Clerk, Curry County, Gold Beach, Oregon.

Red Flats Association	Claims	No.	1 to 9 inc.	Recorded	in	Vol.	10
Hunters Creek	"	"	1 to 4 inc.	"	"	"	12
North Fork	"	"	1 to 3 inc.	"	"	"	12
Sunset	"	"		"	"	"	12
Red Rock	"	"		"	"	"	12
South Side No. 1	"	"		"	"	"	12
Bonanza	"	"		"	"	"	10
Red Ridge	"	"		"	"	"	11
Red Boy	"	"		"	"	"	12
No. 23	"	"		"	"	"	12
Black Butte	"	"		"	"	"	13
Cedar Flats	"	"		"	"	"	13
Red "E"	"	"		"	"	"	13

All of the above claims are recorded as listed.

Associated Red Flats Mining Group
c/o Wm. E. Walsh, Box 359, Coos Bay, Oregon

Instruction 5 (b)

Based on the results of the exploration work and tests carried out by the Bureau of Mines in connection with the Red Flats nickel deposit during 1952 and 1953, and on the results of the considerable work carried out by other agencies on the same deposit, the claim holders feel they are fully justified in again seeking financial assistance under the provisions of the "Defense Minerals Exploration Act", with which to continue exploration work.

Since the presence of strategic minerals in substantial quantities has been definitely established, and since only a fraction of the ore body has been explored, it would seem that all agencies concerned with the discovery and production of the so-called strategic minerals should do their utmost to make possible a more intensive survey of the area in question.

It is still the belief of the claim holders, and of the numerous engineers who have examined the property, that the proposed project would prove the existence of many millions of tons of ore containing strategic minerals which can be mined and processed on a commercial basis. The proposed and approved harbor improvement at Gold Beach would solve all transportation problems.

Following is an outline of the proposed project:

1. Build low cost access roads from Forest Service Road, which traverses claims, to claim boundaries at six points. (Approximate distance 6 miles.)

2. Build cat and jeep trails to lateral from access roads wherever necessary to facilitate drilling and sampling.

3. Delimit nickel-rich areas and drill same at intervals of from 250 to 500 feet, using 4" power driven auger through the laterite soils, followed by 3" churn drill to peridotite in place.

4. Sink hand-dug shafts where garnierite is exposed. Also bulldozer pits at occasional intervals to facilitate bulk sampling.

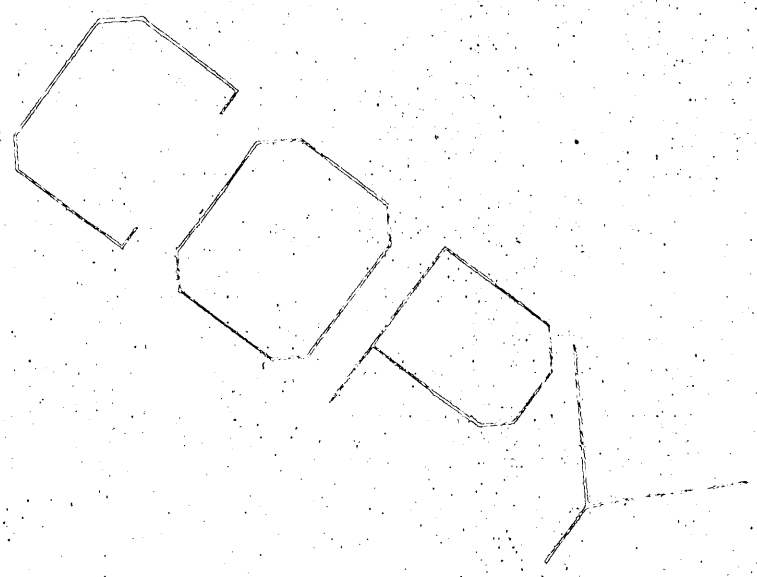
5. Drilled and sampled area to be properly surveyed and mapped.
   (a) All drill holes, pits and shafts to be marked, numbered and indicated on map.
   (b) All samples to be immediately numbered and logged.

Instruction 5 (b) continued

(c) Duplicates of all samples to be properly logged and stored for future reference.

(d) Composite samples to be handled in same manner.

It will be noted that the estimated cost of the proposed project is considerably less than the estimate previously submitted. This is due largely to the substitution of used equipment and to the assumption that the Bureau would participate to some extent in assaying and other technical phases of the operation.



Associated Red Flats Mining Group
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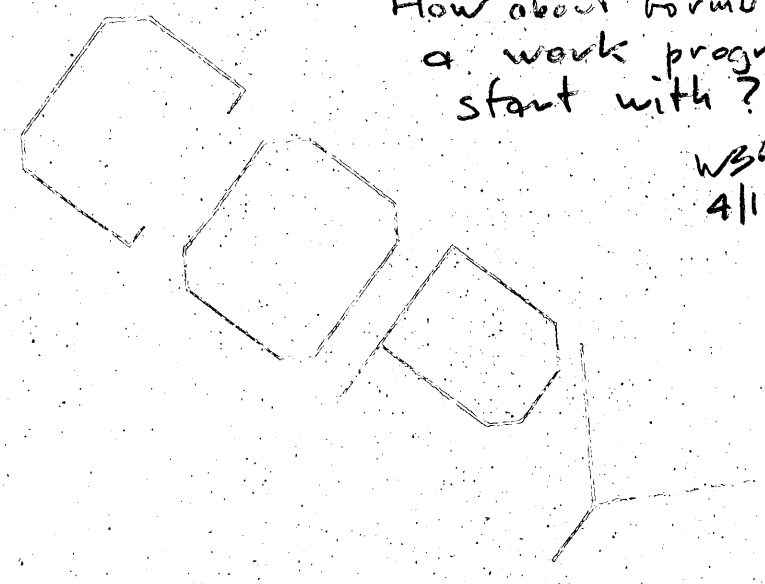
Instruction 5 (d)

Applicants are experienced in all phases of proposed exploration work, including the operation of heavy equipment for any type of mining operation.

How about formulation of a work program to start with?

WEM
4/15/55



Associated Red Flats Mining Group
c/o Wm. E. Walsh, Box 359, Coos Bay, Oregon

Exhibit for Instruction 6 - Estimate of Costs

6 (a) Independent contracts. None

6 (b) Labor, supervision

Labor	18,000.00	
Special engineering and assay fees	3,000.00	
Clerical and legal	2,500.00	$23,500.00

6 (c) Operating materials and supplies

Gas and oil	3,000.00	
Hand tools, drill steel, etc.	250.00	
Gasoline powered water pump w/pipe	350.00	
Additional camp equipment	400.00	4,000.00

6 (d) Operating equipment

Used D6 Cat with blade and drum	7,500.00	
Used 4 or 6 wheel drive truck	1,200.00	
Used pickup truck	800.00	
Used jack hammer (for road work)	150.00	
Auger and churn drill equipment	4,500.00	
Used 160 cubic foot compressor	1,200.00	
Trailer-mounted 300 gallon water tank	400.00	15,750.00

6 (e) Rehabilitation and repairs

Repair and maintenance of equipment	2,000.00	2,000.00

6 (f) New buildings, improvements, installations None

6 (g) Miscellaneous (See 6 (e)).

6 (h) Contingencies

Repairs to existing buildings, powder and fuse for use in road building and shafting, sample bags, necessary travel expense, insurance, telephone and telegraph, freight	4,500.00

TOTAL ESTIMATE OF COSTS $49,750.00

but no estimate of corresponding units of work

WEM 4/15/55