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PLACER MINING IN ALASKA II

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PLACER MINING IN ALASKA II

Placer mining has played a key role in the economic development of Alaska, and hence in the settlement and spread of population. Figure 1 shows the distribution of gold districts, their discovery dates and production in ounces. Although a few of these districts, or camps, are noted chiefly for the production of lode gold, all lode districts have produced at least some placer gold. The widespread distribution indicates the importance of gold mining to Alaska's development.

The government agencies and institutions, and private individuals and organizations that are concerned with mineral production have recognized this and have from time to time published descriptions of placer mining, all of which are applicable to Alaska (see Selected References).

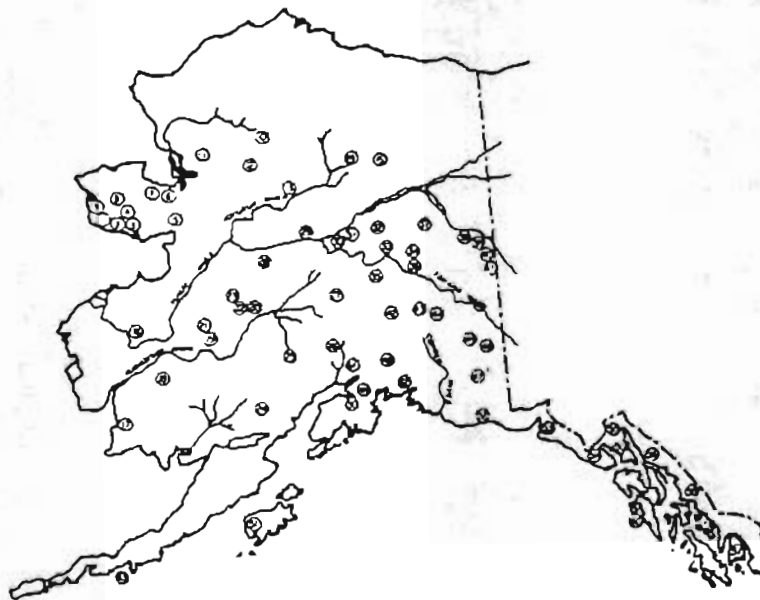
Two early works on Alaska placer mining stand out. U.S. Geological Survey Bulletin 263 by C.W. Purington, Methods and Costs of Placer and Gravel Mining in Alaska, was published in 1905 and contains comprehensive and detailed descriptions of placer mining as practiced during the early gold rushes. U.S. Bureau of Mines Bull. 259, by Norman L. Wimpler, Placer Mining Methods and Costs in Alaska, was published in 1927. This too, brought up to date the state of the art of placer mining in Alaska.

In the mid 1950's, the then School of Mines of the University of Alaska, conducted another survey of post WWII Alaska placer mining. The results were published in U.S. Bureau of Mines Information Circular 7926 by Thomas, Cook, Wolff and Kerns. This work, entitled; Methods and Costs of Operations using Hydraulic and Mechanical Excavation Equipment with Non-Floating Washing Plants, was published in 1959.

Gold mining even at that time was in a long period of economic stagnation, and there was little interest in placer mining research for another fifteen years.

With the end of government control of the gold price, the price began to move up until in real terms it is very favorable. It is obvious that gold is desired very highly and that it should be produced. Interest in placer mining has revived, and the time has again come when the state of the art should be described, perhaps as a prelude to active research and development.

During July, August and September, 1979, a team from the Mineral Industry Research Laboratory visited a number of placer mining districts that could be reached by automobile, hence at a reasonable cost for transportation. These districts yielded varying amounts of information that will be of value to the industry. The districts visited were: 1. Fairbanks, 2. Circle (Birch Creek), 3. Livengood (Tolovana), 4. Manley Hot Springs, 5.



No.	Camp	Gold Production (ounces)	Discovery Date	No.	Camp	Gold Production (ounces)	Discovery Date
1	Nome	5,406,000	1898	29	Gold Hill	1,200	1907
2	Solomon	251,000	1899	30	Mar Springs	441,500	1898
3	Bluff	90,700	1899	31	Rampart	86,800	1882
4	Council	388,000	1898	32	Talroon	571,000	1914
5	Koyuk	57,000	1911	33	Fairbanks	2,464,700	1907
6	Fairbanks (Circle)	119,000	1901	34	Circle (included in Fairbanks production)		
7	Fairbanks (Bismarck)	371,000	1900	35	Chena	45,000	1905
8	Koyukuk	156,400	1900	36	Rutherford	91,000	1905
9	Pan-Oleone	28,000	1898	37	Circle	730,000	1891
10	Nasik	9,000	1898	38	Woodschopper-Cool Creek (included in Circle production)		
11	Kobuk (Sagami River)	7,000	1909	39	Spruce Knob (included in Fairbanks production)		
12	Kobuk (Shungnak)	11,000	1898	40	Fagle	40,700	1895
13	Koyukuk (Furber)	701,000	1910	41	Furber	400,000	1884
14	Noyahuk (Nolan)	790,000	1891	42	Valley Creek	31,000	1901
15	Chandalar	50,700	1905	43	Delta	2,700	
16	Marshall (Aron)	170,000	1913	44	Onychia Quartz	141,000	1898
17	Goodman Bay	29,700	1900	45	Nahant	61,500	1899
18	Kuskokwim (Aron)	230,400	1901	46	Onondaga	44,800	1910
19	Kuskokwim (Cox process)	14,500	1909	47	Milne	141,500	1901
20	Kuskokwim (Hickmory)	173,500	1910	48	Melchior	2,900	1912
21	Iditarod	1,170,000	1908	49	Cinderfoot	173,000	1893
22	Unalakleet	150,000	1906	50	Hopewell (included in Cinderfoot production)		
23	Tahiti	87,200		51	Kadik	4,600	1895
24	Summit (Lake Clark)	1,500	1907	52	Vishayev	53,100	1898
25	Sitka (included in Yareza production)			53	Yareza	2,500	1880
26	Yareza (Castle Creek)	171,700	1903	54	Lucretia Bay	1,700	1894
27	Kanabik	11,000	1903	55	Furber	61,000	1878
28	Ruby	349,100	1907	56	Jurena (Gold Peak)	7,107,000	1880

(Data compiled from U.S. Geological Survey publications, U.S. Bureau of Mines records, Alaska Division of Geological and Geographical Survey records and publications, Mineral Industry Research Laboratory research projects and other sources.)
 *Camps marked with dashed circles appear as official records show no records listed but are known to other sources, some of which are shown in brackets.

Figure 1. Distribution of gold mining districts in Alaska, their discovery dates and production in ounces

Fortymile, 6. Klondike, 7. Kantishna, 8. Yentna. The locations of these mining districts are shown in Figure 2. This field work was funded through the Mining and Mineral Resources Research Institute at the University of Alaska, and it is the purpose of this report to describe the first phase of this project.

Before beginning a visit to a district, an attempt was made to contact at least one miner, or road house keeper or anyone else who could tell miners that the team was coming. On the previous study of this kind, during the 1950's, a questionnaire was used, but during this one, no fixed format was followed. A mining student was attached to the party and it was his duty to make sketches and take notes while the other members were talking to the operator. The results of field work were thus embodied in notes, sketches, and photographs. A number of recent meetings and conferences have been devoted to placer mining, reflecting the renewed interest. It was apparent from these that the most important advances and the greatest interest deal with recovery systems. Hence field work concentrated on these.

The publication which will come out of the field work will describe operations categorized by the methods used to move the gravel and secondly by the type of washing plant. Hence there will be sections on bulldozer, dragline, loader, hydraulic, and ground-slucice mines, among others. Dredging, as was the case in the 1959 publication, will not be described. Complete and detailed descriptions will be made of the various kinds of washing plants, screens, riffles and other components.

In the various districts visited, it was evident that one operator would put into practice a new idea, and that idea would be quickly copied. For example, in the Circle district, sloping grizzlies to remove boulders are popular. In the Fortymile district, steep gradients are used, and shaking screens are evident.

With this report are included a number of typical photographs and sketches. Figures 3 and 4 show the washing plant and cut layout for a mine using a front end loader and small giant to feed the boxes (Mine No. 1). Tailing disposal is no problem at this mine. Figures 5 and 6 show two photographic views of this operation. Figures 7 and 8 show the plant and general layout for a mine using a bulldozer to feed the boxes and a dragline to stack tailings. Figures 9 and 10 show two photographic views of this mine. Figures 11 and 12 show a mine using a shaker screen to size the material going to the sluice, and Figures 13 and 14 again show two views. Figure 15 is a sketch of a mine where gravel is moved to a central hopper by scraper, then conveyed to shaker screen by belt feeder. The sized material is then fed to several oscillating sluice boxes. Figures 16, 17, and 18 show three views of this plant.

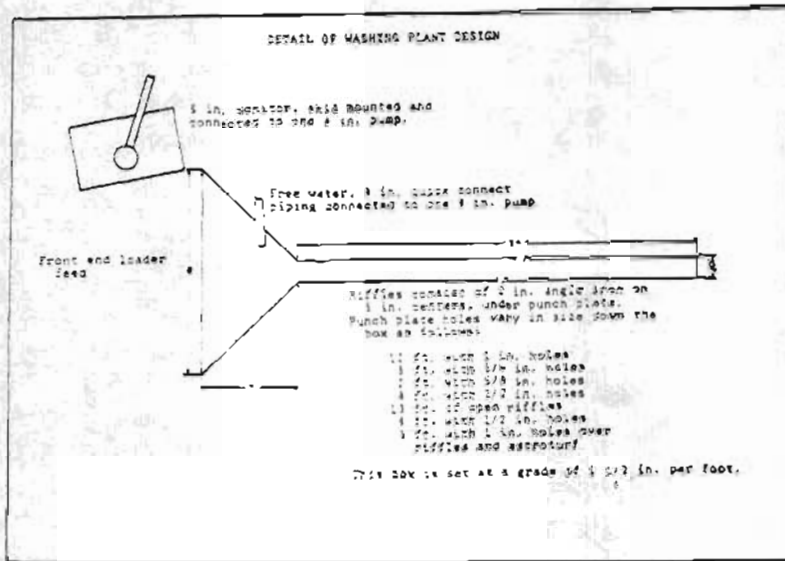


Figure 3. Washing Plant at Mine No. 1

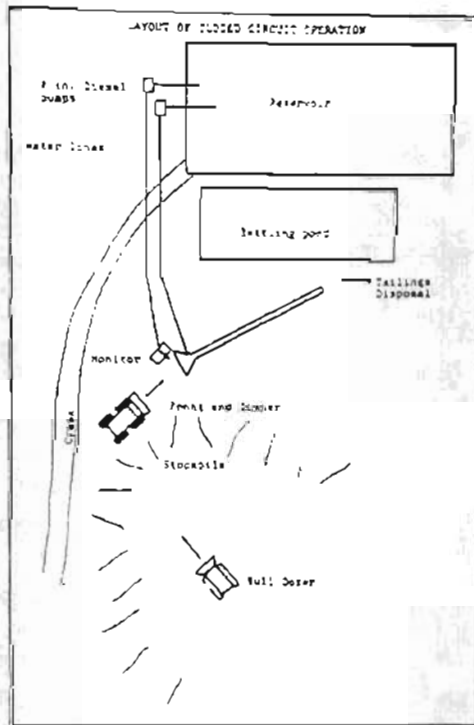


Figure 4. General Layout for Mine No. 1

Figure 6. Return Water Reservoir at Mine No. 1

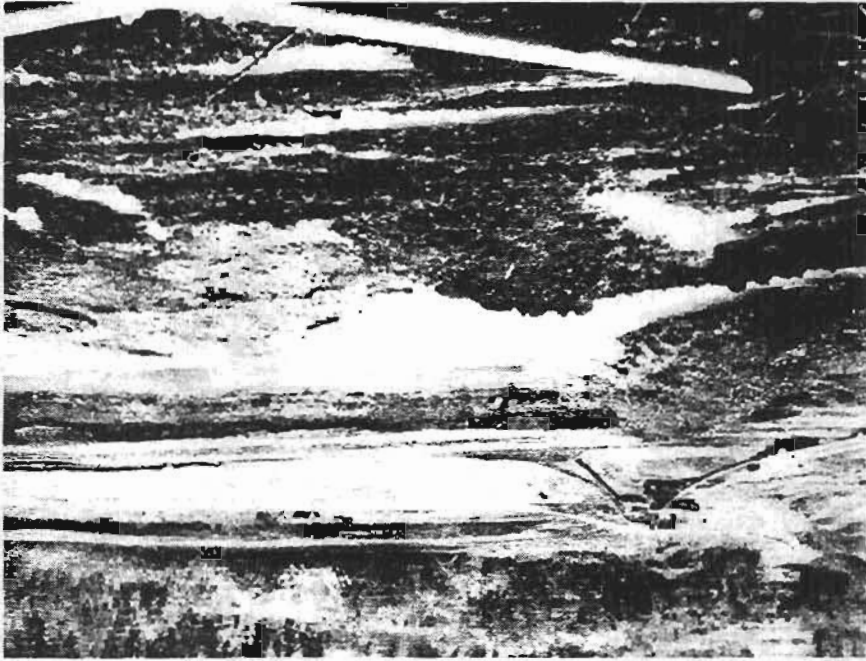


Figure 5. Washing Gravel at Mine No. 1



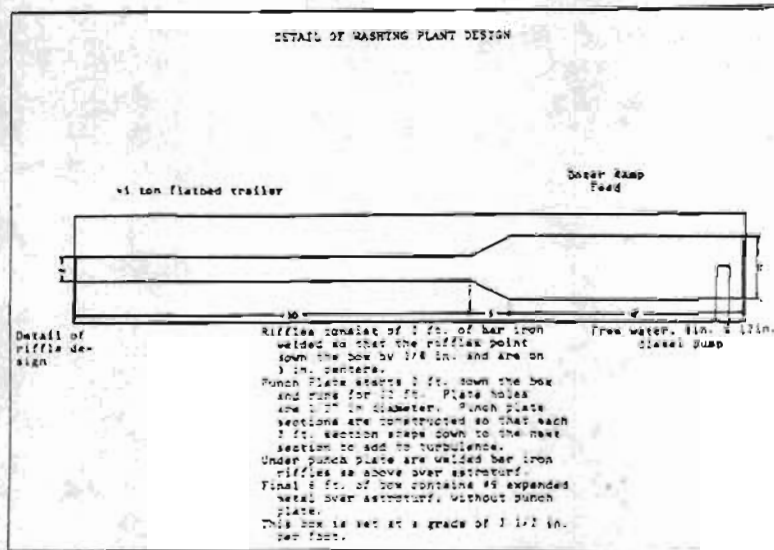


Figure 7. Washing Plant at Mine No. 2

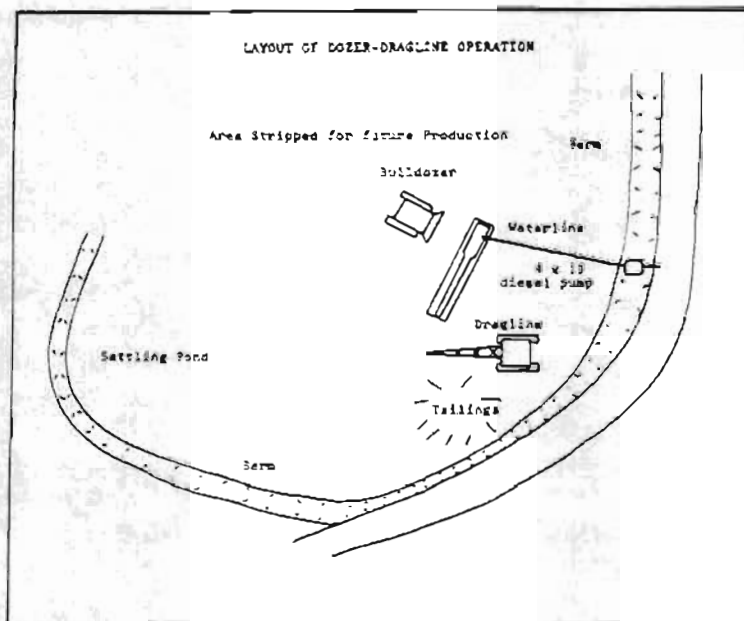


Figure 8. General Layout at Mine No. 2

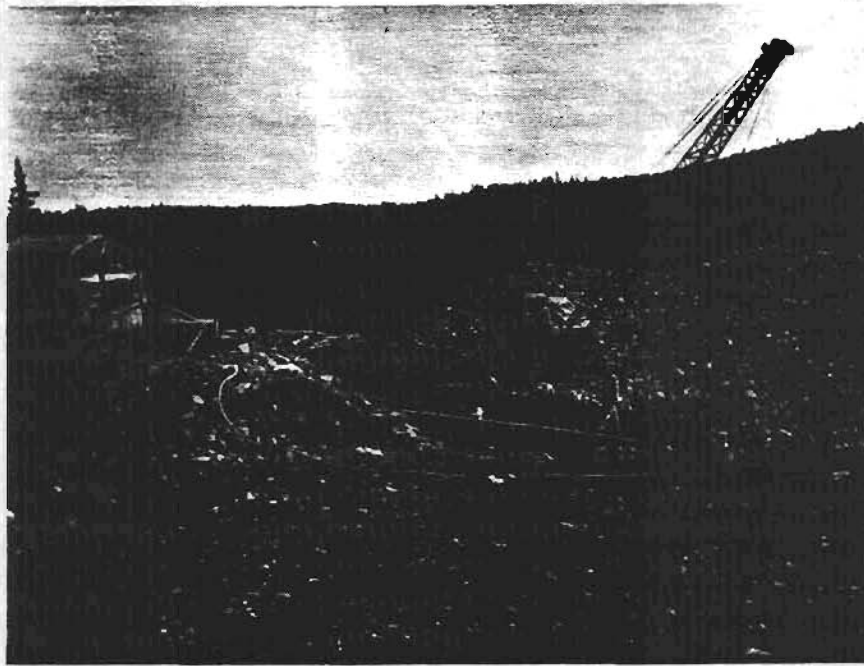


Figure 9. General View at Mine No. 2



Figure 10. Washing Plant at Mine No. 2

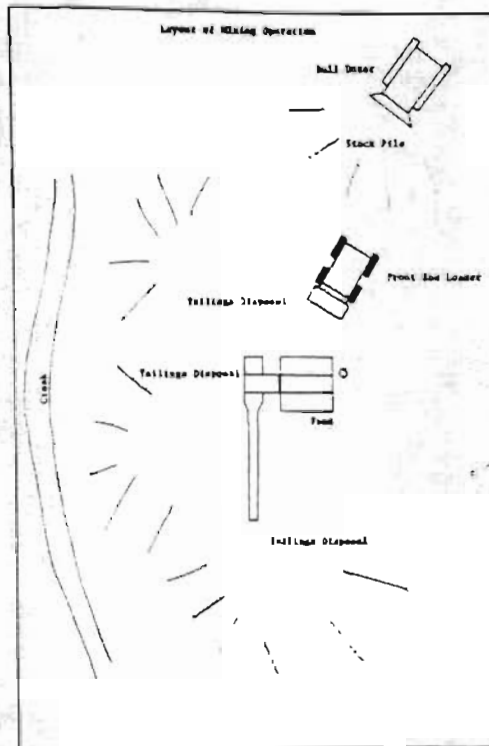


Figure 11. General Layout at Mine No. 3

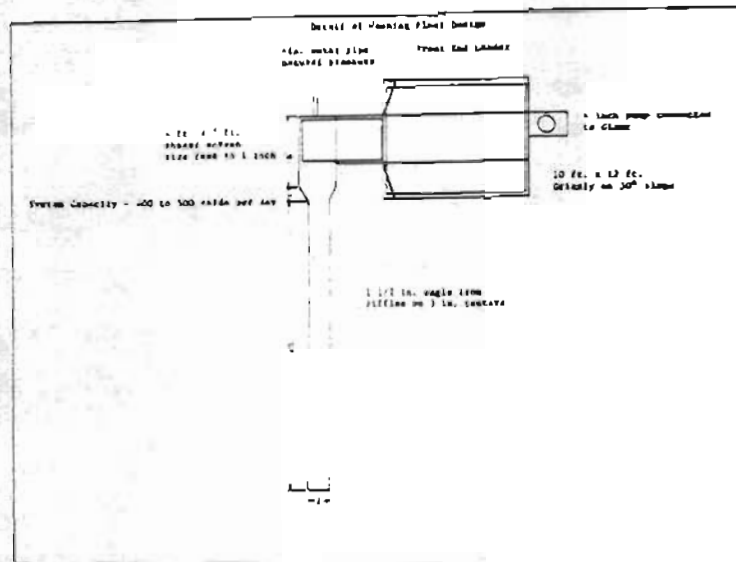


Figure 12. Washing Plant at Mine No. 3



Figure 13. Grizzly-shaking Screen Plant at Mine No. 3



Figure 14. Sluice Box at Mine No. 2

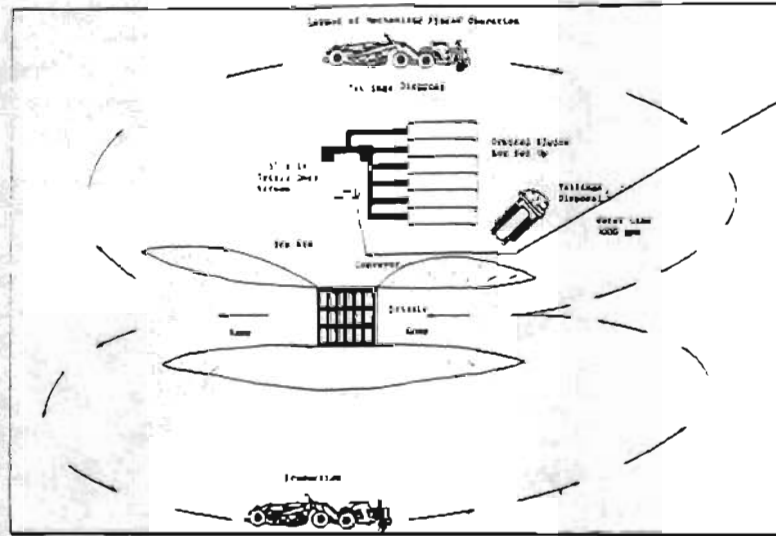


Figure 15. General Layout at Mine No. -

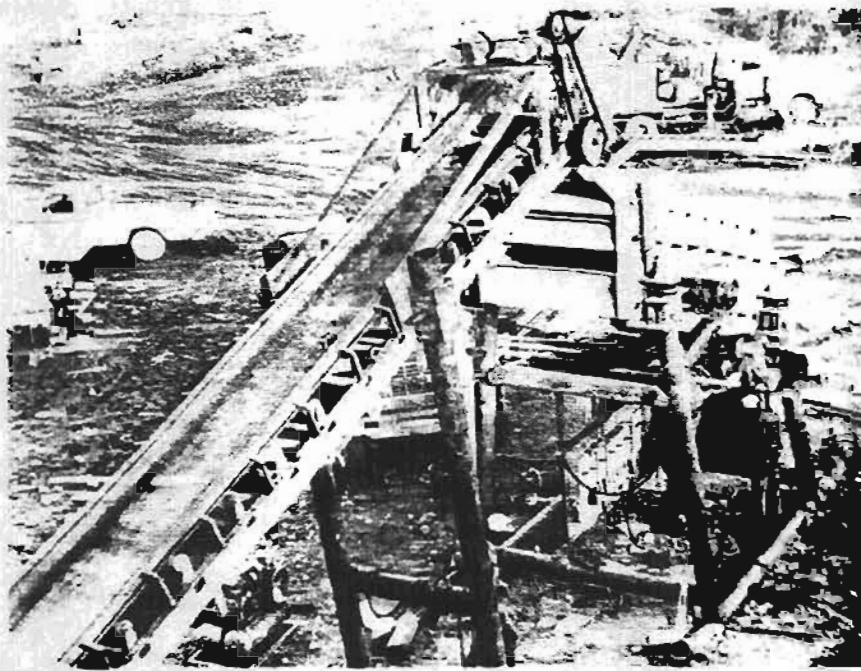


Figure 16. Washing Plant at Mine No. -

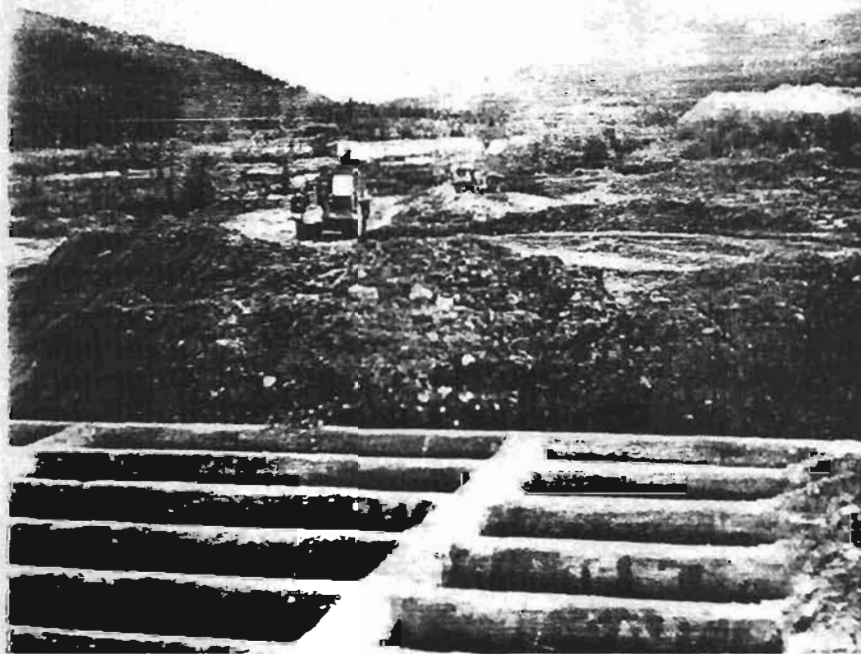


Figure 17. Scraper Moving Gravel to Hopper, Mine No. -

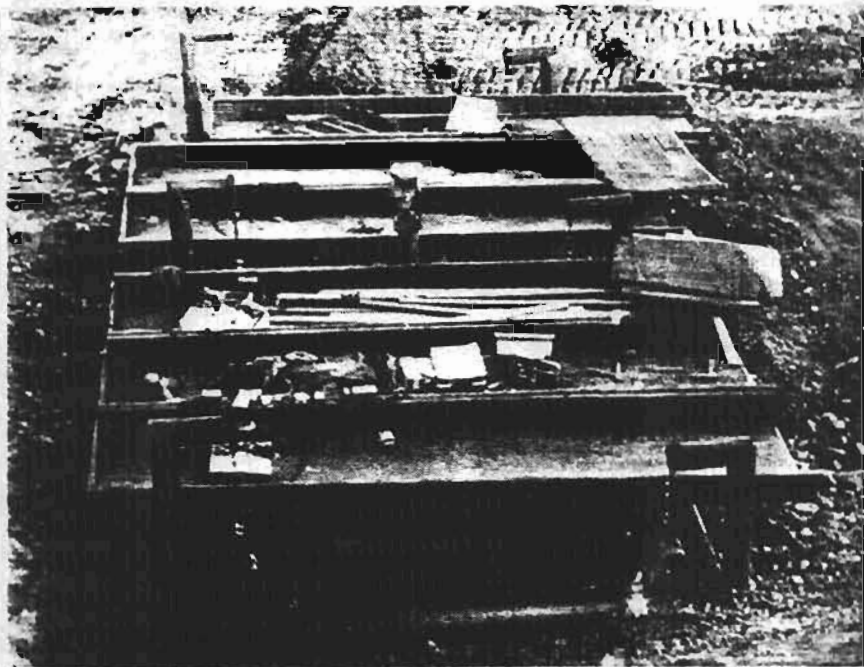


Figure 18. Oscillating Sluice at Mine No. 4

SELECTED REFERENCES

- Adams, John, Zimpter, G.L., and McLane, C.F., 1978, Basin dynamics, channel processes and placer formation: A Model Study: *Economic Geology*, vol. 73, p. 423-428.
- Akhmenov, M.Z., Krasovskii, I.U.F., and Shabokhin, A.D., 1974, Placers of the far north: *Bezopasnost' truda v promyshlennosti*, April, 1975 - No. 1., p. 18-20.
- Anonymous, January, 1936, Gold Mines of Placer County, including Drag Line Dredges: Chapter, Jan., of Report XXXII, 1936 "California Journal of Mines and Geology".
- Anonymous, 1973, Manual for placer mining: Monograph, Moscow, Nedra, 1973, 590 p.
- Baldock, J.W., Hepworth, J.V., and Marengwa, B.S., 1976, Gold, base metals and diamonds in Botswana: *Economic Geology*, vol. 71, No. 1, p. 139-156.
- Bateman, A.M., 1942 and 1950, *Economic mineral deposits*: John Wiley and Sons, Inc., New York.
- Bilibin, Y.A., 1938, *Principles of placer geology*: GONTI-, Moscow-Leningrad, 505 p.
- Blatt, H., Middleton, G., and Murray, R., 1972, *Origin of sedimentary rocks*: Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
- Boericke, Wm.F., 1936, *Prospecting and operating small gold placers*, 2nd. ed., John Wiley and Sons' Inc., N.Y., 1936, 144 p.
- Bouery, P., 1911, Study of riffles for hydraulicking: *Eng. and Min. Jour.*, May 24, 1911, p. 1055-1060.
- Bowie, A.J. Jr., 1885, *A practical Treatise on hydraulic mining in California*, 1885, p. 135.
- Bowie, A.J., 1889, *A practical treatise on hydraulic mining in California*, D. Van Nostrand Company, New York, p. 143.
- Bradley, Walter W., April 1932, *Elementary placer mining methods and gold saving devices. The pan, rocker, and sluice box. Prospecting for vein deposits. Bibliography of Placer Mining; in Report XXVIII of the State Mineralogist, "Mining in California"*.

- in the Richardson mining district, interior Alaska:
in Short Notes on Alaskan Geology: AK. Div. of
Geol. and Geophys. Surveys, Geologic Report 66, p.
29-35.
- Cheney, E.S. and Patton, T.C., 1967, Origin of the bedrock
values of placer deposits: Economic Geol. vol. 62,
p. 852-853.
- Cobb, E.H., 1973, Placer deposits of Alaska: U.S. Geol.
Survey Bull. 1374, 200 p.
- Cockfield, W.E., 1932, The geology of placer deposits:
Trans. Canadian Inst. Mining, Met., vol. 35, p. 83-
84.
- Collins, G.A., 1936, Washing gravels underground at Luck
John: Engineering and Mining Journal, Oct., 1936.
- Collins, Glenville A., Dragline dredging; its application
to the fine gold placers of the Caribou: Min. World,
February, 1945, p. 26-37.
- Cooper, M., 1971, Selected annotated bibliography on the
geochemistry of gold: U.S. Geol. Survey Bull. 1337,
63 p.
- Crampton, F.A., 1937, Occurrence of gold in stream placers:
Mining Journal, vol. 20, p. 3-4, 33-34.

- Van Wagenen, T.F., 1880, Manual of hydraulic mining; Van Nostrand Company, New York.
- Wells, J.H., 1969, Placer examination, principles and practice: U.S. Bureau of Land Management Publication.
- Wertz, J.B., 1949, Logarithmic pattern in river placer deposits: Economic geology - vol. 44, p. 193-209.
- Wilson, E.B., 1918, Hydraulic and placer mining, 3d. ed., p. 230, John Wiley and Sons, New York.
- Wilson, Eldred D. and Fansett, George, R., 1961, Gold placers and placering in Arizona: Arizona Bureau of Mines Bull. 168, p. 124.
- Wimmler, Norman L., 1927, Placer mining methods and costs in Alaska: U.S. Bureau of Mines Bull. 259, p. 11.
- Wolff, E.N., 1969, Handbook for the Alaskan prospector: Mineral Industry Research Laboratory, Univ. of Alaska, Fairbanks.
- Yeatman, J.A., 1904, The pump in Placer mining: Min. and Sci. Press, vol. 88, 1904, p. 226.
- Young, G.J., 1946, Alluvial mining; in Elements of Mining: McGraw-Hill Book Co., Inc., New York, p. 450-496.