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AMERICAN FUELS CORPORATION


**A Review of Coal Reserves
in Utah and Colorado, and
a Placer Gold Occurrence in Nevada**

for

Procon Incorporated
30 UOP Plaza
Des Plaines, Illinois 60016

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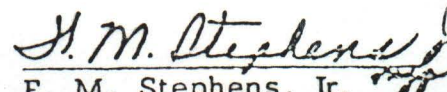

F. M. Stephens, Jr.
Vice President

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INTRODUCTION

NOEL TANNER
RUEBOLD
SALT LAKE CITY

Procon Incorporated requested Hazen Research, Inc., to undertake a review of the reserves of several coal deposits in Utah and Colorado and a gold placer area in Nevada, all owned or controlled by Americal Fuels Corporation. The Hazen investigation was to be made using data supplied by American Fuels Corporation, published information, and from visits to some of the properties.

In every case the visits to the properties were useful. The Colorado coal properties were visited and much information came from conversations with the manager. The Utah coal prospect is not readily accessible but was examined from the air. It was fortunate that the region surrounding this prospect has been studied in some detail by the U. S. Geological Survey. The Nevada placer deposit was visited in late afternoon one day. Since this area is very large, the examination was necessarily of a reconnaissance nature.

American Fuels Corporation personnel and people associated with the individual properties were helpful in providing information and in discussing any aspect of a given property.

Our commission did not involve the investigation of titles nor details of contractual arrangements between American Fuels Corporation and its associates. Every effort was made to establish with reasonable accuracy the boundaries and areas of the several properties where such information was critical for the determination of coal reserves and placer gravel volume.

SUMMARY

American Fuels Corporation has secured, or is in the process of so doing, ownership in a number of mineral and coal properties, only some of which are the subject of this report.

The Osceola placer area in White Pine County, Nevada, contains probably 2 billion (U.S.) cubic yards of gravel within the minable portion of the area held under placer mining claims. The gold content of much of this volume is unknown. Of the total volume, some 250 million yards are within, or close to, areas which have been mined intermittently or prospected to some extent. Subject to verification by systematic prospecting, this area, or portions of it, could be expected to support a profitable operation. At the present gold price of \$150 per ounce and with an operation processing 5,000 yards per day, or more, there should be a large volume of gravel capable of yielding an operating profit of \$1.00 per yard, or more.

The Patmos coal prospect in the Book Cliffs coal field, Carbon County, Utah contains a recoverable reserve estimated to be 120 million tons of excellent quality coking coal. The entire reserve is under a cover of 1,000 feet or more but the size and shape of the leased tract will permit a viable operation which could reach a level of 2 million tons per year if such a market can be generated. This property will require an investment of not less than \$12,000,000 to provide a shaft, development and equipment for production. Utility service, road and railroad spur would be additional.

The Colorado coal properties have a history of modest production and are presently being prepared for greater output. The

Cambridge Mining Company property at Cameo is the more advanced of the two. Here there are recoverable reserves estimated to be over 21 million tons of recoverable coal. Quality is excellent and a ready market for two-thirds of the initial output is a coal-fired generating plant immediately adjacent to the mine.

The other Colorado property, the Rienau mine near Meeker, is not operating at present but plans are being made to put it into operation. This property contains an impressive coal reserve estimated to be 41,600,000 tons recoverable. Quality is excellent. The property suffers a marketing disadvantage for the reason that it is over 40 miles from the nearest railroad and at present there is no significant local market.

OSCEOLA GOLD PLACER AREA

Base Camp
6300 FT
Mine at 7300 FT.

LOCATION AND GENERAL FEATURES

The Osceola Mining District is situated on the western slope of the Snake Range and is about 35 miles southeast of Ely, Nevada. The area is traversed by highway US 6-US 50 which is the major east-west route through the central Nevada-central Utah region.

The Snake Range is typical of the Basin and Range physiographic province which occupies most of Nevada and much of western Utah and which is characterized by north-south trending elongated mountain ranges separated by broad, gravel-filled valleys. The high point of the range is Mount Wheeler, 13,061 feet. The general elevation of Spring Valley to the west is between 5,700 feet and 5,800 feet.

The climate is relatively arid with annual precipitation of about 12 inches or less. Annual temperature range is from around -15°F to over 100°F. Surface mining operations would be possible 9 to 10 months per year. Cold conditions during the December to February period would cause difficulty in operations involving water.

PROPERTY HOLDINGS

By agreement dated September 21, 1973, Noel S. Tanner, et al, conveyed an undivided one-half interest in certain placer claims to E. M. Riebold. The agreement provided that any other claims within a prescribed area would be subject to the agreement when acquired. As of February 26, 1974, N. S. Tanner reported that claims owned, claims optioned, and claims subject to a purchase contract covered approximately 12,060 acres. Figure 1 shows the property

boundaries. Holdings include a fresh water spring called Violet Spring; its flow rate is not known. The property is to be operated by Noel S. Tanner and E. M. Riebold as Operators under a Joint Operating Agreement. DRY

The parties have secured permits to drill five water wells in the valley. To date none have been drilled.

HISTORY

Lode gold occurrences were discovered on the lower slopes of the Snake Range near Osceola in 1872. In 1877 placer mining operations began in the gulches leading from the mountains. From 1877 to 1880 there were reported to be 300 to 400 miners working placer claims. Prior to 1890 a company had built two ditches about 34 miles in length to bring water to the mining area. Operations continued until about 1900 when lack of water caused a virtual shutdown of the district. Since 1900 the district has had a lethargic development with only brief productive intervals. Total gold production through 1959 was 131,700 ounces, 91,555 ounces was from placers, and 40,145 ounces was from lodes.^{1/}

Most of the placer production came from Dry Gulch and Grub Gulch where gravels were mined by a variety of methods, the most productive was probably the hydraulicking done in the 1880's when fairly abundant water was available from the ditch system.

Small scale mining activity has continued intermittently to the present time, much of it being "drift mining" wherein shafts up to 3 feet by 4 feet would be sunk as much as 60 feet in the cemented gravels to reach a "false bedrock" surface, actually a well-cemented

^{1/} Koschman, A. H., and Bergendahl, M.H., 1968, Principal gold-producing districts of the United States: U.S. Geol. Survey Professional Paper 610, p. 200.

gravel layer representing an ancient land surface. From the shafts drifts would be driven on channels or in search of channels in which there would be a concentration of gold values. The gravel ranges from fine to coarse and contains few large boulders. Gravel from the drifts was hoisted to the surface for either wet or dry washing.

There are literally dozens of such shafts in the upper portion of the alluvial fan near the mouths of the canyons draining the Snake Range. Many have stood for years without timber support, testimony to the aridity of the area.

Recently there has been a small scale dredging operation in Section 23. Results of this operation are not available.

GENERAL GEOLOGY

That portion of the Snake Range adjacent to the placer area is composed principally of very old quartzites, argillites, and slates with some minor intrusions of granite ^{1/}. The rocks have been thoroughly fractured. The quartzite series contains numerous quartz veins containing free gold. It is likely that erosion of these outcropping veins has produced the placer deposits in the gulches and in the alluvial fans which have built up in the valley bottoms below the mouths of the gulches. As the fans acquired more and more gravel they tended to coalesce into a single, flatly sloping mass several miles wide and many miles long as can be seen from the photos on page A-1. The fan is probably several hundred feet thick at its base in the valley and would thin progressively towards the mountains.

^{1/} Weeks, F. B., 1908, Geology and mineral resources of the Osceola Mining District, White Pine County, Nevada: U.S. Geol. Survey Bull. 340-A, p. 117-133.

In summary it can be said that the auriferous gravels occupy buried channels which underlay gravels of the alluvial fan but overlay one or more cemented gravel layers which occur at different levels.

Most of the observers of the district report the gold to be relatively fine, however, during a recent visit flakes up to 2-3 mm in diameter were being washed from gravel from about 60 feet below the surface. Johnson ^{1/} reports that some spectacular nuggets were recovered in the early period of operations--1884 to 1892. In 1878 a 24 pound nugget was found; in 1891 one of 53 ounces was reported, and in 1892 discoveries of 35 ounces to 125 ounces are reported, plus one valued at \$6,000-weight not stated.

WATER SUPPLY

A steady supply of water is essential for the operation of a placer operation with any degree of continuity. Surface water in the Osceola area is negligible except during the spring run-off from melting snow.

- As already noted, the Operators have secured permits to drill five wells in the valley. From experience in this and other valleys in the region the probability of finding water in quantity is virtually 100%. The unknown is the rate at which the wells could deliver water over a long period of time. It is assumed that the State would grant water use permits consistent with the well's optimum pumping rates.

STATE WATER DEPT.
CARSON CITY.

^{1/} Johnson, Maureen G., 1973, Placer gold deposits of Nevada: U.S. Geol. Survey Bull. 1356, p. 93-95.

The supply of water will dictate the operating rate for a large-scale, continuous gravel processing operation. A plant design would necessarily include provision for maximum water reclamation.

3054RS @ 600/minute
new well
18/22000

GRAVEL VOLUME POTENTIAL

The valley gravels in Dry Gulch and the alluvial fan sitting along the base of the mountain represent about 10 square miles of gravel cover. In general, this gravel layer will range in thickness from only a few feet in the valleys and along the upper edge of the fan to several hundreds of feet out in the center of Spring Valley. For convenience we have outlined on the transparent overlay of Figure 1 the approximate upper limit of gravel occurrence and the outlines of gravel areas which could be mined without encroaching on highways and main secondary roads. In each such area we have determined an area within the claims controlled under the Tanner-Riebold Joint Operating Agreement. Average thickness used for each of the areas is only a guess since there has been no systematic exploration of the gravels. A tabulation of the estimates follows:

Block	Area		Thickness	Volume
	Acres	Square yds	Yds	Cubic Yards
A	430	2,081,200	5	10,406,000
B	1,530	7,405,200	20	148,104,000
C	2,700	13,068,000	70	914,760,000
D	1,380	6,679,200	20	133,584,000
E	1,900	9,196,000	70	643,720,000
F	1,500	7,260,000	20	145,200,000
	9,440	45,689,600		1,995,774,000

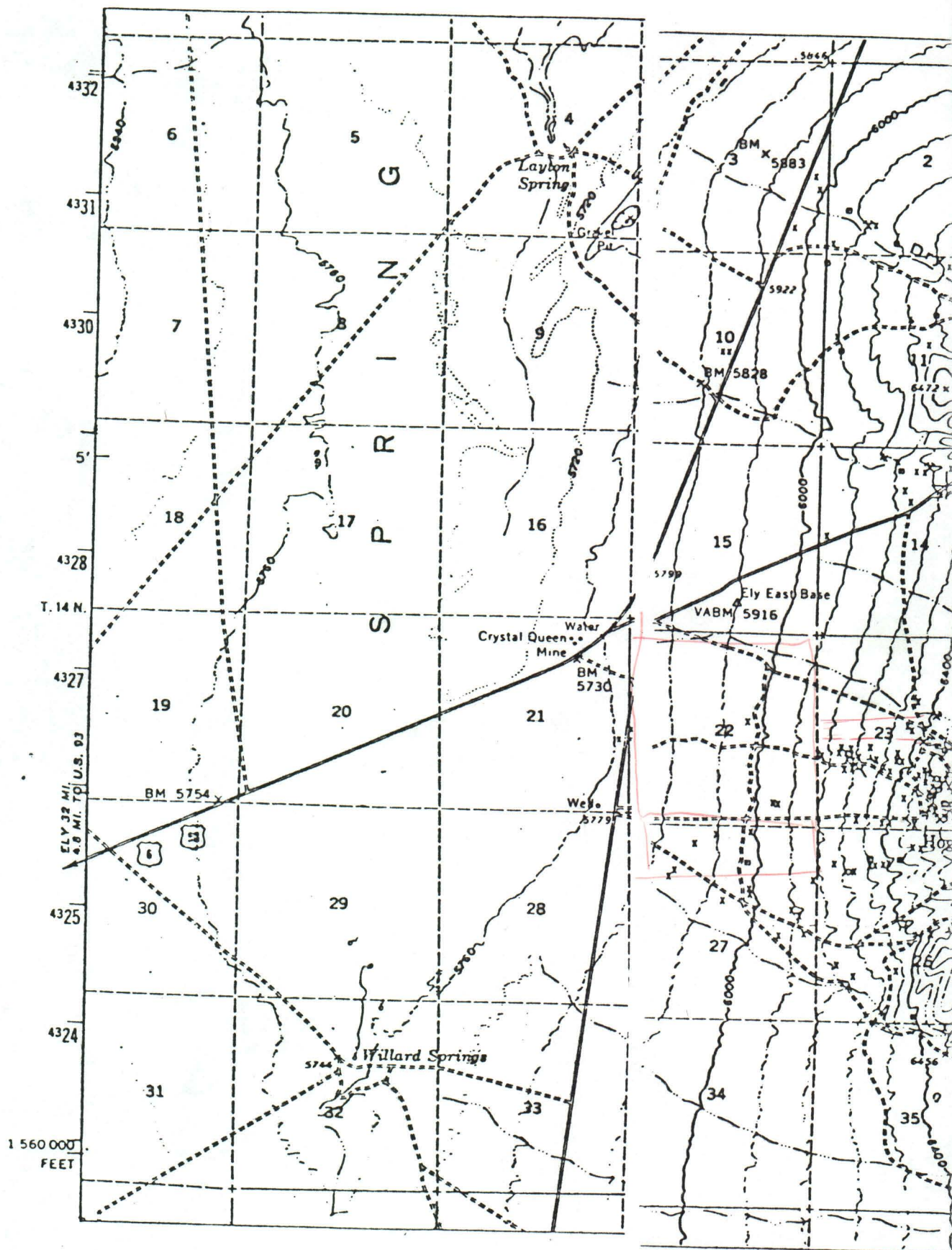
This is an impressive volume of gravel and it could easily be underestimated in the thicker areas toward the middle of Spring Valley.

VALUE POTENTIAL

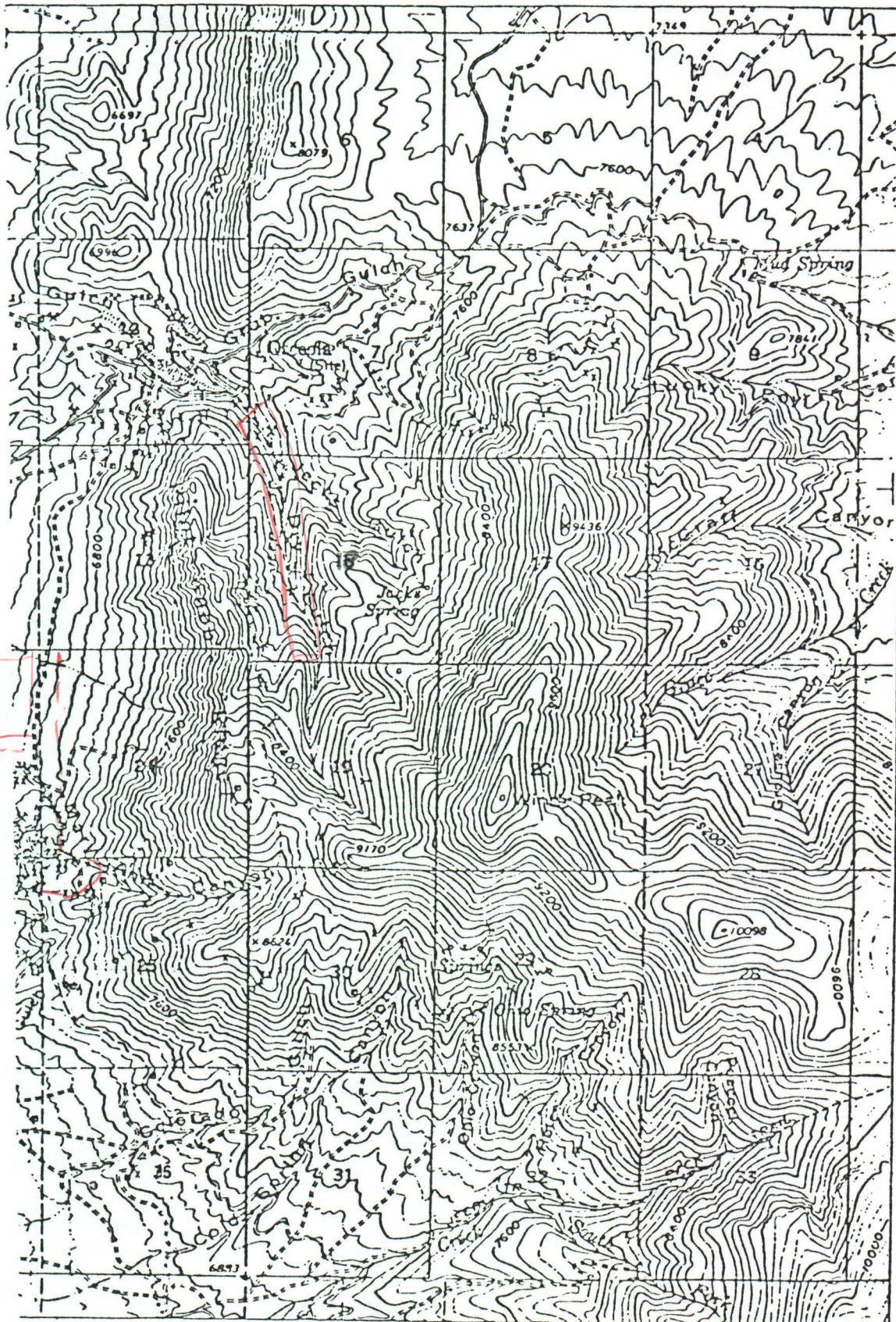
The placer ground has produced gold from several geological environments within the claims and from a fairly extensive area, however, it cannot be said that it has been systematically explored. It is to be expected that gold will be found throughout much of the area but values will vary greatly both vertically and laterally.

Sampling activity in different sections of the property has been reported by several writers. Paul M. Hopkins, in a report to American Fuels Corporation dated January 3, 1974, described a number of samples he took showing a range of from 1.5 cents per cubic yard to \$38.72 per yard using a value for gold of \$100.00 per ounce and assuming the gold product to be 840 fine. Most of the samples came from the Mary Ann and Squeegee claims. Vanderburg ^{1/} reported that old workings in the upper portions of Dry Gulch were sampled in 1-cubic foot lots yielding values ranging from 17 cents to \$8.77 per yard from surface to bedrock as deep as 54 feet. The average depth was 26.5 feet and the average sample value was \$1.32 per yard. In these calculations gold would be at the old price of \$35.00 per ounce. A. F. Frederickson, of American Fuels Corporation, reported that a "Canadian group" had done intensive sampling and had estimated the average grade of the channels (emphasis supplied) should go no less than \$1.70 per yard based on gold at \$40.00 per ounce.

^{1/} Vanderburg, W. O., 1936, Placer mining in Nevada: Nevada Bur. of Mines Bull. 30, p. 169.



FIGURE



23

The data above must be related to the property holdings, gravel volumes, and geological aspects of the various blocks for which volumes have been estimated.

Block "A," consisting of a small volume of valley gravels, will be expected to be relatively rich because of close proximity to the source so that values averaging \$1.32 per yard as reported by Vanderburg are possible.

The upper portions of Blocks "B," "D," and "F" will have gravels of moderate thickness, that is, 10 to 15 yards. Again these areas are relatively close to the source and these areas could be excavated to bedrock without undue difficulty. These areas could be expected to contain values in the ranges reported by Frederickson and Hopkins.

Blocks "C" and "E" contain gravel well removed from the source. Even the fine gold tends to drop out of alluvium within a few miles of the source. These blocks, lying west of the main roads, are 3 miles and more from the source areas. Undoubtedly there will be some gold in these areas, perhaps even local concentrations of minable grade. This area of over seven square miles would be expensive to prospect also.

It appears that the area of greatest potential would consist of Block "A" and roughly the eastern portions of "B," "D," and "F," an area of about 10 square miles and approximately 250,000,000 yards.

Placer mining cannot be highly selective if the operation is to be planned for 5,000 yards per day or more, yet an operation on that scale is required to achieve low costs per yard mined and processed.

Seal Ponds with
Beltaine

At the Osceola, water will be a costly item because of the distances it must be pumped and the lift required. Also, surface restoration will probably be mandatory. At a daily rate of not less than 5,000 yards operating costs will probably be around \$1.00 per yard. It seems likely that a systematic exploration can outline a sufficient volume of gravel in the \$1.50 to \$2.00 per yard range (gold at \$150.00 per ounce) to justify such an operation. However, prudence dictates that the exploration should be done before plant design or construction starts.

EXPLORATION REQUIREMENTS

Mining experience in this area has shown a general concentration of gold at or near bedrock and in "channels" developed on the "false bedrock" surfaces. With nearly 19 square miles of claims to prospect a rapid and relatively inexpensive method of selecting the more favorable areas is necessary. It has been suggested that a program of magnetic and gravity profiling could determine the location and geometry of many of the channels. When channels are located a sampling program can be designed to make a definitive evaluation.

It should be noted that there will probably be some gold contained in pebbles and boulders in the fan and in the gulches. This gold would not be recovered in the usual placer recovery procedures, therefore, in the sampling care must be taken to avoid grinding gravel which could result in "salting" the sample with gold which would not be recoverable in full-scale processing.