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PRINTED: 10-12-2012

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: GREATERVILLE PLACER DEPOSITS

ALTERNATE NAMES:

KENTUCKY  
BOSTON  
EMPIRE  
GRAHAM  
LOUISIANA  
HARSHAW  
COLORADO  
HUMMEL PROPERTY  
HUGHES  
MOHARCH  
WEST REEF

PIMA COUNTY MILS NUMBER: 141

LOCATION: TOWNSHIP 19 S RANGE 16 E SECTION 16 QUARTER SE  
LATITUDE: N 31DEG 46MIN 19SEC LONGITUDE: W 110DEG 44MIN 10SEC  
TOPO MAP NAME: EMPIRE MOUNTAINS - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

GOLD PLACER  
SILVER

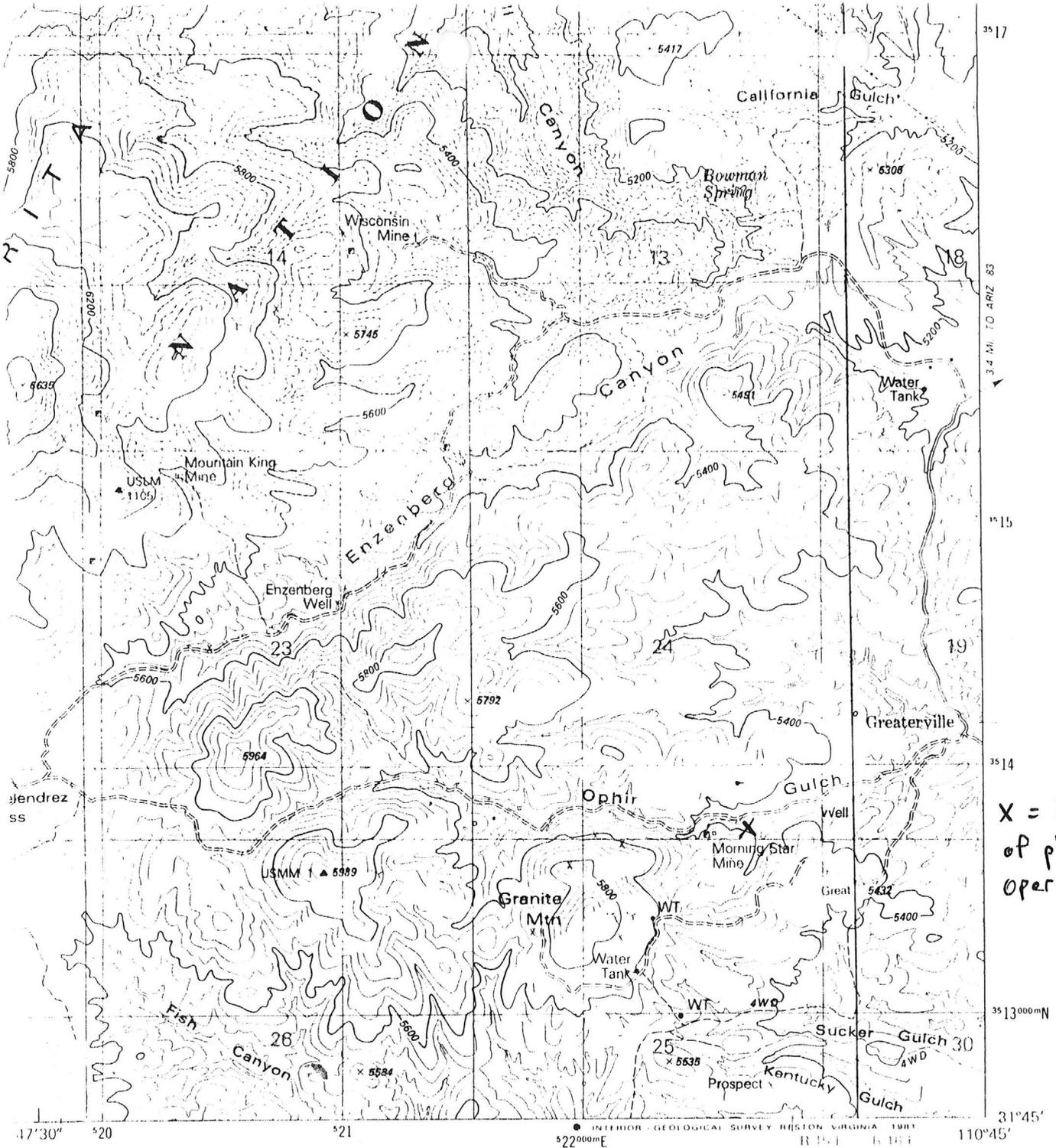
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CONTINUED ON NEXT PAGE

CONTINUATION OF GREATERVILLE PLACER DEPOSITS

IN ARIZONA IN RPT OF THE GOVERNOR OF ARIZONA  
TO THE SECY. OF THE INTERIOR 1899, P. 64-66  
AZ GEO SOCIETY 1992 FIELDTRIP, GEOLOGY GOLD  
PLACERS GREATERVILLE DISTRICT  
CLAIMS EXTEND INTO SECS 28, 33, 34, 35



X = location of placer operation

T195 RISE  
6-1982



ROAD CLASSIFICATION

Primary highway, hard surface	—————	Light-duty road, hard or improved surface	-----
Secondary highway, hard surface	-----	Unimproved road	.....
Interstate Route	—————	U. S. Route	-----
		State Route	.....

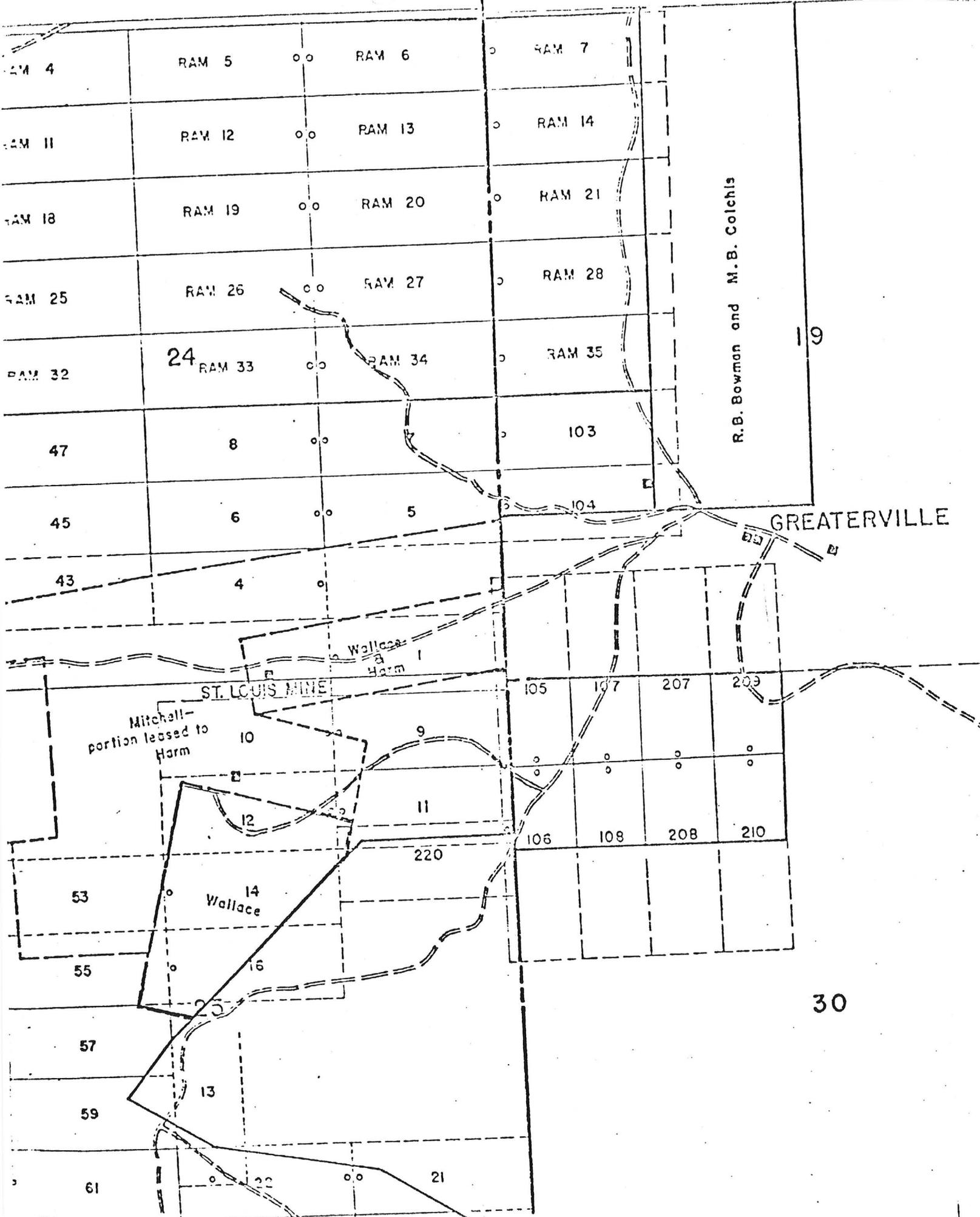
From  
**WIDE WORLD OF MAPS INC.**  
**ARIZ. MAP SHOP & GALLERY**  
Phoenix, Arizona

**HELVETIA, ARIZ.**  
SE/4 SAHUARITA 15' QUADRANGLE  
N3145-W11045/7.5

1981

DMA 3847 IV SE--SERIES V898

(SOUND) NW  
3847 11 NW



Aliso Springs (file) 10/20/78

Arizona Mining Journal, January 1, 1922, p. 24

ABM BUL. 189, p. 121

USGS Bul. 582 p. 158-166.

MILS Sheet sequence number 0040190240 (p. 3652)

Anamax has acquired a portion of the Greaterville placer property. Anamax is entering into an exchange because they need more land for the Helvetia property than can be obtained by patent. KAP WR 5/21/75

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NJN WR 6/3/83: Nick Carruso reported that Ernie Ross is still operating at the Greaterville Placers, Pima County. Values are running about .025 oz. Au per yard of material. About 150,000 yards of placer material is estimated to be there.

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NJN WR 6/1/84: Jim Dau (c) visited and reported he is sampling placer material at R19S R16E Sec 28 and 29 on Ophir Gulch and some tributaries (Greaterville Placers (file) Pima County. He is currently trying to obtain a lease from area land/mineral holders Anamax, U.S. Forest Service and a rancher, Mr. Hummel.

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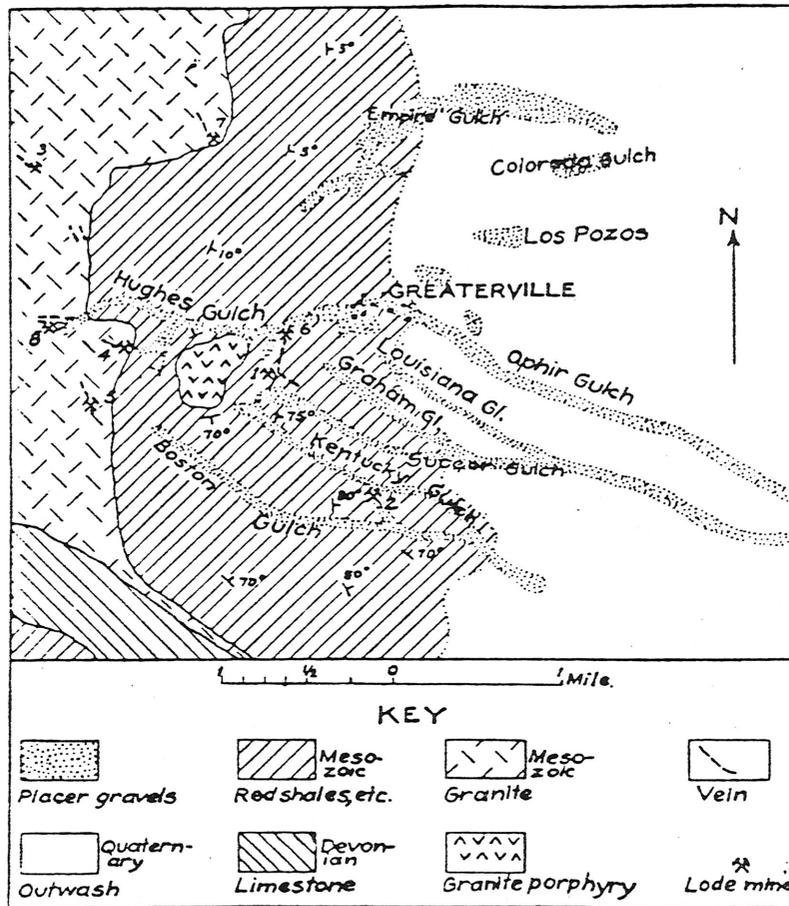


Figure 5.—Geologic map of the Greaterville placer region, after Schrader and Hill, with alterations. Lode mines: 1, Fulton; 2, Harshaw; 3, Mountain King; 4, Quebec; 5, Royal Mt.; 6, St. Louis; 7, Wisconsin; 8, Yuba. Devonian area includes also other Paleozoic rocks.

ground, and also upon the benches, slopes and tops of the ridges, where some of them seem to represent deposits in old stream channels, examples of which occur just south of Greaterville thirty feet above the valley, on the crest of the ridge to the southeast, and on the north side of Hughes Gulch below the mouth of Nigger Gulch fifteen feet above the bottom. They consist chiefly of a two-foot bed of angular gravel which rests unconformably upon the bedrock of all the different older formations contained in the area, including the early Quaternary cement rock. They are covered by one foot to twenty feet or more of overburden composed of later Quaternary and recent gravels and wash. In places, as in Kentucky, Ophir, and Empire gulches, the upturned, irregularly eroded edges of the underlying sedimentary beds form natural riffles, behind which the gold has been concentrated.

The gravels of the gold-bearing bed are generally small, the pebbles, as a rule, being less than an inch in size, though in many places cobbles

four to eight inches in diameter occur. In a few places the gravels are crudely stratified and slightly cemented, generally by lime. They are sharply angular and but slightly water worn. The sand consists chiefly of angular fragments, and many of the particles of quartz and feldspar show well-preserved crystal faces. The coarse material consists chiefly of red and yellow sandstone, shales of various colors, arkose, a little dense white rhyolite, and granite porphyry. The gravels rest in most places on a red-brown clayey matrix which is handled without difficulty by hydraulic methods.

#### Character of the gold:

The gold, which is rather uniformly distributed throughout the bed, is mostly coarse. It ranges from flakes one-tenth of an inch in longest diameter, which was the size of most of the material recovered at the time of the visit in 1909, to nuggets worth a dollar or more. The gold of the early days was all coarse, nuggets ranging from \$1 to \$5 in value being common. Some nuggets brought into Tucson contained from \$35 to \$50 worth of gold, and the largest nugget reported from the camp weighed 37 ounces and had a value of about \$630. The gold averaged about \$17 to the ounce fine, and it was not difficult for a man to take out an ounce a day. The gold, like the containing gravels, is very angular, with many pointed projections, denoting that it is of local origin and has not traveled far. A little quartz adheres to some of it and seemingly also galena, both of which are reported to have been common in the large nuggets. The gold is mostly bright, but some of it is iron-stained and concentrates from panning contain considerable magnetic black sand.

According to L. E. Jones Company<sup>10</sup> of Greaterville, a nugget worth \$228 was found in 1924.

#### Productive gulches: Schrader<sup>32</sup> says:

The productive gulches were Boston, Kentucky, Harshaw, Sucker, Graham, Louisiana, Hughes, Ophir below its junction with Hughes, the upper parts of Los Pozos and Colorado, Chispa on the road from Enzenberg camp to Greaterville, and Empire below its junction with Chispa.

**Boston Gulch:** In Boston Gulch, which heads in the col south and west of Granite Mountain and trends a little south of east, gold was found in paying quantities from its head a point about half a mile south of its junction with Kentucky Gulch at the Kentucky camp. In the upper two miles of its course the gold was found in a channel five feet wide on bedrock, at two to four feet below the surface. Below Harshaw Gulch the gold was still confined in a ten-foot channel in the valley bottom, five to ten feet below the surface. Below the mouth of Kentucky Gulch the valley is wide, and for a half a mile below this point the gold was distributed on bedrock at a depth of ten to sixteen feet for a width of approximately fifty feet.

**Harshaw Gulch:** In Harshaw Gulch, a short, narrow tributary of Boston Gulch with steep bedrock sides, the pay streak, which in places was rich, was confined to the bottom of the gulch, about four feet wide.

**Kentucky Gulch:** In Kentucky Gulch, which heads south-southeast of Granite Mountain and joins Boston Gulch at Kentucky camp, the gold occurs throughout its length on bedrock in a channel six to ten feet wide. At the upper end of the gulch the pay streak lay at the surface, but the covering gradually thickened to six feet at the mouth of the gulch.

**Sucker Gulch:** In Sucker Gulch, which has three small heads southeast of Granite Mountain, the gravels were productive to a point a little below its junction with Ophir Gulch. From its head to the mouth of Graham Gulch the pay channel was six to nine feet wide and three to twelve feet below the surface. Between Graham and Louisiana gulches the pay channel averaged from twenty to fifty feet in width and the depth was from twelve feet at the former to 25 feet at the latter gulch. Below the mouth of Louisiana Gulch the gold was found distributed through

to south-southeast direction, which cuts a sheeting that dips at flat angles eastward. In this granite there are numerous minor faults; one system strikes approximately east-west and the other parallel to the jointing. Some of these fault fissures are filled with quartz; at other places there is little to show their location. A few small rhyolite dikes were noted, their location being shown on the sketch map (fig. 1).

The southern limit of this granite is a fault that brings the granite against Devonian (?) limestone, though here and there a small crop-

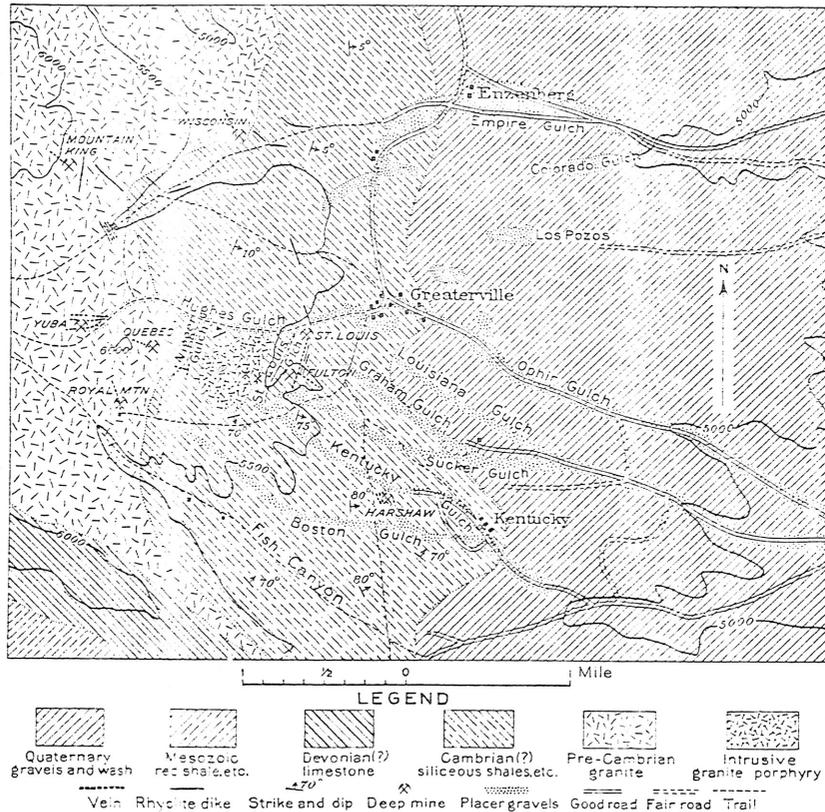


FIGURE 1.—Sketch map of the Greaterville, Ariz., placer camp, showing distribution of dikes, veins, formations, and placer gravels, and the location of deep mines and gulches. Topography enlarged from Patagonia sheet, United States Geological Survey. Contour interval, 500 feet.

ping of what is probably Cambrian quartzite is found between the two. This limestone forms a prominent ridge about a mile south of Fish Canyon (Big Gulch), running southeast for nearly 5 miles, only a small portion of which is shown at the southwest in figure 1. The beds, dark blue-gray, thin and occasionally cherty, dip steeply to the southwest and are not fossiliferous. Their age was suggested by

fossils found in similar limestone about one-half mile south of the center of the area shown.

In the extreme southwest corner of the region covered by the sketch map is a small area of red sandstones and shales of Mesozoic, possibly Cretaceous age. These beds are thin and dip steeply to the southwest.

East of the granite belt is a zone about 2 miles in average width underlain by thin-bedded arkose, sandstone, dolomite, and mudstones or shales. At the north end they dip to the east-southeast at angles of  $5^{\circ}$  to  $10^{\circ}$ . At the south end, along the granite tongue, the dip is from  $70^{\circ}$  to  $80^{\circ}$  NE. In the central part of the area, about the intrusive mass of Granite Mountain, the general structure is very different, the beds everywhere dipping away from the intrusive dome at high angles. The colors in this belt range from almost black, for the dolomites; through dull greens and reds in the quartzites, sandstones, and shales. North of Granite Mountain, where the beds dip at low angles, there is a covering of soil, supporting grass, scrub oak, and a few pines. South of the mountain, where the bedding is almost vertical and there are many gulches, there is comparatively little soil and many exposures of the rock. Small dikes and sills of a dense white porcelain-like rhyolite cut the sedimentary rocks in many places, a few of which are shown on figure 1. The age of these beds is uncertain, but from their lithologic character and their relation to the granite, being deposited on its eroded surface, they have been referred to the Cambrian.

Eastward from the Cambrian belt and covering nearly half of the area of figure 1 is a broad soil-covered area of gravel and wash material of Quaternary age. The contact with the older rocks dips to the east at about  $40^{\circ}$  in almost all places. Where this contact is exposed in the gulches no conformity is shown, as the shales are thin bedded and dip at high angles to the east, while the younger deposit shows an imperfect bedding, dipping at very low angles in the same direction. It is composed of pebbles and cobbles of all the rocks exposed in the region, partly cemented by lime. It is rather white in appearance, as the constituent bowlders are coated with lime. Mr. Coyne states that a shaft was sunk through this deposit about a mile east of the contact for a depth of over 100 feet without encountering any other formation.

Covering the formations of the eastern half of the area there is a deposit of finer gravel and soil, probably of recent age. It overlaps on the ridges the tilted beds of the Cambrian (?) as well as the lime-cemented Quaternary, but has been carried away from the gulch sides to be deposited in their bottoms.

Pesides the rather small rhyolite dikes and sheets there is one intrusive rock of prominence in the area. This forms "Granite

Mountain," a knob that rises to an elevation of 5,500 feet from the general level of 5,000 feet. This hill is about  $1\frac{1}{4}$  miles west-southwest from Greaterville and is a rather conspicuous topographic feature of the region. The granite in hand specimens is white and appears to be made up of feldspar and quartz with a rather large amount of pyrite and a little chalcopyrite widely disseminated through it. It is in some places porphyritic, but more commonly appears granular. In most facies a little biotite is present, but in some of the exposures the dark minerals are absent. The weathered surfaces are yellowish brown and contain casts of pyrite surrounded by brown halos. Under the microscope the texture is seen to be granular to slightly porphyritic. Alteration has gone rather far, chlorite and kaolin being common in all the slides. The minerals in order of their abundance are orthoclase, quartz, plagioclase (usually much altered), and biotite. A little magnetite is present as accessory and pyrite is disseminated throughout the rock.

This knob is entirely surrounded by thin-bedded silicified dolomites and hornfels. The contact is not visible at many points, but where seen in some tunnels on the north side of the hill it was sharp. There was, however, a zone of several feet in which the sedimentary rocks were impregnated with quartz, some calcite, pyrite, and chalcopyrite, the latter two minerals giving a dark-brown cropping stained with malachite and azurite.

#### DISTRIBUTION OF GOLD-BEARING DEPOSITS.

On the sketch map only the location of the placer channels is shown; no indication of their actual width could be made on such a small scale.

#### SITUATION OF DIGGINGS.

The principal diggings are in the bottoms of the gulches, though channels of older gravels are found crossing the ridges or on the sides of the present valleys. Just south of Greaterville and about 30 feet above the present valley there is a small area of high gravel, and northeast of the town a similar deposit is seen on the crest of the ridge. Westward up Hughes Gulch a few small remnants of the high gravels are seen 15 feet above the bottom on the north side of the gulch, below the mouth of Nigger Gulch. This old channel apparently followed a depression along the present drainage way to a point just west of Greaterville, then possibly swung north parallel to the road between Greaterville and Enzenberg and about 200 feet west of it, supplying the values of the west head of Chispa Gulch. The connection between the gravels of Chispa and Hughes gulch is not apparent, as the upper part of Ophir Gulch, west of Greaterville, is barren and no gravels seem to cross it. The intervening gravel-

however, could well have been removed during the erosion of Ophir Gulch, which is one of the larger drainage lines. An east arm of Chispa Gulch, just south of Enzenberg, contains placer gold. This gold was evidently derived from a ledge on the divide between this branch and Los Pozos and Colorado gulches.

#### PRODUCTIVE GULCHES.

The productive gulches were Boston, Kentucky, Harshaw, Sucker, Graham, Louisiana, Hughes. Ophir below its junction with Hughes, the upper parts of Los Pozos and Colorado, Chispa on the road from Enzenberg camp to Greaterville, and Empire below its junction with Chispa.

*Boston Gulch.*—Boston Gulch heads in the col south and west of Granite Mountain and trends a little south of east. Gold was found in paying quantities in this valley from its head to a point about one-half mile south of its junction with Kentucky Gulch at the Kentucky camp. In the upper 2 miles of its course the gold was found in a channel 5 feet wide on bed rock, 2 to 4 feet below the surface. Below Harshaw Gulch the values were still confined in a 10-foot channel in the valley bottom, being 5 to 10 feet below the surface. Below the mouth of Kentucky Gulch the valley is wide, and for half a mile below this point the values were distributed on bed rock at a depth of 10 to 16 feet for a width of approximately 50 feet.

*Harshaw Gulch.*—Harshaw is a short tributary of Boston Gulch. It is very precipitous, heading near Kentucky Gulch. Bed rock is exposed all along and the pay channel was confined to the bottom of the narrow V, rarely over 4 feet wide. In this gulch some very rich gravels were found.

*Kentucky Gulch.*—Kentucky Gulch heads south-southeast of Granite Mountain and joins Boston Gulch at Kentucky Camp. Values were found on bed rock for its entire length in a 6 to 10 foot channel. At the upper end the auriferous gravels were directly on the surface, becoming deeper down the gulch until at its mouth the pay was 6 feet under the surface.

*Sucker Gulch.*—Sucker Gulch has three small heads southeast of Granite Mountain. The gravels in this gulch were productive to a point a little below its junction with Ophir Gulch. From its head to the mouth of Graham Gulch the pay channel was 6 to 9 feet wide and 3 to 12 feet below the surface. Between Graham and Louisiana gulches the pay channel averaged from 20 to 50 feet in width and the depth was from 12 feet at the former to 25 feet at the latter gulch. Below the mouth of Louisiana Gulch the values were found distributed through the gravels on bed rock for a breadth of 100 feet. The overburden at the lower end was excessive, so not a great deal of work was done.

About 10 feet above the present channel there are in a few places in the upper part of this gulch small "bars" of pay gravels. These were evidently accumulated by the stream at some time previous to its present period of erosion and are simply remnants of its old channel.

*Graham Gulch.*—Graham Gulch is a short branch of Sucker heading southwest of the St. Louis mine. The bottom is about 100 feet wide at its lower end, and the pay gravel covered the whole width on bed rock 12 feet below the surface. At its upper end the channel was 10 feet wide and was covered by about 6 inches of soil. Some gravels 15 feet above the present channel on the south side of the gulch were productive.

*Louisiana Gulch.*—Louisiana Gulch heads about one-fourth mile south of Greaterville, is a little over a mile long, and joins Sucker Gulch. At the head values were found almost at the surface, but near the mouth they were 10 to 12 feet below the surface. The channel in this gulch split and reunited, but was generally about 6 feet wide.

*Hughes Gulch.*—Hughes Gulch runs north of Granite Mountain, heading just south of the Yuba mine, 2 miles west of Greaterville. A narrow channel, rarely over 6 feet wide from its head to its mouth, was found productive at 2 to 6 feet below the surface.

*Nigger and St. Louis gulches.*—Nigger and St. Louis gulches are small tributaries of Hughes Gulch. The former is west and the latter east of Granite Mountain. Both of them contain small gold-bearing gravel channels.

*Ophir Gulch.*—Ophir Gulch heads northeast of the Yuba mine but contains no placer deposits above its junction with Hughes Gulch. Below Greaterville a channel 200 feet wide was found to contain values as far as the junction with Sucker Gulch. The bed rock is rather deep and little work has been done here.

*Los Pozos and Colorado gulches.*—The upper 3,000 feet of Los Pozos Gulch was found to contain placer values. This gulch heads about a mile northeast of Greaterville. Colorado Gulch, about one-half mile north of Los Pozos, is a short branch of Empire Gulch. For 2,000 feet near its head some gold was found at no great depth below the surface.

*Chispa Gulch.*—Chispa Gulch is a small branch of Empire Gulch heading southwest of Enzenberg. In the main gulch, about three-fourths of a mile south of Empire Gulch, the highest pay gravels were found. A 5 to 10 foot channel on bed rock, about 10 feet below the surface, was productive and was being worked by Mexicans in the latter part of March, 1909. In an east branch gold was obtained from gravels 3 feet under the surface for a quarter of a

mile from Chispa. The western fork of Chispa Gulch is about 1 mile long. At the head pay dirt was directly on the surface. At the mouth a 50-foot channel on bed rock, with 10 feet of overburden, contained values.

*Empire Gulch.*—Placer gold in Empire Gulch was found only for a mile and a half below the mouth of Chispa Gulch. Near the mouth of the latter gulch the pay gravels were about 300 feet wide, but at the lower end the values were distributed over 1,000 feet. The overburden is 16 feet thick and the pay dirt 2 feet thick on a conglomerate bed rock.

#### CHARACTER OF GRAVELS AND BED ROCK.

The pay dirt is found on bed rock distributed rather evenly through a 2-foot bed of angular gravels in a fine red-brown, somewhat clayey matrix. Some of the gravels are yellow to gray-brown, but these as a rule were not so rich as the heavily iron-stained beds. The conditions were essentially the same in all the gulches, and the thickness of the pay varied little from place to place.

The constituents of this bed are rather fine, usually less than 1 inch in greatest dimension, though in many places cobbles of 4 to 8 inches are found. In a few places the materials of this bed are roughly stratified and somewhat cemented, usually by lime.

The constituent pebbles are very angular and show almost no water wear. Even the sand consists of angular broken fragments rather than rounded grains. The coarse material is red and yellow sandstone, shales of various colors, pebbles of arkose, a few fragments of dense white rhyolite, and a very minor amount of granite porphyry. In Kentucky and Empire gulches particles of quartz and feldspar showing crystal faces were noted, evidently derived from the granite area where these gulches head. These pebbles are held together by a red-brown clay, not very difficult to handle with water.

The depth of this bed varied in the different localities, being almost at the surface in the heads of the gulches and buried to depths of 10 to 20 feet in the lower eastern ends of the diggings.

The Cambrian (?) sedimentary rocks form a perfect bed rock in the upper parts of the gulches. The beds are standing on edge, and their differences in weathering, due to difference in hardness, have formed natural riffles, behind which the gold has been concentrated. In the lower parts of Kentucky, Sucker, Ophir, and Empire gulches the "cement rock" (the Mesozoic cemented gravels) forms the bed rock and its rough surface has acted as riffles. The bed rock in Colorado, Los Pozos, and Louisiana gulches is entirely "cement rock." This shows that the concentration of the gold has been at least later than early Quaternary.

### CHARACTER OF THE GOLD.

Most of the gold from this camp brought from \$16 to \$19 per ounce, that from Louisiana Gulch being the finest. The gold that was washed in 1909 was in rather small flakes up to 0.1 inch in longest dimension. Some of it is rusty, but the largest part is bright. It is said, however, that in the early days of the camp the gold was very coarse and that pieces whose value was \$1 to \$5 were commonly found.

Under the microscope the flakes are seen to be very angular, with many projections which would have been worn off if the material had traveled far. One of the large particles contained a small crystal of quartz completely surrounded by gold. Another showed what appeared to be a little galena with the gold. Mr. Coyne states that in the large nuggets it was common to find this association of quartz and galena with gold.

Concentrates from panning consist of about equal parts of magnetite and light-colored minerals that are apparently quartz and a little feldspar. The light-colored grains are somewhat stained with iron. All this material is angular and a few crystal faces (?) of quartz were noted.

### ORIGIN OF THE GOLD.

The most productive gulches, Boston, Kentucky, Sucker, Graham, Louisiana, and Hughes, all head about the intrusive mass of Granite Mountain. This intrusion, as already stated, is of granite porphyry containing pyrite and chalcopryrite in appreciable amounts. About its base, in the altered, crumpled sediments of the supposed Cambrian, are found numerous quartz veins carrying galena, pyrite, and chalcopryrite, which are reported to have produced surface ores rich in gold and silver. These veins have been opened at the Yuba, Quebec, and St. Louis mines, as well as in numerous other places. They show very similar characteristics in all exposures. A gangue of quartz, with barite in some places, is banded with argentiferous galena, pyrite, and chalcopryrite. These usually form a stockwork in hornfels, quartzites, sandstones, and shales. The ore is in places wide enough to be called a vein.

The surface ores are much iron-stained quartz with scattered patches of malachite, azurite, or yellow earthy cerusite. It is said that several nuggets of native gold associated with quartz and galena were found in the croppings, particularly in the St. Louis vein.

The weathering of these veins and the attendant transportation of the material by the present streams would adequately account for the concentration of the placer gold in the gulches. The gravels between the gulches, however, contain values which could be accounted for

either by sheet wash or by the transportation of the weathered material before the present drainage lines were well established. Concentration by wash from the ridges into the present valleys would further enrich the gold-bearing channels. The complete concentration on bed rock, however, points to frequent movement along the present channels, shaking the gold to the bottom.

The origin of the gold in Los Pozos and Colorado gulches is not so evident, as no ledges have been found on the divide between them and Chispa Gulch. This area is covered by considerable accumulations of wash material, so that prospecting is difficult; and this fact may account for the lack of discoveries of veins in the vicinity. The gold in the west branch of Chispa Gulch may be accounted for either by supposing that the old Hughes drainage turned north at Greaterville to enter the larger drainage of Empire Gulch, or that there are some gold-bearing ledges, not yet discovered, on the divide between this west branch and Ophir Gulch. The validity of the latter supposition is affected by the fact that no values were found in Ophir Gulch above its junction with Hughes Gulch. It is possible, however, that the veins which supplied Chispa Gulch are so far north that none of the branches of Ophir Gulch touch them. The richness of the gravels of Chispa Gulch indicates a rather long period of concentration or very rich primary deposits, and as no veins have been found at its head the former supposition seems the more tenable.

The theory of the origin of the gold from the veins about Granite Mountain is further supported by the fact that in the upper part of Empire Gulch, to the north, and in Fish Canyon (Big Gulch), to the south, no gravels of value have been found. These gulches, the largest in the region, head in the Granite area. There are some few widely scattered prospects in the granite, but the veins apparently carried little gold, except in the Yuba mine.

Furthermore, the fact that the gravels of the placers are largely derived from sedimentary rocks instead of granite shows that the gold did not come from the region west of Granite Mountain.

### METHODS OF WORKING THE DEPOSITS.

Water is extremely scarce in the Greaterville placer district, so the means of working the gravels are limited. Dry washing has not proved a great success, as considerable clay is found in the pay dirt. Rocking has been the chief method employed for the recovery of the values.

Small shafts, usually 2½ by 5 feet in cross section, are sunk through the overburden, where it exceeds 3 or 4 feet in depth, to the bed rock. The gravels next to bed rock and for 2 feet above it are gouged out and hoisted to the surface by crude hand windlasses. In some of the pits seen the gravels for a radius of 20 feet were excavated from one small



115 on

12

SIERRA SANTA RITA GEOLOGY  
and  
GREATERVILLE HISTORY

by  
W. D. Panczner  
Curator of Earth Sciences  
Arizona - Sonora Desert Museum

approx. 1980

The geologic history of the Santa Rita Mountains began over 600 million years ago, when magma intruded into the older regional rocks. During the next 300 million years, most of the Paleozoic Era, the seas crossed back and forth over the region, each time depositing and then exposing the marine sediments to erosion. When the seas finally retreated, the sediments were almost a mile deep.

During the first half of the Mesozoic Era, the region was blanketed with a thick layer of volcanic rocks. This period of volcanism was cycled with periods of erosion. Magma again intruded into the region emplacing several large granitic masses. This emplacement was associated with localized faulting. During the last half of the Mesozoic Era, the region was strongly uplifted. Volcanism occurred again covering a large portion of the region with a layer of volcanic rocks. Eroded sediments soon began to cover portions of the area.

As the Mesozoic Era ended, 65 million years ago, the first of three phases of deformation had occurred with localized faulting and compression. Once again, eroded sediments were deposited in areas within the region. Slowly, these deposits, compressed into solid rock, were folded and deformed. The second and third phases occurred with intrusions of magma into the deformed rock mass causing more faulting and deformation.

As in the past, geologic processes are carving the mountains and changing the landscape, so that what we see today will not be the same in the future.

## GREATERVILLE PLACERS

**Physical Features:** The Greaterville district is in southeastern Pima County, at the eastern foot of the Santa Rita Mountains. The village of Greaterville, in the approximate center of the placer area at an elevation of 5,280 feet above sea level, is about 34 miles in air line southeast of Tucson and 8½ miles northwest of Sonoita, a station on the Nogales-Benson Branch of the Southern Pacific Railroad. This district is accessible by several short roads that branch west from the Tucson-Patagonia highway.

The Santa Rita Mountains, which attain in Old Baldy Peak, 7½ miles southwest of the camp, an elevation of 9,432 feet above sea level, receive abundant rainfall and are well timbered. Although this rainfall varies somewhat from year to year, the average annual amount for elevations of 4,000 to 6,000 feet above sea level is over 14 inches, and for elevations over 6,000 feet is from 16 to more than 20 inches. About 75 per cent of the precipitation occurs in July, August, September, and October, and a large part of the other 25 per cent falls during the winter as snow. The eastward-sloping placer region is dissected by numerous steep-sided, nearly east-west gulches which drain to Cienega Creek and are about 100 feet deep near Greaterville. The only perennial stream of the district is about 4 miles south of the village. Sufficient water for domestic purposes, but not for much gravel-washing, is obtained from shallow wells in Empire, Ophir, Kentucky, and Big gulches.

**History:** According to Raymond,<sup>9</sup> placer gold was discovered in the Greaterville district in 1874 by A. Smith. From 1875 to 1878, the placers were worked by 200 or more men.<sup>7</sup> The virgin gravels are said to have been so rich that each man recovered \$10 or more daily by rocker with water packed in for 4 miles on burros and retailed at about 3 cents per gallon. After 1880, the richer gravels had been worked over; activity in the camp declined, and by 1886 had practically ceased.

According to Schrader and Hill,<sup>32</sup> sluicing was carried on in Kentucky Gulch for a few months during 1900. In 1902, considerable ground was owned and operated by El Oro Mining Company. By 1905, Santa Rita Water and Mining Company had begun operations on about 2,000 acres of patented ground. Their hydraulicking equipment included 8 or 10 miles of ditch and pipe line from a system of dams in Gardner and South canyons in the mountains. Profitable operations were conducted by this company for a short time, and subsequently its property was reported to have been acquired by Gadsden Purchase, Inc.

Further hydraulic operations were tried by another company, at the junction of Kentucky and Boston gulches, with a 125-foot head of water brought through an 8-mile pipe line from the first canyon south of Gardner Canyon. Considerable sluicing of the creek bed is reported to have shown, however, that the gravels in the overburden there were rather coarse and the returns too low to warrant further work.<sup>33</sup>

Another company installed a 1-ton steam shovel, screens, and a conical concentrating tank in Empire Gulch just below Enzenberg Canyon, but the pay dirt was not rich enough to warrant the removal of the 16 or more feet of overburden.

In 1948, Pima Placers worked the Hummel and Richardson properties, on Louisiana Gulch, with a dragline shovel and a washing plant equipped with Ainalay bowls. From January-October of that year, according to the U.S. Minerals Yearbook, this plant treated 90,000 cubic yards of gravel and recovered most of the \$28,511 worth of placer gold that was produced in the district during 1948.

A few men carry on intermittent, small-scale placer mining in the Greaterville district by digging pits or shallow shafts to bed-rock and gophering out the gold-bearing gravels. The pay dirt is concentrated in rockers, with water packed from wells, but the net returns are very low. Owing to the presence of clay in much of the gravel, dry-washing is not very practicable here. Much of the ground has been reworked several times, but a large amount of gold still remains in these placers.

During the 1932-33 season, from ten to twenty men carried on small-scale placer mining in the Greaterville district. The average daily returns per man were less than 50 cents. Owing to a shortage of water, activity fell off considerably during 1933.

**Production:** According to Raymond,<sup>9</sup> the yearly production of the Greaterville placers from 1874 to 1883 was estimated at \$12,000. Burchard<sup>33</sup> places the 1884 output at \$18,000. From 1902 to 1931, the production of the district reported by the U.S. Mineral Resources totaled \$42,756.

In addition, the Jones store at Greaterville reported purchasing approximately \$3,400 worth of placer gold from the area during 1925-32. The output for 1934-48, as reported in the U.S. Minerals Yearbooks, amounted to \$30,920.

**Geology:** The accompanying map (Figure 5), after Hill<sup>34</sup> and Schrader shows the general geology and distribution of placer gravels in Greaterville vicinity. In the vicinity of the larger intrusives, there has been considerable local metamorphism that is marked by sericitization and silicification. Near Granite Mountain, the sedimentary beds are strongly impregnated with quartz and sericite, together with some calcite, pyrite, and chalcopyrite. Here also are gold-bearing quartz veins that probably gave rise to the placers. East of the Cretaceous belt are eastward-thickening, imperfectly stratified, very angular gravels and sand that have been derived by erosion from the Santa Rita Mountains. This material commonly is cemented by clay or lime carbonate. It is dissected by many broad, deep-sided gulches, and contains the gold placers of the district.

**Character and distribution of the gravels:** Schrader<sup>32</sup> gives the following description of the gravels:

They are irregularly distributed, chiefly in the bottoms of the present stream courses and gulches, where the principal diggings occur in shallow

MINE AND PROSPECT FIELD VISIT DATA SUMMARY

Sheet 1 of 2

COMMODITIES Gold

MILS ID No. 141 Date June 20, 1982

ENGINEER Nyal J. Niemuth

INFORMATION FROM: Ernie Ross

PROPERTY SUMMARY

I. MINE NAME Greaterville Placers (file) OTHER POSSIBLE NAMES Last Chance Placers  
INCLUDING ANY CLAIM NAMES NOTED

II. LOCATION: T 19S R 15E SEC(S) 24 MINE DISTRICT \_\_\_\_\_

ELEV. 5,300 COUNTY Pima TOPO QUAD. Helvetia 7 1/2

DIRECTIONS As on topo. 1/2 mile west of Greaterville

MAP ATTACHED Yes

III. OWNERSHIP: NAME Ernie Ross PHONE \_\_\_\_\_

ADDRESS: California

COMPANY NAME IF ANY: \_\_\_\_\_

PERTINENT PEOPLE \_\_\_\_\_

IV. PROPERTY AND HOLDINGS: 5 unpatented claims

V. PAST PRODUCTION - NOTED, KNOWN, PROBABLE, UNKNOWN, NONE Noted

IV. CURRENT STATUS: Active - development and limited production

IIV. WORKINGS: Small open pit & numerous cuts

IIV. GEOLOGY AND MINERALOGY: DEPOSIT TYPE: Gulch and Eluvial Placer

LENGTH: Undetermined WIDTH: Undetermined VEIN STRIKE \_\_\_\_\_

HOST ROCK: \_\_\_\_\_

ECONOMIC MINERALS: Gold, mostly medium and coarse sizes seen.

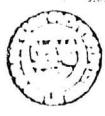
COMMENTS: Some scheelite and galena appear in a gravity concentrate.

IX. EQUIPMENT ON SIGHT: Ore bin, screens, sluice, pumps, electric generator set, backhoe,  
and loader tractor, trailer, water tank, Anda Grub Stake Gold Machine (clean up device).  
Water is supplied from Morning Star Mine.

Greaterville text and photographs from  
Gold Placers and Placering in Arizona,  
E.D.Wilson, Univ. of Arizona, 1961.

GREATVILLE PLACER FINE

sent copy to mesa



# Office of State Mine Inspector

## STATE MINE INSPECTOR

705 West Wing, Capitol Building  
Phoenix, Arizona 85007  
602-255-5971

OCT 19 1983

### NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303\*, we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to (start)/stop (please circle one) a mining operation.

COMPANY NAME THREE C

CHIEF OFFICER Lebern COX

COMPANY ADDRESS 2134 E PALM CROFT TEMPE AZ 85282

COMPANY TELEPHONE NUMBER 966 8768

MINE OR PLANT NAME Three C Mining Co

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)  
Pima County Greaterville ARIZ  
OPHIR CULCH FOREST ROAD 160'

TYPE OF OPERATION Placer PRINCIPAL PRODUCT Gold

STARTING DATE 10-19-83 CLOSING DATE NOT KNOWN

DURATION OF OPERATION NOT KNOWN

PERSON SENDING THIS NOTICE Lebern COX

TITLE OF PERSON SENDING THIS NOTICE Owner

DATE NOTICE SENT TO STATE MINE INSPECTOR 10-17-83

\*A.R.S. Section 27-305 NOTIFICATION TO INSPECTOR OF BEGINNING-OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.

JOSEPH C. BARTON  
MINING ENGINEER  
OIL & MINERAL RESERVES  
UNITED STATES & FOREIGN  
P. O. BOX 1669  
TUCSON, ARIZONA

December 19, 1963

Mr. Earl Wood,  
Room 419,  
Tower Merchandise Mart,  
Denver, Colorado.

RE: GOLD PLACER  
GREATERVILLE, ARIZONA

Dear Mr. Wood:

Thanks for your letter of December 16, 1963.

To get a return of capital and about 50,000 dollars a year for three years with a doodle type dredge of 2500 cu. yds. daily capacity (Bodison type) was a probability.

I found sufficient water there by drilling and would have in time dredged this area in conjunction with several more similar areas.

The gravel would average about 32¢ a cu. yd. but would come in and out because of the erosional breakdown of several horizons and different directions of stream flow. It was a typical "Hill-side placer".

At the time that we were ready to go, I was keeping 30 to 60 projects under study up through explorations, development, construction, operating and marketing stages. I had just examined and recommended many antimony mines and the antimony smelter in Laredo to a major mining company. They bought it and felt that I should move to Mexico city until the five(5) companies were re-organized and were fully led into my normal daily control expectancy from operations. To do this I had to drop the several placers. The dragline dredge and Eimley bowls which were used are still in the neighborhood. I believe that they are in storage.

If Mr. Harris is a member of Strong and Harris (contractors) who lived in Patagonia years ago, they may have something that I do not know about.

I suggest that you send me reports or claims made and I will break it down for you. A pencil sketch of the claims and the name of the several small streams or drainage involved is needed. Any good mineral reserve that can be recommended usually can be turned to groups desiring that particular picture. The most difficult thing is to find properties one can recommend.

The major companies screen about 200 to get one worth spending

money upon. Most companies require the projects to be well engineered by capable Engineers before they will take the time and go to the expense of examining unless they are familiar with the area.

If you will send me exactly what is wanted as to profit potential, size, type of operation and location preference, I can then screen my files and see if I can recommend anything along the request for silver properties. If I am sold on the information presented, I usually take my time and pay my expenses to examine and see if further time and expense are justified. If I am not sold on the information presented, I drop them. The major companies pay my "out-of-pocket" expense if they suggest my study of the situation. I usually require out of pocket expense in advance from those that I do not know. I keep away from promotions or stock selling unless I feel sure that everyone is getting a good run for his money.

Out of over 30,000 screenings since 1917, we have found and developed over 400 mines with no failures, and I now have over 400 worth further research. Some have major development possibilities.

If you will give me a Brief of  
1 What you have  
2. What you want

it is possible that I can come up with an answer. I have complete reports, sampling, maps etc. but these were for myself and a large Company and I can't give out this information without their knowledge and permission.

I hope we can find mutual interests and I will help you all that I can,

Sincerely,

*Joseph C. Barton*  
Joseph C. Barton

JCB:em

cc Mr. Frank Knight ✓  
Director of Arizona Mineral Resources,  
Phoenix, Arizona.

*Shayles  
Feb.*

Sema



Greater Mine Laws,  
Arizona Mine Law  
4-2-84

# Office of State Mine Inspector

705 West Wing, Capitol Building  
Phoenix, Arizona 85007  
602-255-5971

## NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303\* we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start stop (please circle one) a mining operation.

COMPANY NAME Morningstar Mine  
CHIEF OFFICER Ernest H. Hall  
COMPANY ADDRESS Graniteville Area  
COMPANY TELEPHONE NUMBER no

MINE OR PLANT NAME Morningstar mine

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

Bar No 203 Sanitay 85637

TYPE OF OPERATION Placer PRINCIPAL PRODUCT Gold

STARTING DATE \_\_\_\_\_ CLOSING DATE Jan 1, 1984

DURATION OF OPERATION \_\_\_\_\_

PERSON SENDING THIS NOTICE Ernest H. Hall

TITLE OF PERSON SENDING THIS NOTICE Ernest H. Hall Owner

DATE NOTICE SENT TO STATE MINE INSPECTOR 3-7-84

\*A.R.S. Section 27-305 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.



March 20, 1964

Mr. Earl E. Wood,  
Room 419,  
Tower Merchandise Mart,  
Denver, Colorado 80202

RE : GREATERVILLE PLACERS

Dear Mr. Wood :

Thanks for a copy of your letter dated March 12, 1964 to Mr. Levi Harris, Box 41, Patagonia, Arizona. You refer to my letter of December 19, 1963, as stated before.

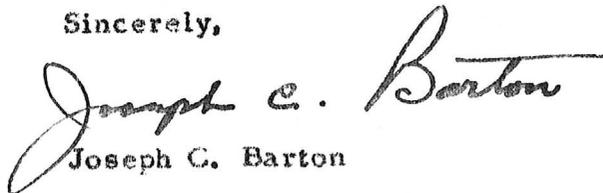
The supposed good area was systematically tested with test shafts and I had a reliable, well experienced professional panner check and also added a number. This area was later dredged and I have not checked this since. Other streams in the general area may have sizeable values with which I am not familiar and these should be pointed out so we can check in a preliminary way and if it looks good, or practical, then to test with a hole or two to see if work is justified.

Only a small dredge (Doodle Bug) type of 2500 cu. yds. a day capacity would be practical for this area. As stated before, the formerly used dredge is stored in that area some place. Why did they quit, is the first fact to consider. I was developing this as a chain of several placers to move to one at a time in order of importance. The other placers, if preliminary panning looked attractive, should be pitted.

As stated in my letter, I had spent 3 weeks examining five companies in Mexico and the Antimony smelter at Laredo which were losing money. An English Banking firm controlled them with Cooksons (authority on metallurgy of Antimony). We could see little ore but by recognizing mineral pattern possibility, I recommended that we could double the tonnage and lower the costs for at least 15 years. This decision was reached after 21 days of examination. We took over and in 30 days, we had doubled production and at the end of 90 days, had tripled it, and at the end of 10 months, we were 10 times the old production. They are now in their 17th or 18th year.

The placer areas in themselves were too small but by taking into account five, I could see a profitable future. My next placer for a doodle bug was a Tungsten placer. Black sands are sometimes very important. We will see what Mr. Harris advises.

Sincerely,

  
Joseph C. Barton

CC : Mr. Frank P. Knight ✓

JCB:em

P. S. Keep in mind that these Greaterville Placers are typical "Hill-Side" placers and as usual have the original bed cut by three or more later cross drainages which at times rob the normal stratifications. Therefore, double the normal test points is advisable and the blank areas must be dredged thru narrow widths or actually moved at times. I have complete maps and details but would not show them without the permission from my old Company. The development of water on this placer was estimated at 29 GPM from the top sand 110 ft. deep (8-foot sand) by the U.S. Government, located in Tucson. I put in writing that I could find over 300 GPM with a 500 foot hole. Twenty eight feet from the bottom or at 472 ft., the water from this lower 18 foot sand jumped 2 feet above the top sand as had been calculated from the water level at Greaterville Postoffice Granite outcrop. The Government gave me credit for over a thousand GPM after running a large test pump for 3 days and 2 nights. While the drill was there, I drilled another hole on the same fault system and several thousand feet distant. We got another flow of the same size as had been estimated before we started. Water, as a rule, is much easier found than most people think. This is a perched water table which overflows into a major basin to the East. The thickness and size of the water-bearing sands, of course, is the answer. The rainfall is 11 inches a year on the placer, and I believe, 38 inches on the East side of the mountain range, south of Greaterville. JCB

STATE OF ARIZONA

DEPARTMENT OF MINES AND MINERAL RESOURCES

Mineral Building, Fairgrounds, Phoenix, Arizona 85007 • (602) 255-3791

MONARCH PLACER  
WEST REEF (former name)

PIMA COUNTY  
GREATERVILLE DIST.  
T19S, R16E, Sec 28,33,34,35

MILS GREATERVILLE PLACER DEPOSITS

See: GREATERVILLE PLACERS (file)  
ALISO SPRINGS (file)  
ORO VERDE (file)  
PATTERSON PLACERS (file)

ARIZONA DEPARTMENT OF MINERAL RESOURCES  
MINERAL BUILDING, FAIRGROUNDS  
PHOENIX, ARIZONA

June 5, 1958

To the Owner or Operator of the Arizona Mining Property named below:

Monarch Placer	(Santa Cruz County)	Gold
(Property)		(ore)

We have an old listing of the above property which we would like to have brought up to date.

Please fill out the enclosed Mine Owner's Report form with as complete detail as possible and attach copies of reports, maps, assay returns, shipment returns or other data which you have not sent us before and which might interest a prospective buyer in looking at the property.

*Frank P. Knight*

FRANK P. KNIGHT,  
Director.



Enc: Mine Owner's Report

No Such Post Office  
In Arizona 12

Mr. Robert M. Wilson  
Greaterville,  
Arizona

*See "Patterson Placers" (file)*

September 8, 1941

Mr. Robert M. Wilson  
Greaterville, Arizona

Dear Mr. Wilson:

A copy of the Mine Owner's Report which you filed on the Monarch Placer has been sent to William H. Smith, 521 Empire Building, Pittsburgh, Pennsylvania. He selected your property as one of several on which he wanted further information and we have sent him all the data we have. It might be well, however, if you would send him a more complete statement which would encourage him to have a personal examination made.

With kindest personal regards, I am

Yours very truly,

Chairman, Board of Governors  
Arizona Department of Mineral Resources

CEW:LP

DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA  
OWNERS MINE REPORT

Date October 10, 1940

1. Mine **MONARCH PLACER**  
(Includes the flat lands of lower Fish Canyon, of lower Louisiana Can, of lower
2. Mining District & County **Greatererville** (Opher canyon, and the 4. Location **54 mi. SE from Tucson T19S, R 16E**  
{the ridges between them.}
3. Former name **West Reef**
5. Owner **Robert M. Wilson**
6. Address (Owner) **Greatererville, Arizona.**  
**Home Camp 2 mi. S of Jones' Store.**
7. Operator " " "
8. Address (Operator) **(Camp is in Fish Canyon on Gold Seal claim)**
9. President **No corp.**
10. Gen. Mgr.
11. Mine Supt.
12. Mill Supt.
13. Principal Metals **Gold**
14. Men Employed **irregular; average 8 men.**
15. Production Rate
16. Mill: Type & Cap.
17. Power: Amt. & Type **None**
18. Operations: Present **Hand washing, dry and wet.**
19. Operations Planned **Wants equipment for handling tonnage. Consisting of a DRY pulverizer with fine screen washer for the fine dirt and an amalgamator, So will only require water enough to wash the fine screened dirt which is not more than one fourth or one fifth of the Bank Volum, The other three fourths or four fifths being disposed of DRY,---This is a tried Cheap Efficient Effectual process both in installation and operation.**
20. Number Claims, Title, etc. **2560 acres. Works 2 yds. deep to 20 or more yards deep, pays all of the way down, T 19 S, R 16 E.**
21. Description: Topography & Geography **Low rolling hills in lower Fish Creek Canyon. Louisiana Canyon and Opher canyon really being more than half flat surface Canyon bottom FILL easier worked than hill land, with power shovel.**
22. Mine Workings: Amt. & Condition **Pits and holes by the hundred. All hand worked so far, and have seldom reached bed rock.**

23. Geology & Mineralization Clay, gravel, resting on congl .ate. Workable ground 50% of surface. 5000 yds. to acre. 50¢ per yd. from top down. 50% rock and boulders, so that workable material is \$1/yd. and better because in many places the dirt being properly screened less than one fourth of the Bank Volum will be washed.

24. Ore: Positive & Probable, Ore Dumps, Tailings

25. ~~XXXXXX~~ ~~Width, Length, Value, etc~~ None - I prefer a Screen amalgamator instead.

~~XXXXXX Mine Mill Equipment & Flow Sheet~~

26. Road Conditions, Route Good. State Hwy. 83 from Mt. View S. Turn off 83 at Greaterville. Or, go on 83 Highway 2 miles and at cement bridge in front of ranch house on lefthand take single track road to the right down across the wash and over the hill a mile just beyond the Opher wash at a post trun square to the right then keep the left hand traveled road to my camp, 4 miles at top of hill 300 yards take track square to left past a cattle guard south down hill to stone cabin 1000 feet.

27. Water Supply

Water by drilling at about 150'  
1 well 180' deep has 80' of water.

28. Brief History One of old placer areas of state. Probable output of district over \$13,000,000. Not half worked out, never having been any but hand work done on the tract.

29. Special Problems, Reports Filed Many reports, but none available.

30. Remarks Must be crushed or screened dry to liberate the values. Needs shovel  
Grizzly Pulverizer Amalgamator FINE GOLD

31. If property for sale: Price, terms and address to negotiate. For sale, lease, or will take working capital. Owner is experienced placer man and could oversee an operation (79 yr. old). Has own cleaner. A LONG LASTING GOOD DEAL at 10% and 2% of that goes to pay for the wells till the wells are paid for and belong to the land, so you are paying 10% and out nothing for wells when it is worked out or long before.

32. Signed.....ROBERT M. WILSON.....

33. Use additional sheets if necessary.

DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA  
OWNERS MINE REPORT

Date ~~June 30, 1939~~

Mine ~~MONARCH~~ <sup>Placer</sup> includes the flat lands  
of lower fish canyon,  
District Greaterville " " Louisiana can, Location 5/4 mi. SE from Tucson  
" " Opher canyon,  
Former name West Reef and the ridges between them,

Owner Robert M. Wilson

Address Greaterville, Arizona.

Home Camp 2 mi. S of Jones' Store.

Operator " "

Address

Camp is in Fish Canyon on

President No corp.

Gen. Mgr. Gold seal claim,

Mine Supt.

Mill Supt.

Principal Metals Gold

Men Employed irregular; average 8 men.

Production Rate

Mill: Type & Cap.

Power: Amt. & Type None

Operations: Present Sand washing, dry and wet.

Operations Planned Wants equipment for handling tonnage. Consisting of a DRY Pulverizer with fine screen, washer for the fine dirt and a amalgamator, so will only require water enough to wash the fine screened dirt which is not more than one fourth or one fifth of the bank volum, The other three fourths or four fifths being disposed of DRY, ---This is a tried cheap Effisient Effectual prosesboth in installation and operation,

Number Claims, Title, etc. 2560 acres. Works 2 yds. deep. to 20 or more yards deep,  
T 19 S, R 16 E. pays all of the way down;

Description: Topog. & Geog. Low rolling hills in lower Fish Creek Canyon. Louisiana canyon and Opher canyon really being more than half flat surface canyon bottom FILL easier worked than hill land, <sup>With Power shovel.</sup>

Mine Workings: Amt. & Condition Pits and holes by the hundred. all hand work so far, and have seldom reached Bull River

Geology & Mineralization Clay, gravel, resting on conglomerate. Workable ground ~~25%~~<sup>50%</sup> of surface. 5000 yds. to acre. 50¢ per yd. from top down. 50% rock and boulders, so that workable material is \$1/yd. And better because in many places the dirt being properly screened less than one fourth of the bank volume will be washed,

Ore: Positive & Probable, Ore Dumps, Tailings

Mine, Mill Equipment & Flow Sheet None I prefer a screen amalgamater instead,

Road Conditions, Route Good. State Hwy. 83 from Mt. View S. Turn off 83 at Greaterville.

~~that road is badly washed so better~~ Go on 83 highway 2 miles and at cement bridge in front of ranch house on lefthand take single track road to the right down across the wash and over the hill a mile just beyond the wash at a post turn square to the right then keep the

Water Supply Water by drilling at about 130' <sup>or 140'</sup> -- left hand traveled road to my camp, 1 well 130' deep has 30' of water.

4 miles at top of hill 300 yards  
(take track square to left  
past a cattle gara south down hill to stone cabin  
1000 feet

Brief History One of old placer areas of state. Probable output of district over \$13,000,000. Not half worked out. never having been any but hand work done on the tract,

Special Problems, Reports Filed Many reports, but none available.

Remarks Must be crushed or screened dry to liberate the values. FINE GOLD. Needs shovel Grizzly Pulverizer Amalgamator

If property for sale: Price, terms and address to negotiate. For sale, lease, or will take working capital. Owner is experienced placer man and could oversee an operation (79 yr. old). Has own cleaner.

A LONG LASTING GOOD deal at 10% and 2% of that goes to pay for the wells till the wells are paid for and belong to the land, so you are paying 10% and out nothing for wells when it is worked out or long before,

Signed ROBERT M. WILSON Robert M. Wilson.  
Greaterville Ariz.

MM15

DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA  
OWNERS MINE REPORT

Date June 30, 1939

Mine Monarch (Placer)

District Greaterville

Location 54 mi. SE from Tucson

Former name West Reef

Owner Robert M. Wilson

Address Greaterville, Ariz.

Home camp 2mi S of Jones' Store

Operator "

Address

President No corp.

Gen. Mgr.

Mine Supt.

Mill Supt.

Principal Metals Gold ✓

Men Employed irregular; average 8 men

Production Rate

Mill: Type & Cap.

Power: Amt. & Type None

Operations: Present Hand washing, dry and wet

Operations Planned Wants equipment for handling tonnage.

Number Claims, Title, etc. 2560 acres Works 2 yds deep.  
T 19 S R 16 E

Description: Topog. & Geog.

Low rolling hills in lower Fish Creek canyon.

Mine Workings: Amt. & Condition

Pits and holes by the hundred.

## Geology & Mineralization

Clay, gravel, resting on conglomerate. Workable ground 25% of surface. 5000 yds to acre. 50¢ per yd from top down. 50% rock and boulders, so that workable material is \$1/yd.

Ore: Positive & Probable, Ore Dumps, Tailings

Mine, Mill Equipment & Flow Sheet  
None

## Road Conditions, Route

Good. State Hwy 83 from Mt. View S. Turn off 83 at Greaterville.

## Water Supply

Water by drilling at about 150'  
1 well 180' deep has 80' of water.

## Brief History

One of old placer areas of state. Probable output of district over \$ 13,000,000. Not half worked out.

Special Problems, Reports Filed Many reports, but none available

## Remarks

Must be crushed or screened dry to liberate the values.

Needs Shovel Grizzly Pulverizer

If property for sale: Price, terms and address to negotiate.

For sale, lease, or will take working capital.

Owner is experienced placer man and could over see an operation (79 yr. old)  
Has own cleaner.

Signed..... Robert M. Wilson

Use additional sheets if necessary.

ANDERSON GROUP

At and near Greaterville are several claims in the midst of the placer ground traversed by lodes carrying gold and silver and lead with iron pyrites and sometimes blended in a quartz veinstone having the characteristic structure of true veins. These claims comprise the Treasure, the Beniger, West Point, Granite Mountain, Fulton, Silver Crown, U.B. and A., and the Arastre.

The Treasure has three openings on it, the deepest about 40 feet. The vein follows the contact between limestone, the foot wall and quartzite the hanging wall. Assays of the ore from this claim as selected for shipment gave, silver, 65 ounces; gold, value, \$5; lead, 48 per cent.

The Beniger-Occurs in limestone. Seventy tons of ore out in the dump will assay, silver, 40 ounces; gold, value, \$3.

The West Point-In porphyry and granite will yield ore carrying, silver, 113 ounces; gold, \$7 in value.

The Granite Mountain-In porphyry and granite yields ore assaying, lead, 44 per cent; silver 90 ounces.

Fulton-In limestone and slate lead, 40 per cent; silver, 30 ounces; gold, value \$3.

Silver Crown-In limestone lead, 35 per cent; silver, 35 ounces; gold, value, \$2.

U.B. and A.-Silver, 300 ounces; gold, value, \$8.

Arastre.-A small vein in crystalline rocks will yield ore assaying \$27 gold.

General Run of Shipping Ores, Anderson Group

Name of Claim	Lead	Silver	Gold
	Per cent	Ounces	Value
Treasure	48	65	\$5
Beniger	40		3
West Point		113	7
Granite Mountain	44	90	
Fulton	40	30	3
Silver Crown	35	35	2
U.B. and A		300	8
Arastre			27

These figures show approximately the values in the three metals of the ore culled for shipment. The use of proper crushing machinery and concentrators would give a larger product and higher values and at less cost.

## GOLD AND SILVER.

### NOTES ON THE PLACER DEPOSITS OF GREATERVILLE, ARIZONA.

By J. M. HILL.

#### INTRODUCTION.

The information contained in this report was obtained by the author in the latter part of March, 1909, while engaged in a mining reconnaissance of the Patagonia and Nogales quadrangles, Arizona, under the direction of Waldemar Lindgren and F. C. Schrader. The writer is under obligations to Mr. P. J. Coyne, of Greaterville, for much valuable information and assistance in the field, and to Messrs. Joseph Anderson, Daniel Johnson, and Hughes for historical data.

Greaterville is 5,280 feet above sea level. It is east of the Santa Rita Mountains, about 3 miles from the summit of Melendreth Pass, whose elevation is 5,850 feet. The Nogales branch of the Southern Pacific Railroad crosses the head of the Cienega drainage basin about  $\frac{1}{2}$  miles southeast of the town. The wagon road from Greaterville to Sonoita, the nearest station on that road, is 13 miles long, running 7 miles a little south of east to Cienega Creek, thence following south up that valley to the station, a distance of 6 miles. A trail of a little over 9 miles connects the two points. Mail is received three times a week, brought on horseback from Helvetia by way of Rosemont, a distance of 14 miles by trail.

In the early part of 1874 the old Yuba mine at the head of Hughes Gulch was operated in a small way. Some cerusite containing silver and gold values is reported to have been rich enough to send to San Francisco and still net \$90 per ton. The St. Louis lead mine was located a short time later and produced some ore. In the latter part of 1874 A. Smith found placer gold.<sup>a</sup> The discovery started a rush to this camp, and in 1878 there were 76 American voters regis-

<sup>a</sup> Raymond, R. W., Mines and mining west of the Rocky Mountains, 1875, p. 390.

shaft. No lagging was used and there was apparently a constant menace of caving.

When there was a sufficient accumulation of the bed-rock gravels to supply the rockers for a few days, water was purchased and the extraction of the gold commenced. Usually two men worked together, but often one man would break down, hoist, and rock his gravels alone.

Two larger undertakings in the way of placer operations failed, possibly because the concentration of the values on bed rock necessitated the handling of so much valueless overburden. One company installed a 1-ton steam shovel, screens, and conical concentrating tank in Empire Gulch just below Enzenberg. After excavating an area 50 by 100 feet to a depth of 20 feet operations were suspended, as the pay dirt was not rich enough to warrant the removal of the 16 feet or more of overburden. The machinery was left in the pit and is fast being buried by slumping from the sides.

In Kentucky Gulch, at its junction with Boston, the Stetson Company tried hydraulic operations. Water was taken from the first canyon south of Gardner Canyon and carried through an 8-mile pipe line giving a head of 125 feet. The company sluiced 1,000 feet of the creek bed for a width of 30 feet. The gravels in the overburden are rather coarse and the pay is reported to have been too low to warrant further work. The pipe line is still in good repair and the company put up very comfortable quarters at Kentucky camp. It is reported that the 3,000 acres of patented land belonging to this company has lately been acquired by G. B. McAvery, of San Jose, Cal.

#### FUTURE OF THE CAMP.

The richer gulch gravels of the Greaterville district have been worked over to a considerable extent, but it is possible that some pay channels have not yet been found. The ground that has been washed still contains some gold, as is shown by the production of the few Mexicans who are working in localities known to have been productive. The gravels on the sides of the gulch and covering the ridges also contain small quantities of gold. E. Ezekiel, a mining engineer, of Tucson, who has examined the gravel deposits for a company, states that in the 8 square miles covered by placer gravels there are still probably nearer \$100,000,000 than \$50,000,000 worth of gold.

The deposits can not be made to pay if worked on a small scale. Hydraulic or dredging in the wider and deeper gulches might possibly pay, but it is a question whether the concentration of the values on bed rock, the considerable overburden to be removed, and the scarcity of water will not greatly retard if not prohibit the future development of the Greaterville placer district.

REPORT OF EXAMINATION OF  
THE GREATERVILLE PLACERS.

FOREWORD:

I have made an examination of the gravel deposits at Greaterville, the results of which are presented herewith.

Greaterville is a small settlement or camp situated in Pima County, Arizona, in the foothills east of the Santa Rita Mountains, which is the highest range in that part of the country, and is 40 miles southeast of Tucson and 8 miles northeast of Sonoita, a flag station on the Nogales and Mexico branch of the Southern Pacific Railroad, connecting with the main line at Benson.

TOPOGRAPHY:

The surface of the placer area is cut by a number of parallel gulches whose general course is from northwest to southeast, a few of which head in Granite Mountain, a high granite butte a mile southwest of Greaterville. These gulches are separated by high ridges ending in mesas and bars of gravel. Greaterville forms very nearly the center of these deposits of auriferous gravel, the greatest volume of which is encountered in the gulches. There are several exceptions, however, to this general description of the gulches.

NIGGER GULCH: lies on the west or opposite side of Granite Mountain, heading in the east side of Quebec Mountain, flows east to the base of the former, thence south and thence west toward the foot of Quebec Mountain.

THE CHISPA: a small gulch tributary to the Empire, heads in a high ridge immediately north of Greaterville and pursues a northerly course for a distance of about 3,000 feet, where it runs into Empire Gulch.

HUGHES GULCH: is situated to the westward of the main placer area, heading in the higher ridges to the west, it assumes a more easterly course and contains no auriferous deposits of gravel until it forms in passing the northern limit of Quebec Mountain; for the remainder of its length it forms the northwestern limit of the placers, forming a junction with the Ophir Gulch at Greaterville.

LOUISIANA GULCH: heads in the high ridge which forms the southern boundary of Ophir Gulch. Its course is more nearly south.

All of the gulches in the District contain deposits of auriferous gravel at their heads, excepting the Empire, Ophir, and Hughes Gulches which have already been mentioned in this respect.

Empire Gulch contains gold-bearing gravel below the junction formed with it by Chispa Gulch, but not above this point, while Ophir Gulch carries no values above the junction of the Hughes.

SOURCE OF THE GOLD:

The origin or source of the gold present in the gravel deposits has never been determined, and there are several theories to account for its occurrence, one of which attributes its origin to Granite Mountain; this seems unlikely. What is most probable is, that the gold has been washed down into the gulches from the ridges that separate them and which contain numerous veins and evidence of a large body of auriferous rock of which I am sending three sacks of samples for assay.

For convenience I have divided the history of the District into three periods and shall refer to them in the following description:

- Period One -- Embracing the years 1874 to 1878 (inclusive)
- Period Two -- Embracing the years 1879 to 1889 (inclusive)
- Period Three -- Embracing the years 1890 to 1901 (inclusive).

For many years previous to the discovery of the placers in the Greaterville District, mines of gold and silver had been discovered and worked at various points in the Santa Rita Mountains by the early Spanish adventurers and clergy who made their way into the surrounding country from Mexico; during the latter part of the sixteenth century; claiming it for the Spanish crown. Several hundred years later Mexican independence was accomplished and a short period of Mexican dominion followed. The war between United States and Mexico and the Gadsden Purchase brought this region within the domain of the United States and it was during the interval that followed that the Québec, Yuba, and other mines, principally of silver, were discovered and worked within the area that is now embraced in the Greaterville Mining District. These mines shipped their ores to Yuma, by ox team for reduction in spite of the constant Indian menace and the several hundred miles of very difficult haul across the desert. This brings us down to the beginning of Period One.

PERIOD ONE -- 1874 to 1878, inclusive.

The gravel deposits near Greaterville were discovered by a man named Smith in 1874. The discovery was almost immediately followed by the usual influx of miners until within a short time there were about eighty Americans and some Mexicans and Indians in the camp. I am particularly indebted to Mr. P.J. Coyne, one of the early arrivals, and for a long time Recorder of the District who recently returned from a two year trip to Alaska, a very quiet and conservative man, for much of the history and records of the placers. Mr. Coyne states that a man known as Hefty cleaned up \$25,000 from his claims in Hawshaw Gulch. Mr. Fred Hughes recovered over \$100 a day with two men working on his claims situated in the Hughes Gulch. Mr. Coyne recovered over \$50 a day working alone on his claim situated on the mesa south of the Ophir Gulch at Greaterville. Mr. Daniel Johnson recovered \$40 per barrel of gravel on his claim in Boston Gulch. These were well authenticated instances of exceptional high values and there are numerous others of the same character.

All operations were carried on with rocker and pan and with very little water which was procured at Kane's Well about five miles distant, packed in to the placers and sold to the miners by the burro load. Others, where possible, hauled their gravel to this well to be washed there. The cost of water and the transportation of the gravel was very excessive and the extraction very low, due to the crudeness of the methods employed and scarcity of water compelled the miners to use it over and over until it became so thick that it was perforce deprived of the power to perform its function.

With the spread of the news of the strike at Greaterville together with the rumors of the richness of the gravels much interest was aroused. With the advent of the new arrivals, some coming from great distances, the placer area became enlarged through new discoveries until now the original placer area comprises about 4,000 acres. This is probably the extent of the placers in so far as sufficient that was procurable with the methods then employed to extract values; but there are adjacent thousands of acres of virgin ground that will yield excellent returns with the employment of modern methods of placer mining and urges the acquiring of these tracts also as they will compare in value contained most favorably with much of the original placer area at present.

During this period the camp saw its greatest activity and the greatest production of gold was attained and which is claimed to have exceeded by several times the production record during Period Two from 1879 to 1889 inclusive which is more than one million dollars. For the first decade following discovery, owing to its remoteness, Indian troubles, unsettled conditions of the country and the lack of proper facilities, there is no complete record of the amount of

gold recovered during this period and part of the following period. Commercial channels and transactions made with the banks, Wells Fargo and Co., and the Mint present the only sources of information procurable and even some of these are not now available. However, such as I have had the opportunity to go over tend quite fully to substantiate the claims made of the production for this and the ensuing periods, and it is fairly safe to conclude that owing to circumstances already referred to, a rather large proportion of the gold produced during the first decade following discovery was disposed of through various channels impossible to trace at this late date. I am indebted to the Zeckendorf Company and Consolidated National Bank of Tucson, and Messrs. Young, Enzenberg, and Coyne, former merchants and postmasters of Greaterville, and others for the information obtained.

PERIOD TWO-- 1879 to 1889, inclusive.

About the beginning of this period some of the richer claims had been worked over and other valuable discoveries were being made. However, within a few years there was a noticeable lessening in the value of the clean-ups as the placer area became more extended. Some of the first miners to enter the District had left with large quantities of gold and others took their places. During all of this period the values recovered were high but not as high as during Period One. The latter part of this period was marked by the greater portion of the placer area being worked over, the working of poorer ground and the abandoning of the District by some of the early miners and a corresponding increase of Mexicans and some Indians.

More efficient mechanical means, adapted to the local condition were being sought, or those who would supply them, for working the claims, or rather the gravels thereon, those of the early miners who had worked over their claims. This culminated in a number of dry-washers and hydraulic machines being introduced into the District. The character of the gravel precludes dry-washing, and there is no need to dwell upon the merits of the various hydraulic machines so called in existence at that time. Needless to say, one failure after another was recorded. However, there was no disposition to attribute the failure to the poverty of the gravels. For instance, two companies tried to operate in the Louisiana Gulch, and both without success; one company spent \$25,000 in the effort. Their machine recovered a small amount of gold but not enough to cover the cost of operation which those employed to sink shafts to test the ground to be worked recovered a little better than \$8,000 per day with rocker and pan. Several attempts of a similar character were made on Kentucky Gulch, but without success. A Mr. Wemple, the superintendent of one of these companies, was killed by the Apaches several miles from his camp.

It was about this time, I am informed by Mr. Thos. Borton, Attorney of Tucson, that the Baron Von Viente, a Russian Engineer seeking investments for European capital, visited the District and remained for a considerable time testing and mapping the placer area at considerable expense. Mr. Borton, who was not then an attorney and who had been working in the placers, assisted him and exhibited to me copies of some of the maps and data then procured. The Baron Von Viente lost his life in returning to Europe following the completion of his investigation.

The latter part of this period brought the railroad to Nogales with a flag station at Sonoita, about eight miles from Greaterville and marked a further decrease of Americans in the camp and an increase in Mexicans. About \$1,500,000 in gold was the approximate production for this period and is confirmed by the records already referred to and to which I have had access. It is estimated that half as much more was recovered from the district of which there is no record.

PERIOD THREE -- 1890 to 1901, inclusive.

This period is marked, after the first few years, by a lessening of activity in the placer area. Some of the Americans that still remain devote much of their time in an endeavor to discover new placer in the surrounding country while others continue to work lowergrade gravels. However, some gave up placer mining for the most part to engage in an effort to discover the source of the gold found in the gravel deposits. The entire Mexican population gains its living by intermittent work in the placers.

Several attempts were made during this period to interest capital in the district, but owing to lack of cooperation and initiative among the various claim holders and insufficient knowledge and understanding of the value of the ground for modern mining methods together with the apparent scarcity of water in the immediate vicinity no sufficiently large amount of placer ground could be secured to warrant an investment with a view of development of water and determining the average value of the gravels. The foregoing conditions, together with the discovery of gold in Alaska and the development of the extensive gravel deposits in Mexico, all contributed to prevent any progress in that direction. However, a few years ago a Mr. Magee undertook to consolidate the individuals' holdings and discover and present the adequate sources of water supply supplemented by a report on the value of the gravel deposits in order that capital could be interested in the District.

During this period about \$6,000,000 in gold was produced most of which was during the early years with a constantly decreasing production toward the end, when placer mining in the District practically was given over almost wholly to the Mexicans who worked everywhere.

#### GRAVEL DEPOSITS:

Are encountered principally in the gulches of the District adjacent banks and in the projecting and dividing bars and mesas. The gulches at their heads are narrow, but broaden as they run eastward presenting more extensive volumes for treatment of greatly increased depth. The values are discovered to exist in the red clay of the banks, mesas, and bars and throughout the beds of the gulches. The character of much of the deposits is also encountered at a number of points in the recurring strata of gold-bearing gravels present.

The overburden of the district consists principally of reddish clay, impregnated soil, which carried very fair values from surface to the pay-streak. The latter consisting of a concentration of values lying on bedrock and averaging two feet four and three-quarters inches in thickness. However, while most often the greatest values are found in concentration on bedrock, this is not always so, for in many instances the greatest values are found in the over-burden.

The pay-streak, or concentrated values in the gravels lies immediately under the overburden; it contains less clay and more lime of greater density and is distinguished by a greater proportion of rock, sand and coarse gravel.

The gravel deposits of this area are free from stumpage, large growing trees, sunken logs, large boulders and other impediments which are so often encountered, and the character of the gravels are such as to render them most easily handled by hydraulic, dredging, and steam shovel mining.

The bedrock encountered throughout the greater part of the examination consisted chiefly of small boulders of quartz, porphyry, schist, and other country rock, sharp and irregular in shape and not averaging more than five inches in diameter and partially cemented.

While pursuing the investigation, Mr. Coyne mentioned that the cement, as it is termed here, indicating the soft lime-cemented gravels underlying bedrock at various points throughout the district, sometimes carries a fair value in gold. Mr. Coyne then stated that an investigation along this line has led several familiar with the results obtained thereby to the belief that perhaps the placer area had received a still earlier enrichment that yet awaited discovery. In order to determine the value of this theory one of the early miners on Louisiana Gulch, after having encountered fair values at other points in the cement sank a shaft to a depth of 180 feet in an endeavor to penetrate, which was not realized. An average value for the entire depth of the shaft is said to have been \$1.00 per cubic yard. At the depth mentioned the owner of the shaft abandoned further work.

#### PLACER WORKINGS:

The prevailing methods of working these gravel deposits up until the present have been substantially as follows: a shaft is sunk from the surface to bedrock, the overburden being considered generally to contain insufficient values of rock, is piled up out of the way; the pay gravel is then followed, undercutting and tunneling as much as possible, and is then removed to the surface together with the gleanings from cleaning of the bedrock; this material is then rocked and panned with varying percentages of the gold content recovered, owing to the crudeness of the equipment and scarcity of water, however, it is seldom that under favorable conditions a high percentage of recovery is possible. Very often the same method was pursued in working adjacent banks while at other times a tunnel or drift is employed near the face of the bank, bar, or mass, to reach and remove the gravels to be washed.

#### METHOD OF EXAMINATION:

In the present investigation use was made of those methods most commonly used and employed of which the following description is given:

Upon arrival at Greaterville a study of maps of the District was made, and then proceeded to verify their accuracy and become familiar with the topography and characteristics of the country and become acquainted with the names and relative positions of the gulches by walking and riding over the area.

The next step was to determine the general elevation of the gravel deposits and to visit the available sources of water to ascertain their relative elevation and whether or not they would constitute adequate supply, and with a sufficient working head, Also what provision could be made for impounding a sufficient volume of water with which to carry on mining operations through the dry seasons.

This was followed by sinking of shafts within the placer area; cross cutting the gulches at intervals, beginning at or near the head of the gulch. The shafts were sunk to bedrock, samples were taken from the surface down, weighed, rocked, panned, and assayed in the usual manner.

The number of shafts on each gulch, average of sample length, width, depth, and cubic yards contained in each gulch is hereinafter given. The tabulation of samples, length, depth, width of each shaft, cubic content, weight of sample taken, weight and value of gold content in each sample will be forwarded under separate cover together with maps showing location and number of each shaft sunk on various gulches as soon as the same which is in course of preparation is complete.

While proceeding with the examination of the gravels, I determined at the same time to ascertain the precipitation and take the measurement of the creeks which would constitute the sources of water supply. The results thus attained are presented herewith under another head.

GULCHES EXAMINED--RESULTS:

A summary of the results obtained from the examination of each gulch is given below under separate heads, following the name of each gulch respectively:

OPHIR GULCH

Length examined	10,670 ft
Average width	1,130 ft.
Average depth (gravels)	35.5 ft
Number of shafts sunk	60
Cubic yards of gravel	10,401,274.13
Average value per cubic yard	54.65 cents

LOUISIANA GULCH

Length examined	6,470 ft.
Average width	151 ft.
Average depth (gravels)	8.5 ft.
Number of shafts sunk	45
Cubic yards of gravel	307,564.31
Average value per cubic yard	43.01 cents

SAN CARLOS GULCH

Length of gulch	2,140 ft.
Average width	206 ft.
Average depth (gravels)	8 ft.
Number of shafts sunk	15
Cubic yards of gravel	130,619.3
Average value per cubic yard	46.2 cents

NOTE: THIS GULCH FLOWS INTO THE LOUISIANA GULCH.

SUCCOR GULCH

Length of gulch	14,400 ft.
Average width	507 ft.
Average depth (gravels)	11 ft.
Number of shafts sunk	60
Cubic yards of gravel	2,767,844.46
Average value per cubic yard	45.37 cents

NOTE: The Louisiana Gulch forms a junction with this gulch which in turn flows into the Ophir Gulch at a point about four miles southeast of Greaterville and beyond the area embraced in the present examination.

KENTUCKY GULCH

Length of gulch	13,240 ft.
Average width	277 ft
Average depth (gravels)	11.5 ft.
Number of shafts sunk	60
Cubic yards of gravel	1,243,074.79
Average value per cubic yard	51.06 cents.

NOTE: this gulch forms a junction with Fish Gulch.

BOSTON GULCH

Length of gulch	9,516 ft.
Average width	220 ft.
Average depth (gravels)	15.5 ft.
Number of shafts sunk	50
Cubic yards of gravel	1,201,935.89
Average value per cubic yard	46.97 cents

NOTE: This gulch flows into the Kentucky Gulch.

HUGHES GULCH

Length examined	4,620 ft.
Average width	196 ft.
Average depth (gravels)	9.5 ft.
Number of shafts sunk	30
Cubic yards of gravel	318,608.82
Average value per cubic yard	36.16 cents

NOTE: this gulch flows into the Ophir Gulch at Greaterville.

LOS POSOS GULCH

Length examined	7,060 ft
Average width	646 ft.
Average depth (gravels)	16 ft.
Number of shafts sunk	45
Cubic yards of gravel	2,702,672.61 c
Average value per cubic yard	39.21 cents.

COLORADO GULCH

Length examined	4,970 ft
Average width	190 ft.
Average depth (gravels)	12 ft
Number of shafts sunk	30
Cubic yards of gravel	419,688.86
Average value per cubic yard	37.18 cents.

HEFTY GULCH

Length examined	5,880 ft.
Average width	168 ft
Average depth (gravels)	11 ft.
Number of shafts sunk	40
Cubic yards of gravel	402,453.33
Average value per cubic yard	40.1 cents

GULCHES NOT EXAMINED:

The Chispa, Fish, Empire, and Nigger Gulches were not included in the present examination, mostly due to the difficulty in acquiring several of them and due to the case of others to their geographical position which renders the gravel deposits contained quite apart and remote from the rest of the gravels area, although the gravels compare very favorably with those present in the rest of the District. I believe the volume of the gravels contained hardly warrant the expenditure necessary in several instances to work them.

TOTALS AND AVERAGES

Total length Gulches	77,766 ft
Average width Gulches	363.1 ft
Average depth Gravel	12.35
Least depth Gravel	3.7 ft.
Greatest depth Gravel	38.31 ft.
Total number of shafts sunk	435
Total cubic yards	19,895,630.50
General average all samples)	
Value per cubic yard )	43.991 cents

NOTE: the gold recovered in sampling the gulches is uniformly coarse in character. The value per ounce being \$16.67. Average volume of iron-sands 1.81%. Traces of platinum.

AVAILABLE WATER SUPPLY:

A sufficient and available water supply for hydraulic dredge and steam shovel mining is found at a distance of from  $3\frac{1}{2}$  to 6 miles southwest of Greaterville, consisting of three creeks that drain the main water-shed of the Santa Rita Mountains and which flow for the greater part of the year. They are from north to south, the Sawmill, Gardiner and South Creeks.

As these streams do not flow continuously throughout the year, although at various times their volume is considerable; the problem is therefore to make the proper provision to impound a sufficient quantity to insure continuous operation of the placers. This can only be accomplished by the construction of one or more dams at favorable points. The same should be as near as possible to the placer area and at an elevation that would insure a proper working head upon delivery of the water at the point of operation. It is also desirable that a large quantity of the material for construction be as adjacent as possible and the area to be occupied by the impounded water sufficiently large to admit storing the desired quantity. There are such locations available on these streams which

flow through rather deep canyons and from the latter take their names.

**THE WATER SHED:**

Is formed by the main and highest part of the Santa Rita Mountain range, which is the highest of any in this part of the country. The area of the water-shed drained by these streams referred to, is approximately 30 square miles; greatest elevation, nearly 10,000 feet. The slopes carry a varying amount of snow during the winter months and are covered with a large amount of excellent timber of a number of varieties.

**PRECIPITATION:**

The rainfall recorded in the vicinity of Greaterville is about 18.4 inches. That taken at Empire Ranch in the Sonoita Valley about 6 miles to the east is 16.5 inches. In the region of the water-shed, observation leads to the belief that the precipitation there exceeds that of Greaterville by several inches. There are two periods of greatest precipitation and occur during the summer and winter months.

**STREAM FLOW:**

The following tabulation of the flow of the several streams under consideration is the result of nearly continuous daily measurement taken during and while investigation of the gravel deposits were being conducted. At times conditions were encountered that forebore the following of the usual methods of measuring the flow, such as severe floods due to excessive precipitation but in most instances, fairly good estimates of the volume of the flows could be made, and these estimates are likely to be found considerably under the actual volume of water passing a given point.

Usually the maximum flow during floods began to fall in an hour after the rise, but sometimes there was no diminution in volume for three hours. It also required 8 to 37 hours for the streams to return to normal following these floods.

The period over which these measurements were taken and recorded was during the last eight days of July, all of August, and September, and the first fourteen days of October and while tabulation is very nearly accurate, it is incomplete and not comprehensive enough but is sufficient to indicate that these streams do form an adequate and available water supply for working the gravel deposits at Greaterville. There are difficulties to be overcome in order to conduct the water to the points desired, but they are not of such a character as to discourage the undertaking.

The tabulation following will give the average and maximum flows of the streams under consideration for the period during which the same was taken. However, I am prepared and will forward on completion, a chart giving the daily flow of each creek, and illustrating by diagrams the various changes and fluctuations.

**TABULATION:**

	SOUTH CANYON	
Average daily flow		2,918 Miners inches
Minimum daily flow		237 " "
Maximum daily flow		12,970 " "

	CAVE CANYON	
Average daily flow		2,668 Miners inches
Minimum daily flow		251 " "
Maximum daily flow		10,171 " "

	SAWMILL CANYON	
Average daily flow		2,601 Miners inches
Minimum daily flow		201 " "
Maximum daily flow		11,200 " "

NOTE: this canyon constitutes the nearest source of water supply it being situated  $3\frac{1}{8}$  miles from the gravel deposits. The measurements taken were taken at the junction of the Cave Creek and the one being considered in this paragraph and at which point there is an excellent dam

site, and the reservoir area resulting is capable of accomodating a large amount of water with less height of dam than any other of the sites presents.

#### RECOMMENDATION:

Water Supply: the dam and reservoir site and the stream running through Gardner Canyon are the recommendations made by Mr. Magee and his associates. The same is well chosen and the flow of Gardner Creek is in excess of either of the other two; its relative elevations are sufficient, but the area of the reservoir resulting from the construction of a dam at this time would be insufficient unless the same was carried up to a considerable height which of course entails greater expense. Also the point is situated about two miles further away from the auriferous gravel deposits than the dam reservoir site situated at the junction of Sawmill and Cave creeks where a larger reservoir is possible with the construction of a dam there, and the advantage gained is<sup>th</sup>at of two water sources instead of one.

I, therefore, suggest that the recommended source of water supply and the reservoir site of Gardner Canyon be abandoned in favor of the site proposed at the junction of the other two creeks unless it is desired to appropriate all of these sources of water with a view to irrigation and future development of the grass lands in Sonoita Valley adjoining the Empire Ranch.

All things being equal, I believe the conduction of the water to the placers would present less engineering difficulties from the reservoir on Sawmill Canyon; the distance is also less and therefore a less quantity of pipe would be required. However, it would be necessary to tunnel through Limestone Ridge in order to take advantage of the most direct route to the gravel deposits. However, this can be avoided by the route recommended by Magee as indicated on Map 7.

#### RECOMMENDATIONS FOR WORKING OF GRAVELS:

There are no problems of difficulty to be solved in determining the methods of mining best adapted to the conditions that exist in the Greaterville district. The character of these auriferous gravel deposits make them easily disintegrated by the use of water setting free the gold values contained. The gold itself, which is uniformly coarse and of generally high specific gravity is easily separated and recovered and renders high percentage of recovery assured. The placer area is free of large stumps and large trees either on or below the surface; it is also free from the presence of quicksands, or large boulders or other impediments or obstructions which are often difficult to remove and occasion loss of time in operation. However, the upper portions of the gulches are narrow and do not present extensive volumes of gravel that is desirable in hydraulic mining; however the gulches at these points are flanked by mesas and bars presenting varying volumes of workable gravel. The only method of mining at present adapted to handling this portion of the placer area successfully is by hydraulic method and is the method recommended. Further east on these gulches they widen out to a degree that makes possible the use of steam shovel as there are far greater volumes of gravel to be handled but the width of the gulches precludes the use of a dredge. Further down these gulches widen out into wide, long, and nearly flat reaches containing large volumes of gravel of much greater depth. This portion of the gravel area would be worked best by the employment of a floating dredge of fair capacity.

At any points where the employment of the dredge and steam shovel are indicated, it would also be necessary to employ the hydraulic method in order to handle more cheaply some of the banks of gravel.

The system of water supply may be so installed that the water may be used for mining in three different operations thereby gaining a maximum use therefrom.

The installation of a floating dredge is particularly indicated and warranted by the volume of adjacent deposits of virgin gravel lying further to the east, the acquirement of which is hereby recommended.

RECAPITULATION:

The conclusions reached as a result of this investigation are that there is a sufficiently large volume of workable gravels of high enough value per cubic yard to insure mining operations for a long period of time at a high rate of profit to the owners and warrants the expenditure or expense necessary to conduct the waters available to the placer area for the recommended method of mining and that such waters are procurable in sufficient quantity to assure continuous operation throughout the year if impounded for the purpose and that these undertakings to conduct the working of the gravel area are also warranted in taking the necessary steps to this end. The deposits are of a character that could be hardly more amenable to mining operations. There is also the likelihood of the existence of a large body of lode within the area of the auriferous gravel. This district is not far from the railroad and has other very fair transportation facilities. The climatic conditions are favorable to continuous operations and a large daily yardage feasible, dependent on the equipment installed. The ground embracing the gravel deposits, under consideration and the necessary water rights can be acquired on favorable terms at a reasonable price.

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C O P Y