CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

Artillery Peak

December 2, 1931

Mr. Walter A. Schmidt,
Western Precipitation Company,
1016 West Ninth Street,
Los Angeles, California.

Subject: Manganese ore

Dear Walter,

I have yours of November 30th relative to the manganese deposit near Artillery Peak in Western Arizona and ~~am~~ enclosing a copy of a report on this property by Mr. Woodbridge..

Mr. Woodbridge is a well known and highly esteemed Engineer who formerly was quite prominent in the iron districts, but I agree with you that this particular report is far from being convincing. A large part of it is taken up with statistics and generalization of no particular interest and many essential points are not covered at all.

Specifically, I would state that there is not the slightest ground for believing that the Santa Fe will build any railroad in the Artillery Peak district and transportation by road to any shipping point is by no means a simple matter and would involve building a bridge across the Bell Williams River or ~~otherwise~~ crossing thru nearly half a mile of sandy river bed and bottom, which is entirely impassbble at high water. Otherwise, the road might be built northwest to the McCracken Mine, which you will remember, and would then continue out to Yucca. In either case the road haul would be in excess

of fifty miles unless the ore were shipped from Swansea, and the railroad from Swansea to Bouse, altho it is still in existence, is no longer operated in any regular manner.

Woodbridge states that the Santa Fe Railroad have suggested a rate to Birmingham, Alabama, of $7.00 per ton, but actually the rate from Winslow to Birmingham on manganese ore is $10.80 and would certainly be around $12.00 from either Congress Junction or Yucca. A rate from Yucca to Los Angeles of between $4.00 and $5.00 might possibly be obtained and from Los Angeles to Atlantic ports. I judge that the ocean freight would not exceed $5.00, but in any case the ore or concentrate would have to be trucked for over 50 miles on rough desert roads and the trucking cost would not be far from $8.00 per ton.

I have never personally visited the manganese deposit at Artillery Peak, altho I have passed near them and know something of their occurence ~~in~~ and history. I have a copy of portions of a report on these properties made by E. L. Jones of the U. S. Geological Survey and quoted in the Bulletin of the Arizona Bureau of Mines. I can have this report copied if you wish, but the gist of it is to the effect that the deposits are quite extensive and very possibly contain some hundred of thousands of tons of ore, but most of the tonnage is low grade material which will require concentration and Jones emphasizes the difficulties of transportation which would tend to prevent any profitable operation until this situation is greatly improved.

From other sources I have learned that the largest and presumably the best deposit in this district are owned or controlled

by the Chapin Company of Chicago who are well financed and have spent considerable money in developing their property.

During 1930 I spent some time and money in investigating various manganese deposits in Arizona, since some of my friends in the East thought that they might purchase some of our ore or concentrates, but I was unable to find anything satisfactory.

At this time I discussed the Artillery Peak deposit in some detail with the engineer in charge of these properties for Chapin and he told me that they had concluded that there was no opportunity to operate them profitably and that they merely intended to hold on to them for an indefinite period and in the hope that conditions would eventually improve, particularly in respect to the price of manganese.

It is my opinion that the manganese ores of this district may eventually have some value, but it seems very unlikely that they can be worked to advantage at any time in the near future and any person acquiring them will probably have to follow the Chapin policy and merely hold them for their potential value.

As you will note, I do not feel in a position to make any very detailed comment on the particular property described by Woodbridge, but I should be very glad to examine and report on same if your friend, Sibley, or his associates cared to have such an examination undertaken. I could not advise you personally to spend any money in further investigating this matter at present, as I think that the chances are all against your obtaining any immediate return

from such an expenditure.

Best personal regards,

Sincerely,

G. M. C.

G
M
C
:
HG

copied not checked

The following is a condensed statement of the facts concerning the important holdings of manganese ores in the Artillery Peak District of southern Mojave County, Arizona, owned by Messrs. Corum, De-Neefe, Koehler, Woodbridge, and their partners.

This property consists of approximately 1,700 acres in what is known as the Artillery Peak mining district of Arizona. It comprises some 80 U. S. mining claims, on all of which the required work has been carried out since discovery and location, proof of which work has been filed in accordance with the laws, and on which claims there are no conflicts over titles.

The tract lies close to the Bill Williams River and some 25 miles east of the Colorado. It is 16 or 18 miles from the mining town of Swansea, which is the nearest railway point, and which can be reached over a flat hard surfaced desert area, on which roads can be put almost anywhere with ease and at exceedingly low cost of construction and maintenance. It is some 50 miles from Congress Junction, also a railway point. It is well known that a railway will be built to these properties as soon as business is in sight to warrant the Santa Fe Company in this extension.

not

The Bill Williams River carries abundance of water for all purposes, and these lands reach the river bank. The climate is Arizonian - perfect as one can desire in winter, with occasional frosts; a few very hot days in summer, usually with cool nights; and a definite period in which rains fall. Along the river valley there is ample exceedingly rich and well watered land, so that everything can be grown in profusion, and living costs will be low.

In time there will be hydro-electric power at hand, but oil is cheap and the cost of power from diesel engines will not now exceed 1 cent per kw. hour.

The property is about 300 miles from the seaport of Los Angeles, and freight costs for delivery there will be less than $3.00 per ton. This will guarantee to the company the west coast market for manganese against any importations from foreign sources whenever the west coast shall develop into an important consumer of this ore, which development seems but a short distance ahead. The Santa Fe has suggested a rate for this ore to Birmingham, Alabama, of $7.00 a ton, all rail, which will make it possible to deliver the ore there at a cost of about $15.50 a ton. This is some $6.00 a ton under the present distress dumping price charged by the Soviet government of manganese imported to the United States. Birmingham is one of the chief centers of manganese consumption, being the point where the U. S. Steel Corporation has several furnaces normally running on this type of ore.

actual rate

Manganese is one of the few minerals without which the world cannot progress. It is absolutely essential to the manufacture of steel - all steel, without exception. A confidential report prepared in 1924 for the U. S. War Department, by the

American Institute of Mining Engineers, makes this statement:

> Much work has been done, particularly during the late war, on proposed substitutes, but no other element in available commercial quantities has yet been discovered that will perform the functions of manganese in steel making, or at anything like an equivalent price; and it is the opinion of your committee that the discovery of a practical, suitable, substitute for manganese is so remote that this possibility should be disregarded.

The manganese of the world is found chiefly in countries far removed from the United States, and the ore is consumed in this country in far greater volume than anywhere else. This makes a serious situation for this country in times when transportation by sea is difficult, as during the great war. Then the cost of manganese here rose to very high figures, so that a 50% ore then sold here for more than $60.00 a ton. It is now about $22.50. The U. S. Bureau of Mines shows the world's production and consumption of this mineral as follows:

Country	Share of World Production	Share of World Consumption
United States,	3.89%	35.20%
France,	0.12	18.31
England,	0.10	10.84
Germany,	0.14	7.88
Russia,	41.77	2.92
India,	23.89	1.56
Brazil,	12.14	- - - -
Africa,	12.84	- - - -
Cuba,	0.92	- - - -
Norway,	- - -	7.78

It is important to note that the world has been dependent for practically all its manganese on four countries, all of which are long distances from the United States.

In the same connection, statistics show that the world's known reserves of manganese are as follows, the ore being reduced to metallic content in each case:

	Tons (Metal)
United States,	630,000
Cuba,	280,000
Africa,	5,000,000
India,	30,000,000
Russia,	43,000,000
Brazil,	61,000,000

But, to-day, by the discovery of the Artillery Peak district in the United States, the amount of matellic manganese in this country is increased by at least 50,000,000 tons. This fact is of the utmost importance, not only to the owners of this tremendous American tonnage, but to the stability of the iron and steel industry in this country. It relieves the nation of the fear that the iron and steel industry of the country will be dependent on foreign nations, far away, for a material that is essential to its great and basic industry, that of the manufacture of steel.

So much for the character of the American manganese industry. The War Department has been so exercised over the scarcity of this mineral and the long distances by sea and over foreign railways that it must be carried in order to reach us, that it has urged the establishment and permanent maintenance of a reserve that shall serve to tide us over any reasonable period of future wars. The Department knows that in case of interruption to the flow of this traffic into the United States, by war or otherwise, the country would be put in a very dangerous situation.

The consumption of manganese in this country runs with the production of steel, and in normal times averages from 600,000 to 750,000 tons a year, of a 50% ore.

The geology of the Artillery Peak district is simple, and it is very easy to test the grades of ore in place as well as to make preliminary estimates of the tonnages existing. Nature has exposed the ore in a most remarkable manner, and presents long and thick outcroppings that can be sampled readily and estimated with reasonable precision.

The region is cut deeply by arroyos and small canyons that expose the flat lying rocks down to the old granites, leaving the beds of manganese outcropping along the sides of these arroyos for thousands of feet in length. These arroyos show that overlying the granites there are almost horizontal layers of sandstones and manganese, all once covered by lava flows. The sides of these arroyos are broadly banded by, in places one and elsewhere two, separate beds of this manganese ore, the number of beds exposed in sight depending on the depth of the erosion that formed the gullies. These outcrops are practically continuous along the gullies to the limit of the formation, a series of broad, black bands of from ten to fifteen and twenty feet in thickness. It is very evident that the ore extends under the lava flows from one arroyo to the next, for parallel arroyos, or gullies, disclose similar bands, alike in thickness, grades and elevations.

The work that has been done in these beds indicate that the ores do not diminish in quality as they pass under the lava. On the other hand, a tunnel driven on some of the group

does show that the grade improves materially.

The entire mineralized area of which these claims form a part consists of some five square miles, say 3,500 acres, and is owned by two concerns, the other being the Chapin Exploration Company of Chicago, who have some 2,000 acres. Since our original discovery two years ago, others have learned of the business, and many have been staking ground surrounding us within the past few months. We feel that, while they may have outlying portions of the mineral bearing ground, they are at a disadvantage in that all the easily reached, cheaply mined areas are in the hands of the Chapin Company and ourselves, and that what others may find is but extensions, too deep for cheap mining and entirely uncertain as to the presence of any ore at all.

Like manganese almost everywhere, most of the ore in this district requires concentration to become available for the manufacture of ferro-manganese, which is the metal used in steel making. So far as I know, the only manganese mined in quantity anywhere and used for ferro in its crude state is that from Brazil, which assays about 43% Mn. Concentrates from Russia and other exporting nations assay from 45 to 50% Mn, after concentration.

Concentration of manganese is a simple matter. Others and myself have worked this out, on our ores, and we have been able to produce a concentrate assaying as follows:

Mn 50.5%, iron 3.48%, silica 7.12%.

This is an exceptionally high grade and very valuable.

The average grade of the leaner commercial ores on this property has been found to be about 12% Mn. There are many millions of tons in one group that average not far from 20% Mn. There is a smaller tonnage that runs from 45% to 47% Mn. But the greater bulk of the tremendous tonnage existing is from 12% to 15%. It has been found that this concentrates with small losses of ore. It is shown that the cost of mining enough ore to make one ton of 45 to 50% concentrate, the crushing and concentration of this ore, the shipping to Birmingham, under the rate suggested by the Santa Fe road, will all be done for approximately $15.50 a ton of the concentrated product. Conditions are such that mining can be done at exceptionally low cost, and almost completely by mechanical means. The concentration of the ore is not difficult nor expensive and involves no untried problems. In figuring the above mentioned cost I have included a charge of $1.25 for agglomerating the concentrate, which may or may not be necessary. I have not included the royalty to be paid the owners by the mining operator, which should amount to about $1.50 a ton. This can hardly be classed as a part of the operating cost.

Manganese from the Soviet's mines on the Black Sea are now chief sources upon which American steel makers draw. This

is because the Soviets are making a price that nobody else can meet. They are hard pressed for cash with which to finance their five year plan of development, and they are sacrificing any and all resources in their frantic effort to raise money for the portion of their goods that they must pay for in cash. It stands to reason that, once the five year plan is accomplished, Russian exports will diminish and their own people will no longer suffer for the necessities of life. Their home requirements of manganese, now less than 3% of the world's consumption, will rise and they will not care to dissipate their reserves of ore without profit.

Of the price that the Russians now receive in this country for their manganese, from $21.50 to $22.50 a ton, something like 83% is paid by them in freights and duty, leaving very little for their labor and profit. In other words, their present selling price is at the bottom of their possibilities. By selling at this price, they have effectually barred almost all competition, for the time being.

With a Soviet price of $21.50 and a cost of delivery of Artillery Peak manganese at Birmingham of from $15.00 to $16.00, the future of the Artillery Peak property can readily be understood.

I have had considerable experience in manganese and its production and sale, having for the past fifteen years been mining in a small way in Arkansas. This ore has been sold to several customers, mostly to the U. S. Steel Corporation's Birmingham works. This experience probably has given me a better knowledge of the manganese business than is possessed by most engineers. It has caused me to study the question of world manganese. And I know that in this Artillery Peak property we have an asset of tremendous value, that is bound to come into use as soon as general conditions right themselves. I know that a reasonable royalty on this ore, to be worked out in the course of the next few generations, will amount to more millions of dollars than I care to state. I know that the annual income from the property will be very large, once it is developed and operating.

This field is one of the world's chief bodies of manganese ore, better situated than any other now known for the use of the United States, and therefore of peculiar value to this country. It is so unusual that anyone, at this stage of knowledge of what the rocks of North America contain, should discover such bodies as these, that I can think of no parallel case since the first unearthing of the iron ores of the Mesabi Range or the opening of the great porphyry copper mines of Utah and Arizona, famous as vast producers and dividend earners.

(Signed) Dwight E. Woodbridge

Rate to Bringer of Lunch is 10.80 p/ton

or 12.00 for Carry Free

Rec'd by to Co

ARTILLERY PEAK

Note by G. M. Colvocoresses, October, 1937.

During the past two years this property has been extensively drilled by the M. A. Hanna Co. of Cleveland and it is reputed that they have confirmed the existence of a very large tonnage of low grade manganese ore.

Also, in conjunction with the U. S. Bureau of Mines they have been carrying on experiments in the concentration of this ore and I am told that they are encouraged to believe that commercial operations can be undertaken at some future date when transportation facilities have been improved and when, they hope, a higher price for manganese will prevail. This may be looking quite a long way into the future.

The following is a condensed statement of the facts concerning the important holdings of manganese ores in the Artillery Peak District of southern Mojave County, Arizona, owned by Messrs. Corum, De-Neefe, Koehler, Woodbridge, and their partners.

This property consists of approximately 1,700 acres in what is known as the Artillery Peak mining district of Arizona. It comprises some 80 U. S. mining claims, on all of which the required work has been carried out since discovery and location, proof of which work has been filed in accordance with the laws, and on which claims there are no conflicts over titles.

The tract lies close to the Bill Williams River and some 25 miles east of the Colorado. It is 16 or 18 miles from the mining town of Swansea, which is the nearest railway point, and which can be reached over a flat hard surfaced desert area, on which roads can be put almost anywhere with ease and at exceedingly low cost of construction and maintenance. It is some 50 miles from Congress Junction, also a railway point. It is well known that a railway will be built to these properties as soon as business is in sight to warrant the Santa Fe Company in this extension.

The Bill Williams River carries abundance of water for all purposes, and these lands reach the river bank. The climate is Arizonian - perfect as one can desire in winter, with occasional frosts; a few very hot days in summer, usually with cool nights; and a definite period in which rains fall. Along the river valley there is ample exceedingly rich and well watered land, so that everything can be grown in profusion, and living costs will be low.

In time there will be hydro-electric power at hand, but oil is cheap and the cost of power from diesel engines will not now exceed 1 cent per kw. hour.

The property is about 300 miles from the seaport of Los Angeles, and freight costs for delivery there will be less than $3.00 per ton. This will guarantee to the company the west coast market for manganese against any importations from foreign sources whenever

the west coast shall develop into an important consumer of this ore, which development seems but a short distance ahead. The Santa Fe has suggested a rate for this ore to Birmingham, Alabama, of $7.00 a ton, all rail, which will make it possible to deliver the ore there at a cost of about $15.50 a ton. This is some $6.00 a ton under the present distress dumping price charged by the Soviet government of manganese imported to the United States. Birmingham is one of the chief centers of manganese consumption, being the point where the U. S. Steel Corporation has several furnaces normally running on this type of ore.

Manganese is one of the few minerals without which the world cannot progress. It is absolutely essential to the manufacture of steel - all steel, without exception. A confidential report prepared in 1924 for the U. S. War Department, by the American Institute of Mining Engineers, makes this statement:

> Much work has been done, particularly during the late war, on proposed substitutes, but no other element in available commercial quantities has yet been discovered that will perform the functions of manganese in steel making, or at anything like an equivalent price; and it is the opinion of your committee that the discovery of a practical, suitable, substitute for manganese is so remote that this possibility should be disregarded.

The manganese of the world is found chiefly in countries far removed from the United States, and the ore is consumed in this country in far greater volume than anywhere else. This makes a serious situation for this country in times when transportation by sea is difficult, as during the great war. Then the cost of manganese here rose to very high figures, so that a 50% ore then sold here for more than $60.00 a ton. It is now about $22.50. The U. S. Bureau of Mines shows the world's production and consumption of this mineral as follows:

Country	Share of World Production	Share of World Consumption
United States,	3.89%	35.20%

Country	Share of World Production	Share of World Consumption
France,	0.12%	18.31%
England,	0.10	10.84
Germany,	0.14	7.88
Russia,	41.77	2.92
India,	23.89	1.56
Brazil,	12.14	- - -
Africa,	12.84	- - -
Cuba,	0.92	- - -
Norway,	- - -	7.78

It is important to note that the world has been dependent for practically all its manganese on four countries, all of which are long distances from the United States.

In the same connection, statistics show that the world's known reserves of manganese are as follows, the ore being reduced to metallic content in each case:

	Tons (Metal)
United States,	630,000
Cuba,	280,000
Africa,	5,000,000
India,	30,000,000
Russia,	43,000,000
Brazil,	61,000,000

But, today, by the discovery of the Artillery Peak district in the United States, the amount of metallic manganese in this country is increased by at least 50,000,000 tons. This fact if of the utmost importance, not only to the owners of this tremendous American tonnage, but to the stability of the iron and steel industry in this country. It relieves the nation of the fear that the iron and steel industry of the country will be dependent on foreign nations, far away, for a material that is essential to its great and basic industry, that of the manufacture of steel.

So much for the character of the American manganese industry. The War Department has been so exercised over the scarcity of this mineral and the long distances by sea and over foreign railways that it must be carried in order to reach us, that it has urged the establishment and permanent maintenance of a reserve that shall serve to tide us over any reasonable period of future wars. The Department knows that in case of interruption to the flow of this traffic into the United States, by war or otherwise,

the country would be put in a very dangerous situation.

The consumption of manganese in this country runs with the production of steel, and in normal times averages from 600,000 to 750,000 tons a year, of a 50% ore.

The geology of the Artillery Peak district is simple, and it is very easy to test the grades of ore in place as well as to make preliminary estimates of the tonnages existing. Nature has exposed the ore in a most remarkable manner, and presents long and thick outcroppings that can be sampled readily and estimated with reasonable precision.

The region is cut deeply by arroyos and small canyons that expose the flat lying rocks down to the old granites, leaving the beds of manganese outcropping along the sides of these arroyos for thousands of feet in length. These arroyos show that overlying the granites there are almost horizontal layers of sandstones and manganese, all once covered by lava flows. The sides of these arroyos are broadly banded by, in places one and elsewhere two, separate beds of this manganese ore, the number of beds exposed in sight depending on the depth of the erosion that formed the gullies. These outcrops are practically continuous along the gullies to the limit of the formation, a series of broad, black bands of from ten to fifteen and twenty feet in thickness. It is very evident that the ore extends under the lava flows from one arroyo to the next, for parallel arroyos, or gullies, disclose similar bands, alike in thickness, grades and elevations.

The work that has been done in these beds indicate that the ores do not diminish in quality as they pass under the lava. On the other hand, a tunnel driven on some of the group does show that the grade improves materially.

The entire mineralized area of which these claims form a part consists of some five square miles, say 3,500 acres, and is owned by two concerns, the other being the Chapin Exploration Company of Chicago, who have some 2,000 acres. Since our original discovery two years ago, others have learned of the business, and many have been staking ground surrounding us within the past few

months. We feel that, while they may have outlying portions of the mineral bearing ground, they are at a disadvantage in that all the easily reached, cheaply mined areas are in the hands of the Chapin Company and ourselves, and that what others may find is but extensions, too deep for cheap mining and entirely uncertain as to the presence of any ore at all.

Like manganese almost everywhere, most of the ore in this district requires concentration to become available for the manufacture of ferr-manganese, which is the metal used in steel making. So far as I know, the only manganese mined in quantity anywhere and used for ferro in its crude state is that from Brazil, which assays about 43% Mn. Concentrates from Russia and other exporting nations assay from 45 to 50% Mn, after concentration.

Concentration of manganese is a simple matter. Others and myself have worked this out, on our ores, and we have been able to produce a concentrate assaying as follows:

Mn 50.5%, Iron 3.48%, silica 7.12%.

This is an exceptionally high grade and very valuable.

The average grade of the leaner commercial ores on this property has been found to be about 12% Mn. There are many millions of tons in one group that average not far from 20% Mn. There is a smaller tonnage that runs from 45% to 47% Mn. But the greater bulk of the tremendous tonnage existing is from 12% to 15%. It has been found that this concentrates with small losses of ore. It is shown that the cost of mining enough ore to make one ton of 45 to 50% concentrate, the crushing and concentration of this ore, the shipping to Birmingham, under the rate suggested by the Santa Fe road, will all be done for approximately $15.50 a ton of the concentrated product. Conditions are such that mining can be done at exceptionally low cost, and almost completely by mechanical means. The concentration of the ore is not difficult nor expensive and involves no untried problems. In figuring the above mentioned cost I have included a charge of $1.25 for agglomerating the con-

centrate, which may or may not be necessary. I have not included the royalty to be paid the owners by the mining operator, which should amount to about $1.50 a ton. This can hardly be classed as a part of the operating cost.

Manganese from the Soviet's mines on the Black Sea are now chief sources upon which American steel makers draw. This is because the Soviets are making a price that nobody else can meet. They are hard pressed for cash with which to finance their five year plan of development, and they are sacrificing any and all resources in their frantic effort to raise money for the portion of their goods that they must pay for in cash. It stands to reason that, once the five year plan is accomplished, Russian exports will diminish and their own people will no longer suffer for the necessities of life. Their home requirements of manganese, now less than 3% of the world's consumption, will rise and they will not care to dissipate their reserves of ore without profit.

Of the price that the Russians now receive in this country for their manganese, from $21.50 to $22.50 a ton, something like 83% is paid by them in freights and duty, leaving very little for their labor and profit. In other words, their present selling price is at the bottom of their possibilities. By selling at this price, they have effectually barred almost all competition, for the time being.

With a Soviet price of $21.50 and a cost of delivery of Artillery Peak manganese at Birmingham of from $15.00 to $16.00 the future of the Artillery Peak property can readily be understood.

I have had considerable experience in manganese and its production and sale, having for the past fifteen years been mining in a small way in Arkansas. This ore has been sold to several customers, mostly to the U. S. Steel Corporation's Birmingham works. This experience probably has given me a better knowledge of the manganese business than is possessed by most engineers. It has caused me to study the question of world manganese. And I know that in this Artillery Peak property we have an asset of tremendous

value, that is bound to come into use as soon as general conditions right themselves. I know that a reasonable royalty on this ore, to be worked out in the course of the next few generations, will amount to more millions of dollars than I care to state. I know that the annual income from the property will be very large, once it is developed and operating.

This field is one of the world's chief bodies of manganese ore, better situated than any other now known for the use of the United States, and therefore of peculiar value to this country. It is so unusual that anyone, at this stage of knowledge of what the rocks of North America contain, should discover such bodies as these, that I can think of no parallel case since the first unearthing of the iron ores of the Mesabi Range or the opening of the great porphyry copper mines of Utah and Arizona, famous as vast producers and dividend earners.

(Signed) Dwight E. Woodbridge