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This month's Ghost Town Getaway:

Duquesne

File Notes - Duquesne

Report by S.K. Garrett - April '39

74 Pat claims, all but 13 owned by A.R. Byrd who is optionee of rest.

Bonanza mine most extensive operation, 635' deep -, next New York 200 feet deep and Kansas, 150'

Production to 1925, Cu, Pb, Zn + Ag (first highest) Total 4 mil.
F.V.R letter - 1128-50 - 421,000 tons

Sulphides occur in garnetized zones near monzonite - ls contact.
Very little pyrrhotite or mag in ores -

Ores appear to bottom in garnet in Belmont-Silver Bell region

Ore deposits occur for the most part as small scattered pod-like bodies.

Ore often on contact between Garnet & ls

Custom to Trench - 140 to 500 + to Eagle Pitcher

tons	Ag	Pb	Cu	Zn
153,436	3.87	265	153	8.37

420,000
Total develop - 31,000 feet - = 13.6 tons/foot

Outcome (leaser)

Develop -	4.00			
mining -	10.00			
Indirect -	2.00			
	<u>16.00</u>			

breakdown at

Pb	Cu	Zn
140	219	158

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YDUQUESNE PROPERTYSANTA CRUZ COUNTY, ARIZONABy S. K. GARRETT

April 20, 1939

After cursory investigation during September and October, 1938, a preliminary examination agreement was entered into by the Callahan Zinc-Lead Company, on November 11, 1938, with A. R. Byrd, Jr., owner of 56 patented claims comprising the Duquesne property, located near Nogales, Arizona.

After two months of examination, which included the unwatering and reopening of several old workings, the sampling of accessible ore exposures, geologic study and mapping, a final lease agreement was entered into with A. R. Byrd, Jr., on January 13, 1939.

From that time until April 5, 1939, the examination was continued and parts of the property explored by diamond drilling. Twenty-one holes, aggregating 3982 feet, were drilled on the property. Description of the holes, together with that of the rest of the property, is included in the following report.

Maps showing prominent mine workings, geology and assays of sampled ore exposures, accompany the report.

DUQUESNE PROPERTY
Santa Cruz County

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DUQUESNE MINING PROPERTY
Santa Cruz County, Arizona

By S. K. GARRETT

April 19, 1939

Location and General Features

The Duquesne property is located on the eastern slope of the Patagonia Mountains in the Patagonia Mining District, Santa Cruz County, Arizona, about 20 miles east of Nogales and four miles north of the International Boundary between the United States and Mexico. The property is situated at an average elevation of about 5500 feet, the highest point on the property being about 6300 feet.

The topography is characterized by steep-sloped hillsides and narrow ravines. The slopes are well vegetated with black oak, manzanites, juniper and

The climate is semi-arid. The average rainfall is said to be about 14 inches a year.

Property:

The Duquesne property consists of 74 patented claims aggregating about 1200 acres. All but 18 are owned by Mr. A. R. Byrd, Jr., who is the optionee of the rest, namely: New York, Kansas, Indiana, Maine, Texas, Arizona, Smuggler, San Antonio, San Antonio Mill Site, California, Empire, Empire Mill Site, Pocahontas, North Belmont, and South Belmont, Belmont Mill Site, Holland and Estella-Louise.

HISTORY:

The first record of the Duquesne property is 1862 at which time the San Antonio ore body was found.

Until about the start of the present century, the various mines comprising the present Duquesne group, were divided into small groups and individually owned.

About the year 1892, the late George Westinghouse organized the Duquesne Mining & Reduction Company and consolidated the various claims into the present property. The copper content of the ores is said to have attracted his interest.

The history of the property, as derived from United States Geologic Survey bulletin No. 582, and from hearsay of the old residents in the district, indicates that the majority of ores mined were sorted and shipped directly to the smelters. The complexity of the ores and the inability to make metallurgical separations and savings of the values discouraged milling. Mining was pursued most intensely during the periods of high copper and lead prices and some zinc ores were shipped during the late war period. Ore extraction is said to have stopped when metal prices dropped and when the zinc content of the ores became so high as to prohibit sorting out the lead and copper contents.

Several attempts at milling were made but in each case the zinc values were lost; in most cases the copper values were lost. One of the earliest mills in the region was the Crowe Mill which handled the Holland ores and saved most of the lead content, but lost a large percentage of the copper. All but about 150 tons of the tailings were shipped to the copper smelter at Douglas, Arizona, during the war period for the copper and silver content. A sample of the remaining tailings assayed 5.7 Ag, 1.85 Cu, 3.5 Pb and 13.1 Zn.

The Duquesne Mining & Reduction Company ceased operations when metal prices fell shortly after the war period. Since that time the various mines on the property have been operated intermittently by leasers, shipping ores for their copper, silver and lead content.

The most extensive operations on the property have been performed in the Bonanza Mine, 635 feet deep and the largest mine in the area; the New York, 200 feet deep and the Kansas, 150 feet deep.

According to a bulletin of the Arizona Bureau of Mines, the production of the Duquesne Mining and Reduction Company from 1899 to 1925 amounted to 15,000,000 pounds of copper, 12,000,000 pounds of lead, 3,000,000 pounds of zinc, and silver valued at \$350,000. The total value of this production is recorded to be \$4,000,000.

Geology:

The Duquesne property lies principally in a highly fractured and generally steeply west dipping block of massive limestone, with interbedded thin layers of quartzite and sandy limestone that is almost completely surrounded by intrusive igneous rocks ranging from quartz-monzonite on the west contact to diorite on the south and east contacts. One prominent dike of the monzonite cuts through the property at the Pride of the West mine.

On the eastern side of the property there is a later

period of igneous activity that cuts the diorite in the form of dikes of fine-grained granite that grades into a rhyolitic phase progressing eastward.

The limestone block with interbedded quartzites is suggested by F. C. Schrader in United States Geologic bulletin No. 582, to be Devonian in age.

The pre-mineral fracture pattern suggests major stresses from the northeast and southwest resulting in a series of prominent north-south fractures with northeast-southwest cross fractures.

The thrust from these stresses has probably caused considerable offsetting of the beds along the northeast-southwest cross fractures. A detailed geologic study and survey will be necessary to determine the extent of the throw. There is also over-riding of thrust blocks and overturning of the bedding which should be brought out in a detailed survey.

In only a few places is bedding recognizable in the limestone and quartzite due to the fracturing and metamorphism.

Along the limestone-monzonite contacts and fractures, the limestone has been metamorphosed into garnet for widths that vary from a few inches to several hundred feet; the wider garnet areas are in zones of intersecting fractures and near the south intrusive contact. Limestone for several hundred feet on each side of the garnet zones has been re-crystallized or marbleized.

The quartzite has been pyritized to a small extent along intrusive contacts; in only a few places is epidote developed.

The principal ore minerals found are oxide minerals of lead, silver, copper and zinc as supergene ores and silver-bearing lead, copper and zinc sulphides as hypogene ores.

The principal gangue minerals are garnet, quartz, pyrite and calcite. There is very little pyrrhotite and magnetite in the ores. There are many other supergene minerals and metamorphic minerals of no importance.

Ore Deposits:

The ore deposits occur as fracture fillings and replacements in limestone and garnet with replacements favoring the limestones. Nearly all ore bodies on the property have been found along the garnetized areas in the limestone and the largest bodies found at or near the intersection of two or more fractures; some bodies are found almost completely isolated in limestone. The ores appear to have replaced readily into strongly fractured limestone as in

the Kansas Mine. The garnet does not appear to have been replaced readily, though some replacement does occur as in the hanging wall of the Holland Mine. In most cases invasion of the garnet by ore minerals appears to have been controlled by the fracturing in the garnet.

In the Belmont-Silver Bell region, which is composed almost entirely of garnet, the ore bodies do not appear to go deep. Exploration beneath the large surface stopes has revealed only narrow, non-commercial widths of mineralization that suggests the ores are bottoming in garnet.

In places where ore deposits occur along fractures where there is no apparent cross fracture, the ore bodies are developed in narrow widths on the hanging and foot wall contacts of the garnet and limestone.

The ore deposits occur, for the most part, as comparatively small and scattered pod-like bodies.

The quartzite does not replace readily, and only minor fissure fillings with ore too narrow to mine are found in this type of rock along pre-mineral fractures.

The intrusive rock that is the source of the ore deposits is not exposed on the property.

The fact that the monzonite is pre-mineral is evidenced in a tunnel in monzonite on the Lead King claim; the blocking (tension breaks) is pyritized and fine grain chalcopyrite is thought to occur with the pyrite.

There is no apparent zoning of the primary ores with depth. However, sufficient work to definitely establish this has not been done. There is a remarkable similarity of the ore deposits in all parts of the property indicating widespread mineralization and more or less simultaneous deposition.

The paragenesis is yet to be determined microscopically.

The greatest vertical depth explored by diamond drilling (400') has revealed no change in the character of the mineralization in the limestone it is therefore reasonable to suppose that primary ore deposits of a similar nature to those extracted from the various mines on the property will continue to the bottom of the crystalline limestone.

BONANZA-ESTELLA-LOUISE AREA

Location and Accessibility

The Bonanza-Estella-Louise area is located at the east central part of the property and is made accessible by the Nogales-Lochiel road.

This area contains two of the strongest fractures on the property which occur a short distance west of the east intrusive contact of what has been termed granite porphyry. Extensive stoping has been done on both fractures in the vicinity of the Bonanza mine and there is scattered surface pitting and stoping along both of the fractures south of the mine.

BONANZA MINE

Location and Accessibility

The Bonanza mine is located in the south central part of the Bonanza claim in the east central part of the Duquesne property, at an elevation of about 5370 feet.

The shaft of the mine is about 300 feet west of the Nogales-Lochiel road and is accessible by a short branch road.

History

The Bonanza shaft was sunk and mine development started shortly after the year 1892, shortly after the Duquesne Mining & Reduction Co. was organized.

The mine was operated quite continuously until about 1920.

About 1915 a 100-ton flotation mill was installed to treat the ores from this mine and others in the area. This mill did not operate long; and shipment of ores direct to smelters resumed with the increase in metal prices.

The Bonanza is the deepest and most extensively developed mine in the area. During the year 1916, Mr. T. F. Gardner speaks of shipping 300 tons of 10% copper ore per month from this mine. This was undoubtedly the product of considerable sorting, the rejects going on to the dumps which were shipped during high metal prices and said to have run copper 5%.

The Bonanza mine is at present full of water above the 70' level and the stoping of ore above the 235 level by leasers has resulted in twisting and settling of the shaft, which would

probably require retimbering to the 235 level should the mine be reopened.

Geology:

The Bonanza mine is located near the intersection of two strong pre-mineral fractures that strike north-south; these fractures, the Bonanza fracture, to the west and the Estella-Louise fracture to the east, can be traced for a length of about 3000 feet and numerous surface pits and trenches give indication of widespread mineralization.

The Bonanza fracture occurs in limestone along the west contact of crystalline-sandy limestone and the Estella-Louise fractures in limestone along the east contact of the same sandy limestone with crystalline limestone a short distance west of the east intrusive contact. The fractures are garnetized only in the ore zones in the vicinity of the shaft but as they progress southward and approach the south contact garnetization increases to the point where the fractures are entirely in garnet before passing into the south intrusive contact.

The south part of the 40 level workings were examined by descending through large surface stopes south of the shaft; the level shows prominent stoping on the Bonanza fracture to a point about 150 feet south of the surface stope. The attitude of the ore bodies on the 40 level south of the surface stope is readily discernible; the ore bodies occur pod-like, pinching to narrow widths as small as a few inches for several feet and suddenly enlarging to widths up to 10 feet, remaining as an ore pod for 30 or 40 feet and then repeating the condition along the strike. The same condition existed along the dip; none of the ore pods mined above the 40 level south of the surface stope come through to the surface. It is possible that this same condition exists elsewhere on the property.

Development:

The only workings of the mine open to examination were the two large surface stopes and the southern part of the 40 level. All other information has been derived from old maps and reports.

The Bonanza mine is developed by a 635 foot vertical shaft and the following levels: 40, 70, 235, 335, 435, 535 and 635. It is said that most of the stoping has been done above the 435 level but that some was done from the 635 level to the 435.

The 70 level is the most extensive lateral working; it followed along the Bonanza fracture about 750 feet, then cross-cutted 200 feet to the Estella-Louise fracture and then drifted

along this fracture about 150 feet; a connecting raise was driven from the 70 level to the Estella-Louise shaft.

ESTELLA-LOUISE MINE

The Estella-Louise mine is located along the Estella-Louise fracture, about 800 feet south of the Bonanza shaft. The mine is developed by a 50-foot inclined shaft from which a level has been driven south about 60 feet in a rather narrow ore body which has been stoped out.

The 70 level of the Bonanza mine extends about 70 feet south and under the Estella-Louise shaft, along the fracture, and connects with the 50-level by an inclined raise about 20 feet north of the Estella-Louise shaft.

An old map indicates ore from two to four feet wide and assaying 5.0 Ag, 5.0 Cu, 4.0 Pb and 20.0 Zn, remains in the bottom.

NEW YORK MINE

Location and Accessibility

The New York Mine is located in the southwest end of the New York Claim in the northwest part of the Duquesne property at an elevation of about 5500 feet. The mine is accessible by a road up Washington gulch from the Nogales, Lochiel road.

History:

The New York Mine is said to have been intermittently worked from the earliest days of operation in the area until the 1920's. A large tonnage of ore, running up to 10% copper, is said to have been shipped from the mine. The extent of stoping is evidenced by an ore dump of sorting rejects. This dump contains about 4500 tons of sulphide ore that assays, according to four large samples taken: 2.3 Ag, 2.06 Cu, 0.4 Pb and 7.2 Zn; the dump has remained exposed to the air for so many years that the sulphide surfaces are probably so badly tarnished and oxidized as to make a flotation separation of the values impossible; metallurgical tests will determine this.

Geology:

The New York Mine is located at the intersection of two prominent fractures in - - - - (not legible.) The principal ore bodies as seen on the 50 and 110 levels, occur along a branch fracture trending toward a point a short distance north of the Indiana Mine. The ground surface

along this zone was quite intensely shattered in pre-mineral time as evidenced by narrow cross bands of garnet.

A small amount of narrow fissure filling and slight replacement occurs in the quartzite.

The ore minerals consist of chalcopyrite, galena and sphalerite.

Development:

The New York Mine was developed by a 150-foot vertical shaft from the floor of a large surface stope and three levels, namely the 50, 110 and 150 levels.

We unwatered the mine to the 110 level at which point the shaft was found filled with muck.

On the 50 level there is a stope on the branch fracture from the Kansas-New York fracture, about 40 feet long by 10 feet wide, which extends to the surface under the large surface stope of dimensions about 80 feet by 30 feet. There is a small stope on the Kansas-New York fracture about 20 feet long by 6 feet wide and 15 feet high; 6 feet of ore mineralization remains in the south face of the Kansas-New York fracture.

There are several stope margins that were sampled on the 110 and 50 levels, the average of which is: 1.19 Ag, 2.99 Cu, 0.56 Pb and 12.23 Zn.

There is no tonnage of any consequence in pillars and stope margins above the 110 level and the small amount that does exist is possibly too badly tarnished to be millable.

Diamond drilling exposed ore occurrence below the 110 level and also the existence of the 150 level.

Diamond Drilling:

After the New York Mine was unwatered to the 110 level and the shaft was found filled with muck below that, an attempt was made to drill down the rake of the ore body from the 110 level.

New York I-U, drilled at an angle of 60 degrees, passed out of the ore body into the hanging wall at 4 feet and intersected a narrow width of branch replacement from 15 to 17 feet that assayed 2.90 Ag, 9.69 Cu, 0.00 Pb and 1.56 Zn; the first four feet assayed 2.40 Ag, 2.82 Cu, 1.00 Pb and 3.43 Zn. A pre-mineralization branch fracture caused a localized reversal of dip of the ore body a few feet below the 110 level.

New York 2-U was then drilled vertically from the same location; the hole passed out of the ore body at 4.0 feet entered it again at 17.0 feet and passed into the footwall of the ore body at 29.0 feet. The core from 2.0 feet to 4.0 feet assayed 0.50 Ag, 1.33 Cu, 0.00 Pb and 1.06 Zn and the core from 17.5 feet to 29.0 feet assayed 1.00 Ag, 2.46 Cu, 0.00 Pb and 10.34 Zn. The hole passed through an open stopp or drift, probably on the 150 level, from 37.0 to 47.5 feet.

The diamond drill hole split core samples and samples cut on stopp margins give an average grade of 1.33 Ag 3.06 Cu, 0.42 Pb and 10.20 Zn. This grade is probably lower than the average of the ore body as the drill holes cut it in only two places and the cut samples were on the stopp margins.

KANSAS MINE

Location and Accessibility

The Kansas Mine is located in the northeastern half of the Kansas claims, on the northern edge of the Duquesne property, at an elevation of about 5700 feet on the north slope of a spur ridge from the crest of the Patagonia mountain range.

The dirt surfaced county highway from Nogales to Patagonia passed directly before the portal of the upper Kansas tunnel; a spur road connects the mine with the Washington and Duquesne camps.

History:

In 1902 silicious ores were extracted from the Kansas Mine for furnaces smelting Pride of the West ores. From 1902 until 1915 the mine was worked intermittently by leasers, and shipped by the Duquesne Mining and Reduction Company. The ores were hauled by T. F. Gardner to Patagonia, the nearest shipping point, 20 miles away.

From 1917 until 1918 the mine was leased by Frank Cox who shipped considerable oxide ore for its copper content.

From 1918 until 1920 the Duquesne Mining & Reduction Company started the lower workings and shipped considerable ore with a good lead content.

Later George Everett took a lease on the mine and shipped most of the ore extracted from the present lower workings. He worked the mine until 1924.

In 1932, a Mr. Shell took an option on the property and spent six months examining the mine. His sampling is said to have

resulted in an average of 8 ozs. Ag, 2% Cu and 11% Zn and 7% Pb for the ore remaining in the mine, including the winzes in the bottom of the lowest stops.

Geology:

The Kansas Mine is in a more or less continuous ore body that occurs as a limestone replacement at the intersection of and along two pre-mineralization fractures that strike about S 78 degrees W and S 50 degrees W, respectively, and appear to dip steeply to the northwest. Most of the ore was found along the S-78 degrees W. fracture, which extends from the Kansas Mine to the Indiana Mine.

Garnetization of the limestone is practically absent; the only garnet found is occasional crystals occurring as a matrix in the sulphide ore bodies.

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The mineralization consists of pyrite, sphalerite, silver bearing galena and chalcopyrite with a preponderance of pyrite.

Branch ore replacement from the main body occurs frequently in pre-mineralization branch fractures and along bedding. In all cases the ores appear to follow the fracture pattern and replace most extensively in the more fractured zones.

Development:

The Kansas Mine is developed by an upper tunnel above which all ores, oxides, have been extracted, a mill floor tunnel above which practically all ore had been extracted and a vertical shaft 150 feet deep from the surface outcrop of the ore body.

The main ore body and branches have been extensively stoped to a depth of about 63 feet below the mill floor tunnel. The dimensions of the ore body on the lowest level are approximately 130 feet by 20 feet. Two winzes from this level about 25 feet apart are sunk to a reported depth of about 25 feet and are reported to be in ore the entire distance, which is reasonable to believe, in view of the size and depth of the ore body.

A lower tunnel was started about 68 feet below the mill floor tunnel and driven about 186 feet toward the main ore body. About 190 feet remain to be driven to reach its objective but no advantage would be obtained since the tunnel corresponds in elevation with the bottom of the lowest stops.

No exploration or development work has been pursued north-east along the lateral continuation of the fractured zones. Several small ore exposures on the surface along the Kansas-New York fracture between the Kansas and New York mines indicate strong possibilities

of ore bodies along this zone. The Kansas-Indiana fracture near the west contact of the monzonite has not been explored to depth; the presence of two feet of mixed oxides and sulphides was exposed on one surface pit about midway between the Kansas and Indiana mines.

Prominent pillars and ore slabs remaining above the floor of the bottom stope were sampled to obtain an indication of the grade remaining in the mine. The results of the sampling are shown on the sketch accompanying this report.

Diamond Drilling:

An attempt was made to explore the downward continuation of the Kansas ore body by drilling down the rake of the ore body from the floor of the lowest stope. In attempting to reach the floor of the stope to collar a drill hole east of the east winze the ore body was found to have been underhand stoped and back filled to the bottom of the winze, which is said to be 25 feet below the filled stope floor.

Kansas No. 1-U was collared in the stope floor about 10 feet west of the east winze at an angle of 87 degrees. The hole passed into the foot wall at 21.0 feet and intersected a narrow branch body from 37.0 to 41.0 feet that assayed 2.10 Ag, 0.36 Cu, 8.32 Pb and 6.41 Zn. The cores from the first 21 feet assayed as follows:

0' to 5'	3.20 Ag	1.28Cu	8.62Pb	31.87Zn
5' to 11'	1.80 "	0.15 "	4.42 "	9.58 "
11' to 21'	3.10 "	0.72 "	4.95 "	7.82 "

Kansas No. 2-U, drilled vertically from the same location passed through the foot wall of the ore body at 21 feet and through the narrow branch body from 63.5 feet to 71.0 feet. The ore sections assayed as follows:

0 to 4'	3.80 Ag	1.05 Cu	10.70 Pb	16.69 Zn
10.5' to 21'	1.50 "	0.18 "	3.33 "	7.59 "
63.5' to 71.0'	8.00 "	2.05 "	5.15 "	3.89 "

A bed of sandy limestone, with bedding dip about 70 degrees SE, contacts the crystalline limestone in the drillholes about 60 feet below the floor of the bottom stope. This sandy limestone contact appears to have influenced the pre-mineral fracturing and caused the ore body to reverse its dip and follow along the direction of the contact.

HOLLAND MINE

Location and Accessibility

The Holland Mine is located in the south-central portion of the Holland claim in the west-central part of the Duquesne property, at an elevation of about 5700 feet. The mine is situated on the eastern slope of a prominent northwest-southeast ridge along the eastern slope of the Patagonia mountain range.

The mine is made accessible by 0.7 mile of property dirt road from Duquesne camp, which is on a branch road to Lochiel, a border patrol and customs station.

History:

The Holland mine was worked quite continuously from 1897 to 1900 when operations ceased. During this period a mill was constructed to treat ores by jigging and tabling. During the World War all but about 150 tons of the tailings dump was shipped for the copper and silver content.

About 1902, the Pride of the West Co. installed a boiler to be used in unwatering the Holland Mine. In building a road at that time an ore body was uncovered a short distance north of the former Holland workings. The company mined this, and in the latter part of 1902, the Pride of the West Co. suspended operations in the Holland and their own mine and mill.

Geology:

The Holland mine is on a pre-mineralization fracture in limestone that strikes about N 20 degrees W and dips about 40 degrees SW, and is located about 400 feet east of the quartz-monzonite limestone contact. The limestone along this fracture is strongly garnetized to widths that vary between three and thirty feet.

The mine workings are in what appear to be two district ore bodies, but which might, due to their nearness to one another, come together at some depth greater than reached by the south Holland workings.

The ore bodies occur as garnet and limestone replacements. In zones of cross fracturing the limestone has been replaced to widths from 5 to 20 feet. All of the ore mined in the south Holland workings occurred on the footwall side of the garnet zone. In a few places where the garnet zone is narrow, the full width of metamorphic zone was mineralized.

The mineralization consists of silver-bearing lead, zinc, copper and iron sulphides. In the south Holland workings, the better concentrations of galena and chalcopyrite were found on the footwall side of the ore bodies; the hanging wall side contained mostly sphalerite.

The limestone on both the hanging and footwall sides of the garnet zone has been re-crystallized and is quite pure.

Development:

The Holland mine was developed and operated by four different shafts. The depth of the workings is reported to be 200 feet. The southernmost shaft was found full of fill rock at a depth of 133 feet below the collar; at this depth the only opening present was the shaft. Stopping from this shaft started 120 feet below the collar and extended to the surface. The next shaft, progressing northward, was found caved at a depth of 105 feet; the next shaft appeared to bottom at 70 feet in the vicinity of samples 16 and 17 on the assay plat of the Holland mine, and the northernmost shaft was found full of rock at a depth of 160 feet below the collar. From 50 feet to 120 feet an average width of six feet of ore is exposed on the south wall; the north wall is barren except for one spot at sample 20, which appears to be a skin of ore remaining on the wall; from 120 feet to 150 feet the ore is mostly in the hanging wall; two feet is exposed on the south wall and an additional two feet was exposed by blasting a boot-leg hole in the hanging wall. Two feet of ore is showing on the north wall from 152 to 160 feet.

The hanging wall of the stope around the southernmost shaft, from 20 feet to 120 feet below the collar and from 35 feet north to the south limit of the stope, is mineralized with sphalerite and minor amounts of chalcopyrite and galena for a thickness that varies from three to seven feet.

A small crosscut driven into the hanging wall at sample 25 exposed five feet of very good zinc ore with an appreciable amount of chalcopyrite. The fill line of the south stope is probably within ten feet of the old stoping limit since the volume of alluvium and wall rock sluff would indicate no more fill.

In addition to the hanging wall there are two large pillars and several small ones in the south Holland workings as shown on the assay plat. The bottom of the south Holland workings showed ore in all solid vein exposures that varied between four and eight feet in width.

Several pits in the garnet zone to the north of the main Holland mine workings showed copper staining and samples in two of them ran 0.2% and 0.4% copper.

CALIFORNIA AREA

Location and Accessibility

The California area is located in the south central part of the Duquesne property and comprises the California surface pits and stopes, the Annie pits and the Roadside pits along the California fracture system. The average elevation of the workings in this section is about 5500 feet. They are accessible from the road leading to the Empire mine.

History:

There is no recorded history on this area; no mines of any consequence have been developed. A comparatively small tonnage of ore has been mined from the oxide portions of the ore bodies by leasers and in only one case was an attempt made to mine the sulphides. This was in the north California pit in which an inclined shaft extends to a depth of about 50 feet.

Geology:

The California fracture system is strong and continuous for a length of about 1400 feet and embraces the area from the Holland road to the San Antonio north pit and covers a width of about 400 feet. In the central part of the area there is much branching and cross-fracturing and this is apparently the zone in which the principal ore deposits occur, as indicated by surface mining.

A small quartz-monzonite plug about 175 feet long and 60 feet wide, occurs about 50 feet west of the middle California stope. This plug is completely surrounded by garnet; to the south the garnet extends to the south intrusive contact; to the east it extends about 50 feet to the middle California stope which has crystalline limestone on the east wall.

California Pits and Surface Stopes:

California pits and surface stopes in the central and southern part of this area show the occurrence of rather large ore bodies on the surface. The northernmost stope indicated an orebody about 125 feet long and the middle stope an orebody about 150 feet long. Many other pits and surface stopes in the southern part indicate occurrences of small pod-like orebodies and narrow widths of what might have been high grade mineralization along the fractures.

The Annie Pits:

The Annie pits occur in the northern part of this area, along the California fracture system, a short distance south of the Holland road. Various pits indicate the occurrence of rather scattered

and small pod-like orebodies. The pit nearest to the Holland road is about 30 feet long by 10 feet wide.

Two samples cut in this pit assayed as follows:

4.5' - 3.0 Ag	1.69 Cu	1.1 Pb	4.5 Zn
8.0' - 15.5 "	2.68 "	11.8 "	9.7 "

A pit of dimensions of approximately 12 feet long by 8 feet wide located about 160 feet north of the Roadside shaft, contains ore that assayed 3.5' - 11.0 Ag, 0.81 Cu, 6.8 Pb, 25.6 Zn.

There is little garnetization in this area, the orebodies being practically isolated in limestone.

Roadside Pits:

The Roadside pits, including the Roadside shaft and neighboring small pits, are located in the west central part of the area. These indicate the occurrence of small pod-like orebodies at intersecting fractures. In only one is fresh sulphide ore exposed and that is the Roadside shaft which is about 20 feet deep. This shaft has been sunk in the ore and no attempt has been made to delineate the orebody as regards width or length. The full width of the bottom of the shaft is in ore which continues into the hanging wall. Two samples cut in this shaft assayed as follows:

3.5' - 40.0 Ag	5.70Cu	14.1 Pb	13.5 Zn
4.0' - 10.0 "	0.76 "	2.4 "	6.4 "

Diamond Drilling

To cut the California fracture system, five surface holes were drilled in the area and two holes were drilled west from the face of the west crosscut on the 100' level of the Duquesne shaft. Our most encouraging drilling results were obtained from these holes, indicating that ores of a good grade and in minable widths occur below some of the ore bodies mined by surface pits and stopes.

The accompanying plan and sections show the locations of the holes and their interpretations are as follows:

California No. 1 was drilled to cut all three fractures in the central part of the California area and to explore the downward continuation of the rather large ore body on the west fracture mined on the surface. This hole encountered two ore bodies, one on the east fracture and one on the west fracture.

The ore body on the east fracture occurs at a garnet-limestone contact and does not come through to the surface. The hole passed through this body from 88.5 to 100.0 feet (the cross-section indicated this would be of a normal width of between five and six feet.) The split core for this section assayed 1.70 Ag, 3.38 Cu, 1.50 Pb

and 2.78 Zn; a sample covering only the section from 88.5 to 93.0 feet assayed 3.0 Ag, 6.20 Cu, 4.2 Pb and 4.0 Zn. It is not possible to estimate the tonnage of ore indicated by the hole in this body as the only dimension we have is the width at one point.

The ore body on the west fractures where intersected by the hole, from 459.0 to 476.0 feet, occurs entirely in limestones. From this ore zone 3.2 feet of core was obtained, which assayed: 12.80 Ag, 1.43 Cu, 8.82 Pb, and 12.66 Zn. With a uniform dip of 65 degrees the ore zone has a width of six feet normal to the dip of the fracture. Reference to the longitudinal section of the California area shows that this ore body is possibly the downward continuation of the body mined in the northern part of the area on the west fracture and the downward extension of the middle ore body which was the intended objective of the hole.

Sludge samples for the section 460.0 to 480.0 feet averaged 6.17 Ag, 1.65 Cu, 3.95 Pb and 5.25 Zn; the sludge samples carried four feet of barren limestone carry-over, so the grade of the ore body is probably somewhere between the average assay of the sludge samples and the assay of the split core.

The fact that the ore did not occur at the garnet-limestone contact and that no garnet was found to a hole depth of 586.0 feet, suggests that the garnet zone in that area overrides the limestone from the south, and that the garnet for some distance to the south is underlain by crystalline limestone. This being the case, it is probable that ore bodies in that area will have a rake to the south.

The middle fracture, where hit by the hole from 191.0 to 196.0 feet, was oxidized and contained iron oxides and small remnants of pyrite which carried no values.

California No. 2 was drilled to cut the main (west) fracture near the north limit of the mineralization as it indicated by surface pits and stopes. The hole cut a mineralized garnet-limestone contact from 60.0 to 63.5 feet, which assayed 1.25 Ag, 0.35 Cu, 0.59 Pb and 8.42 Zn. This mineralization occurs on a branch fracture from the California fracture system. The main fracture was intersected from 133.0 feet to 134.0 feet and assayed California area, as suggested, have a rake to the south, this hole went under the ore body on its rake and the mineralized section encountered represents only the continuity of mineralization along the fracture.

California No. 3 was drilled to cut the main California fracture below the south end of the north surface pit. The hole cut the mineralized garnet-limestone contact found in California No. 2, as a branch from the main fracture system, from 54.3 to 56.6 feet which assayed 1.90 Ag, 0.82 Cu, 0.80 Pb and 9.44 Zn. Three

other garnet-limestone contacts in this hole contained minor dissemination of iron, copper, lead and zinc sulphides. The main fracture was cut from 189.7 to 197.0 feet with limestone on both sides of the body; the ore body in this section consisted of two ore streaks separated by 1.8 feet of barren crystalline limestone. The ore body from 189.7 to 192.0 feet assayed 2.40 Ag, 0.05 Cu, 9.90 Pb and 6.46 Zn; from 194.0 to 197.0 feet assayed 1.70 Ag, 0.30 Cu, 6.54 Pb and 6.71 Zn. It is possible that these ore streaks occur as lenticular replacements of the limestone branching from the mineralized garnet-limestone contact intersected from 180.0 to 185.0 feet.

California No. 4 was drilled to cut all three of the California fractures near the north end of the large surface stop in the central part of the area. This hole was collared in the monzonite plug about 80 feet west of the main California fracture, and remained in this rock for 18 feet. The hole encountered disseminated zinc sulphide in garnet just before it dropped into an open cavity from 97 to 100 feet. Lack of oxidation indicated that the opening encountered was vug or cavity and not a mine working. The hole was abandoned at 100 feet.

California No. 5 was drilled from the same location and in the same direction as California No. 4, but at a steeper angle with the same objectives in view. The hole encountered the main fracture from 150.0 to 161.8 feet. The section from 150.0 to 154.0 feet assayed 4.50 Ag, 4.95 Cu, 0.60 Pb, and 11.06 Zn. The rest of the zone was mineralized with iron, zinc, copper and lead sulphides, but not strongly enough to make ore.

After passing through the main fracture the hole remained in limestone to 100.0 feet, passing through only one narrow garnet band about one-half inch wide and accompanied by a little gouge at 295.0 feet. This is probably the downward continuation of the east and middle fractures, which came together at some higher elevation. The failure to find a prominent garnet zone beneath the zone shown between the east and middle fractures on the surface bears out the over-riding of the garnetization from the south.

The ore found on the main fracture in California No. 5, when plotted in longitudinal section, gives indications of being the downward continuation of about the south limit of the body mined in the northern part of the area, if the body rakes to the south.

Duquesne 2-U was drilled horizontally from the face of the west crosscut on the 100 level of the Duquesne shaft, to cut the California fracture about 90 feet north of the San Antonio north pit, at a vertical depth of about 150 feet below the surface. The hole intersected the fracture from 134.6 to 136.1 feet and assayed 19.0 Ag, 0.72 Cu, 15.3 Pb, and 13.0 Zn. There is no surface pitting or trenching to indicate the presence of ore bodies above this fracture intersection; the fracture is covered by alluvium on the surface.

Duquesne 1-U was drilled horizontally from the face of the west crosscut on the 100 level of the Duquesne shaft to cut the California fracture about 125 feet north of the Duquesne 2-U. This hole intersected the fracture from 201.0 to 202.6 feet, which assayed 30.0 Ag, 1.40 Cu, 17.2 Pb and 15.5 Zn. With a south rake to the ore bodies in the California area, this fracture intersection could be near the north limit of the downward continuation of the small body mined on the surface near the south end of the California fracture.

EMPIRE - SILVER BELL AREA

Location and Accessibility

The Empire-Silver Bell area consists of the Empire mine and pits, along the Empire-Silver Bell fracture system, to the Silver Bell shaft in the northern part of the Silver Bell claims, but does not take in the Silver Bell tunnel or stopes. The area is located in the southwest part of the property at an average elevation of about 5520 feet and is accessible by the road leading to the Empire mine.

History:

The Empire claim was patented in 1874 by a Captain O'Conner. During the period 1880 to 1890 the mine was worked by leasers who extracted considerable oxide ore. The Duquesne Mining & Reduction Company acquired the claim in 1905 and opened it to a depth of 60 feet. The present owners did a small amount of work in the mine during 1938 and extracted an estimated 50 tons of ore.

Geology

The area is located in the pre-mineral fracturing of crystalline limestone that lies on the north side of the strong garnet area bordering the south intrusive contact. Surface pits indicate that the ore bodies in this section occur usually as small pods rather widely separated. The largest bodies are found in the northern part of the area, at the Empire mine where they occur at intersecting fractures. The largest, about 100 feet long, occurs along the eastern contact of a tongue of limestone with a massive garnet area to the east in the vicinity of the Empire shaft. Another smaller body, about 35 feet long, occurs where the western fractures of the Empire-Silver Bell system converge in limestone in the northern part of the area.

Sulphides were reported encountered at a depth of about 30 feet and are composed of silver-bearing lead, zinc, copper and iron sulphides.

Development:

The Empire mine is developed by two shafts, (1) a vertical shaft 64 feet deep in the immediate vicinity of the furnace stope

on the eastern fracture, and (2) a 48-foot inclined shaft, about 100 feet north of the vertical shaft, on the western fracture about 60 feet south of a surface stope on the same fracture.

The crosscut from the vertical shaft, on the 64-foot level cut an ore body eight feet wide which has been exposed for a length of 12 feet by leasers stoping; ore remains in the north and south faces and in the back and bottom of the stope; this ore body is probably the downward continuation of the body stoped on the surface to a depth of about 30 feet where sulphides were encountered.

The bottom 20 feet of the inclined shaft is on the south side of an ore body apparently making to the north; the ore is one foot wide on the south side and seven feet wide on the north side with ore still in the hanging wall. This ore body is probably the downward continuation of the body mined on the surface about 50 feet to the north of the collar of the shaft. Sulphides were encountered at a depth of about 28 feet in the inclined shaft.

The trend of the ore body found in the crosscut from the vertical shaft suggests a continuation toward the ore body in the inclined shaft; the fracture is strong and this is a good possibility in spite of a suggestion of decreased mineralization in the north face.

In addition to the Empire workings, the fracture system is explored by numerous small surface pits along its southern continuation. All of these show narrow widths of oxide ore and one, which is under water, has good looking sulphide ore on the dump. At the south end, the area is developed by the Silver Bell shaft, which is reported to be 100 feet deep and an old map indicates that the only level, 100 level, is driven east toward the Empire-Silver Bell Fracture system. The shaft is filled with water to within 60 feet of the collar. It is a two-compartment shaft and the timbers appear to be in quite good condition. A small amount of sulphide ore on the dump indicates that a mineralized fracture was cut on the 100 level.

Two pits a short distance north of the Silver Bell shaft show three feet of sulphide ore that assayed:

3.0' - 7.0 Ag	1.62 Cu	3.1 Pb	5.5 Zn
3.0' - 19.5 Ag	1.60 Cu	8.8 Pb	8.4 Zn

Diamond Drill Exploration:

Six surface drill holes were drilled in the Empire area and one in the Silver Bell area to explore the Empire-Silver Bell fracture system.

The accompanying plan and sections show the hole locations. The interpretations are as follows:

Empire No. 1 was drilled to cut the ore body mined on the surface about 70 feet east of the Empire vertical shaft. The intersection of two fractures appears to have localized the ore body and the hole was directed to cut the body on its downward continuation with a rake to the south.

The hole was collared in garnet that was mineralized with copper sulphide too lean to be ore, and passed through the main mineralized zone from 48.5 to 76.5 feet; the average of the split core sample assays for the section is 4.33 Ag, 1.47 Cu, 1.44 Pb and 3.72 Zn. Two split core sections within this wide mineralized zone assayed ore as follows: 52.5 feet to 56.5 feet, 7.0 Ag, 1.40 Cu, 2.1 Pb and 4.5 Zn; and 58.5 to 64.5 feet, 7.6 Ag, 2.72 Cu, 2.4 Pb, and 4.0 Zn. The average sludge samples assays from 59.0 to 75.0 feet is 6.80 Ag, 1.87 Cu, 2.08 Pb and 4.78 Zn. It is estimated that 10 feet normal to the dip is minable. The hole passed through another mineralized fracture from 118.0 to 121.0 feet which assayed 9.00 Ag, 0.21 Cu, 3.96 Pb and 6.05 Zn.

Empire No. 2 was drilled to intersect the same ore body at approximately the same elevation, about 60 feet south of the Empire No. 1. The hole passed through ore on a garnet-limestone contact from 67.0 to 70.3 feet that assayed 9.40 Ag, 0.05 Cu, 6.34 Pb, and 2.57 Zn. The sludge sample for the section 65.0 to 70 feet, assayed 10.59 Ag, Tr Cu, 3.0 Pb, and 5.2 Zn, showing that the ore minerals in this section ground up considerably and were not recovered in the core, and as a result, the split core sample is lower in grade than the actual ore occurrence where intersected. The hole passed through the main body from 82.0 to 91.5 feet that assayed 7.40 Ag, 0.10 Cu, 4.21 Pb and 4.59 Zn; only three feet of core was recovered from this section. The sludge samples from 80.0 to 90.0 feet, containing two feet of barren limestone from the hanging wall side of the ore body, averaged 6.25 Ag, Tr Cu, 5.45 Pb and 5.05 Zn, indicating that the split core sample is probably a little low in lead.

Empire No. 3 was drilled to cut three fractures that showed a tendency toward convergence on the surface about 130 feet southwest of the Empire vertical shaft. In addition to the three mineralized fractures, the hole cut two mineralized limestone-garnet contacts; the second mineralized contact cut from 49.5 to 53.5 feet, assayed 1.20 Ag, 0.25 Cu, 1.29 Pb and 3.58 Zn. The first fracture was intersected from 94.6 to 107.0 feet and assayed 5.70 Ag, 0.35 Cu, 3.96 Pb and 4.49 Zn. The second fracture was intersected from 152.4 to 162.8 feet and assayed as follows:

152.4'	to	156.4'	2.25 Ag, 0.26 Cu, 1.39 Pb, 2.93 Zn
156.4'	to	160.0'	Mineralized garnet
160.0'	to	162.8'	4.80 Ag, 1.23 Cu, 2.38 Pb, 2.22 Zn

The third fracture system, intersected from 251.5 to 266.5 feet, assayed as follows:

255.5' to 263.5' Mineralized garnet
 263.5' to 266.5' 10.05 Ag, 0.62 Cu, 3.76 Pb, 10.84 Zn

The drilling has demonstrated the occurrence of rather narrow widths of ore below the surface and it is not possible to estimate the tonnage indicated.

Empire No. 4 was drilled to cut the west Empire-Silver Bell fracture about 80 feet south where cut by Empire No. 3. The hole passed through the fracture from 138.7 to 141.3 feet which assayed 6.20 Ag, 0.36 Cu, 3.86 Pb and 7.21 Zn; the mineralization in this section is too narrow to be ore.

Empire No. 5 was drilled to cut the fracture system about 200 feet north of where cut by Empire No. 3 and was directed to cut the downward continuation of an ore body mined on the surface. The hole passed through mineralized fractures as follows:

76.3' to 78.3' assay 0.95 Ag, 0.10 Cu, 5.84 Pb, 7.42 Zn
 89.3' to 91.8' " 1.60 " 0.31 Cu, 1.09 Pb 3.63 Zn
 128.2' to 128.2' " 13.30 " 0.15 Cu 7.03 Pb 4.44 Zn

Empire No. 6 was drilled to 100 feet north of Silver Bell hole No. 1 to cut the entire Silver Bell-Empire fracture system. No ore bodies were encountered in this hole but mineralization was found as follows:

72.7' to 74.5' - 9.70 Ag, 0.71 Cu, 4.86 Pb, 8.07 Zn
 246.5' to 247.5' - 0.76 " 0.00 " Tr " 6.8 Zn

Silver Bell No. 1 was drilled to cut the west Empire-Silver Bell fracture below an ore body mined on the surface about 110 feet north of the Silver Bell shaft. The hole passed through the ore from 85.9 feet to 88.9 feet which assayed 9.75 Ag, 0.97 Cu, 6.54 Pb and 7.26 Zn. With the narrow width this is marginal ore. The ore body as mined on the surface is a pod about 30 feet long.

Drilling in the Empire-Silver Bell area did not reveal the presence of sizable bodies of commercial ore, other than that in Empire Nos. 1 and 2. The failure to find ore in the other holes indicated that ore bodies in that area are small, irregular and quite widely separated.

MAINE- INDIANA AREA

Location and Accessibility

The Maine-Indiana area is located in the northwestern part of the property at an average elevation of about 5650 feet; the Indiana mine is accessible by the New York road. An impassable road runs from the New York mine to the Maine mine.

The area is located along the west fracture system that occurs along a quartzite-limestone contact a short distance east of the west intrusive contact; the quartzite contacts the monzonite and is slightly pyritized.

INDIANA MINE

Location

The Indiana mine is located in the central part of the Indiana claim at an elevation of about 5560 feet.

History:

The only history available on the mine is comparatively recent. During the period from 1910 to 1920 a sizable tonnage of ore was mined above the 50' level, but nothing has been done in very recent years other than the unwatering of the mine by T. F. Gardner to see whether ores of a shipping grade remained in the walls and backs of the stopes. Mr. Gardner did not operate the mine.

Geology:

The Indiana mine is located in a strongly cross-fractured area along the western fracture which follows along the limestone quartzite contact 60 feet east of the west monzonite (intrusive) contact. The entire length explored, about 280 feet, appears to be strongly mineralized with a preponderance of pyrite and marcasite; base metal ore bodies of silver-bearing lead, copper and zinc sulphides and their oxidation products, occur the entire distance within the pyritized area. To the south there is a marked decrease in the pyrite content and a tendency toward straight base metal fracture filling and limestone replacement.

Development:

The Indiana mine is developed by two vertical shafts; the north one is filled at 33 feet (reported to have been 50 feet deep) and the south shaft, about 20 feet distant from the other, about 50 feet deep.

The south shaft was unwatered and all working therefrom made accessible for examination. At the 30 foot level there are two small pillars of sulphide ore with principal value in zinc, (sample 2 on plan of Indiana mine). About 50 feet north of the shaft is a winze connecting with a short drift toward the south about ten feet below the 30 level. On the walls of this winze is about six feet of low-grade sulphide ore (sample 3).

The 30-foot level south drift is entirely in oxides. From the 50 level of the south shaft a drift, with inclined stoping therefrom, has been driven about 145 feet along a prominent east dipping mineralized fracture; the first 50 feet has an ore width varying between three and six feet; the rest of the distance has been stoped to an average width of about ten feet. A small amount of sulphide ore remains on the walls of the lower part of the stope and the bottom of

the stope is in sulphide ore. The lowest point to which ore has been exposed in the mine is six feet below the 50 level in the south end of the drift.

About 550 feet south of the Indiana mine and on the Indiana claim, and about 50 feet east of the intrusive contact, there is an open stope about 100 feet long by 7 feet wide, with a winze sunk to a depth of about 30 feet below the surface. The bottom 20 feet of this winze is in sulphide ore; the surface stope extends to a depth of about 10 feet. The grade of this sulphide ore as indicated by a sample cut over a width of 6 feet at a depth of 25 feet is:

4.5 Ag 4.58 Cu 0.3 Pb 22.1 Zn

MAINE MINE

Location and Accessibility:

The Maine mine is located in the central part of the Maine claim in the northwest part of the Duquesne property, at an elevation of about 5800 feet.

The mine at present is not accessible by road. The distance from the nearest road, the New York-Indiana road, is about 1200 feet. It would require about a quarter of a mile of road building in alluvium to reach the mine.

History:

Workings in the Maine mine date back to 1880 and possibly before that time. From that time to the present year it has been worked intermittently by leasers who have extracted small tonnages of shipping ore, mostly in the sulphide form.

Geology:

The Maine workings occur along two fractures, one at the contact of the limestone and quartzite, about 30 feet east of the monzonite contact, and the other a pre-mineral fracture in the limestone, about 100 feet east of the contact, which joins the contact fracture at the Ochoa shaft, the highest working of any importance on the Maine claim.

The west fracture is strongly pyritized and the ores occur within the pyritized limits as lens and pod-like bodies. The ores consist of galena, chalcopyrite and sphalerite, and replace into limestone extensively in zones of cross-fracturing. Several workings along the east fracture show 2.5 to 8.0 feet of excellent sulphide ore; the north and south faces and the bottom of these workings are in ore, suggesting continuous mineralization from the Weaver tunnel to at least 25 feet south of the Ochoa shaft. However, it is questionable whether mineralization will be of minable widths for the entire distance. (See Maine mine map).

The west fracture is mineralized for the full length explored, 210 feet, and where elsewhere exposed by a cut and short winze near the Ochoa shaft, two feet of ore is shown. At the Weaver shaft, from two to six feet of good ore is exposed.

Development:

The Maine mine is developed by a tunnel 210 feet long and by a shaft at the portal of the tunnel, reported to be about seven feet deep. There is an open cut and winze about 10 feet deep near the Ochoa shaft, and the Weaver inclined shaft, reported to be 50 feet deep and in ore the entire distance, is sunk on the west fracture near the monzonite contact. It is further developed by the Weaver tunnel, the Ochoa shaft, 25 feet deep, and interspaced stopes and pits along the east fracture.

There has been no stoping from the Weaver shaft.

In the Maine tunnel a small tonnage of ore was extracted from a stope about 100 feet south of the portal; a 7-foot winze, filled with muck at present, is sunk in this ore body below the tunnel level and is reported to be in very good ore, with a high copper content.

Near the south face of the tunnel a large stope was carried from the tunnel level to the surface. Ore remains in the south face. Copper staining on the west wall of the drift, between the two stopes, suggests the presence of ore not exposed.

The Weaver tunnel was driven on a narrow body of excellent sulphide ore that averages 2.5 feet wide; all the ore extracted was shipped. Ore remains in the south face and bottom.

About half way between the Weaver tunnel and the Ochoa shaft there is a large stope extending from the surface down 30 feet; the north and south ends and bottom of the stope are in good sulphide ore. Between this stope and the Ochoa shaft there is a shallow inclined shaft about 15 feet deep, the bottom of which is in 4.5 feet of good sulphide ore.

The Ochoa shaft is 25 feet deep and sunk in ore. At the 25 level a drift was driven 25' south in ore and six feet remains in the south face. An underhand stope 12 feet long and about 4 feet deep, was worked by the T. F. Gardners recently, from which some excellent ore extracted. The bottom of the stope is reported to be in 6 feet of ore ^{with ore} still in the hanging wall. On the north wall of the shaft there is about 2.5 feet of good ore.

All exposures of sulphide ore in the various workings were sampled. (See plan and section).

ARIZONA MINE

Location and Accessibility:

The Arizona mine is located in the west-central part of the property near the south end of the Arizona claim, at an elevation of about 5950 feet.

The mine is not accessible by road; the road ends at the Pride of the West mine.

History:

Ores were known to occur on the Arizona claim by early workers in this region. In recent years T. F. Gardner extracted two cars of ore from the mine, which, according to this report, ran about 18 Ag, 5 Cu, 20 Pb and 20 Zn; undoubtedly considerable sorting was done on this ore.

Geology

The Arizona mine is located at the intersection of a cross-fracture with two general north-south fractures. The cross-fractures and the several open cuts between the two shafts show narrow widths of oxide with mixed sulphide ore. There is a suggestion of continuous mineralization along the cross-fracture which is entirely in limestone. The north-south fractures occur along limestone-quartzite contacts and show practically no garnetization and only occasional spots of mineralization.

Development:

The Arizona mine is developed by two short shafts. The west shaft, a vertical one, is sunk to a depth of 28 feet at the intersection of the cross-fracture with the west north-south fracture. The east shaft, an inclined one, is sunk to a depth of 30 feet at an angle of about 45 degrees, at the intersection of the cross-fracture with the east north-south fracture.

A small amount of surface stoping has been done in the vicinity of the two shafts and the continuity of the cross-fracture has been exposed by trenching and open cutting; each cut shows mineralization.

The two shafts are in sulphide ore the entire depth and a small amount of stoping has been done in each.

One sample was cut in each of the two shafts; the results are shown on the section that accompanies the report.

DUQUESNE MINE

Location and Accessibility:

The Duquesne Mine is located on Grasshopper Flats in the south central part of the property, at an elevation of about 5440 feet. It includes the area adjacent to the Duquesne shaft and east of the California fracture system. The mine is accessible by a branch from the road running to the Empire mine.

History:

The Duquesne shaft was reported to have been sunk to a depth of 200 feet and cross-cuts driven east and west therefrom by the Duquesne Mining & Reduction Co., about the year 1920. It is reported that the shaft was intended to reach a depth of 1000 feet with exploration and development working to be driven at regular intervals. The explosion of some powder stored in the hoist house resulted in the death of one man and the complete destruction of the headframe, hoist house and compressor house, and all equipment. No work has been done in the mine since this occurred.

Geology:

The Duquesne shaft is a short distance north of a cross-fractured part of the limestone where the major fracture systems show a tendency toward convergence before passing into the south contact of the intrusive quartz-monzonite.

There is very little quartzite or sandy limestone exposed on the surface but the underground workings revealed considerable in the eastern part of the 100 level.

The ore bodies in this area, as indicated by surface pits and stopes and workings from the Duquesne 100 level, are small and pod-like and occur principally at fracture intersections.

Development:

The Duquesne shaft was retimbered to the water level, 72 feet below the collar, and unwatered to the bottom, 164 feet below the collar. Two levels were found: One at 103 feet below the collar and the other 157 feet below the collar. The 100 level consists of about 600 feet of drifts and cross-cuts, 300 feet east of the shaft and about the same amount to the west. The 150 level consists of 81 feet of cross-cut south from the shaft.

A plan showing geology, assays of ore and mineralized exposures on the 100 and 150 levels, and the diamond drill holes from the 100 level that explored part of this area, accompanies this report.

The workings on the 100 level encountered four mineralized zones, two of which contained minable widths of commercial ore. These showings are favorable for exploration with the chance of finding one or more small ore pods that will be readily available for extraction.

The cross-cut on the 150 level intersected one mineralized zone at a limestone-garnet contact, about 10 feet north of the face. The mineralization consists of one foot of silver-bearing lead, copper and zinc sulphides, disseminated in garnet, that assayed 2.12 Ag, 1.9 Cu, 1.4 Pb and 11.5 Zn. This mineralization corresponds with the first ore zone, intersected on the 100 level, on which a little stoping was done.

Diamond Drilling:

The Duquesne area was explored by two drill holes, drilled from 100 level of the Duquesne shaft; locations are shown on the accompanying plan and section.

Duquesne 1-U was drilled from the intersection of a drift and cross-cut east of the shaft on the 100 level at an inclination of -15 degrees, to cut the Doodle Bug and Bonanza fractures. The Doodle Bug fracture was cut from 114.0 to 118.0 feet and assayed 6.04 Ag, 0.00 Cu, 3.7 Pb and 9.2 Zn. The Bonanza fracture was cut at 232.5 feet; the fracture at this point was only slightly mineralized with lead, zinc and iron sulphides for a width of about two inches. The split core sample indicated an absence of copper values below the surface where small sulphide ore exposures contain about 1.5%; it is probable that the hole intersected the ore body at a localized point where no copper sulphide was contained and that elsewhere in the narrow body copper values will be found.

Duquesne 4-U was drilled east horizontally from a point about 58 feet from the face of the west cross-cut to intersect the possible south extension of the mineralized zones and ore showings found on the Duquesne shaft 100 level. The hole found only one ore showing, from 17.5 to 19.1 feet that assayed 5.0 Ag, 4.80 Cu, 0.8 Pb, and 8.2 Zn. This ore mineralization occurred along a branch fracture that was mined in the Gardner surface pit.

SAN ANTONIO AREA

Location and Accessibility

The San Antonio workings are located in the southern part of the property at an elevation of about 5420 feet and are accessible by a branch road from the road leading to the Duquesne shaft.

History:

The San Antonio workings are some of the oldest on the property, dating back to the 1860's.

Geology:

The San Antonio area occurs at a point where the California and Bonanza fracture system show a tendency toward convergence before going into the south intrusive contact. To the east of the Bonanza fracture system and to the west of the California fracture system, the area is strongly garnetized to the contact. The largest San Antonio pit contains a small remnant of limestone, completely surrounded by garnet; this pit is in a strongly fractured area. Other pits and surface stopes in the area are on smaller ore bodies than occur at limestone contacts.

Development:

The San Antonio workings consist of two parts: (1) The old San Antonio which is a surface stope about 40 feet by 12 feet and a shaft inclined along the strike of the ore zone at an angle of about 30 degrees and reported to be 50 feet deep. It is filled at present. (2) New San Antonio which consists of two large surface out-cropping. No ore is visible in the tunnel. Both stopes occur in zones of strong cross-fracturing and the size of the excavations indicates a large tonnage extraction. The only sulphide exposure is in a vertical shaft about 20 feet deep and about 30 feet east of the north stope. A 4.5-foot cut sample in this shaft assayed 6.0 Ag, 4.00 Cu, 12.5 Pb, and 11.7 Zn.

Diamond Drill Exploration:

The San Antonio area was explored at depth by one drill hole which was directed under the largest San Antonio pit. The location is shown on the accompanying plan; the interpretation is as follows:

San Antonio drill hole No. 1 was drilled to cut the system of intersecting fractures along which a sizable ore body was developed as evidenced by a large surface pit. The hole encountered two mineralized zones as follows:

37.5' to 39.5' 2.0 Ag, 0.75 Cu, 0.5 Pb, 2.0 Zn
60.8' to 62.0' 1.2 " 0.30 " Tr " 0.9 Zn

TEXAS SMUGGLER AREA

Location and Accessibility

The Texas-Smuggler area is located in the central part of the Duquesne property, on the Texas and Smuggler claims at an elevation of about 5500 feet.

The mines are accessible by a branch from the Holland road; the branch road runs to the Pride of the West mine.

Development:

There are several large surface pits and stopes on the Texas-Smuggler fracture system, from which considerable oxide ore was extracted. The deepest working at the Smuggler is about 30'; a small amount of sulphide ore on the dump indicates the lowest workings to be in sulphides. The deepest working in the Texas mine is the shaft, reported to be down 50 feet in depth. It is now inaccessible. There is an estimated 200 tons of sulphide ore on the Texas dumps.

The large surface stopes at the Texas and Smuggler occur where branch fractures intersect the Texas and Smuggler fracture which runs through the Double Standard and across the Mary Jane claim to the Empire mine. The fracture occurs in crystalline limestone along a limestone-quartzite contact. The limestone is strongly garnetized in places.

BELMONT-SILVER BELL AREA

Location and Accessibility

The Belmont-Silver Bell area includes the North Belmont mine, located at the south end of the North Belmont claim; the South Belmont mine located at the south end of the South Belmont claims, the Silver Bell Mine located on the Silver Bell claims, a few hundred yards east of the South Belmont mine and all are in the southwest corner of the Duquesne property.

The North Belmont mine is made accessible by the Empire road.

The South Belmont and Silver Bell mines are accessible by a branch road from the Nogales-Lochiel road, following along the south intrusive contact.

History:

Operation in the South Belmont mine dates back to 1860 and the Silver Bell operations go back to 1889.

All of the ores extracted from these mines chiefly by leasers, was of the oxide form containing values principally in lead and silver, with minor amounts of copper and practically no zinc.

The size of the surface stopes indicated that a large tonnage of ore was extracted from each of the mines, the Silver Bell, South Belmont and North Belmont.

In recent years a small amount of oxide ore has been mined by leasers and some low grade ore remains in the pillars and walls of the stopes.

Geology:

All three mines are located in highly garnetized areas that are strongly fractured near the south-west contact of the intrusive monzonite.

The North and South Belmont mines are in oxide ores the entire depth of the workings, according to oral reports.

The lowest workings of the Silver Bell mine are in sulphides that occur as narrow fracture fillings, with minor replacement, in the garnet.

The Silver Bell mine is on the continuation of the Empire fracture system.

The South Belmont mine is on a fracture system that can be traced for only a few hundred feet but which appears to have joining cross-fractures to the south with the Silver Bell system.

The North Belmont mine is on the south continuation of the Holland fracture at the junction of a series of minor fractures that trend toward the north along and a short distance east of the west contact of the intrusive.

Along the west contact of the intrusive, a large dike of alaskite occurs, that can be traced for about 1000 feet and varies in width between 20 and 50 feet. This dike is related to the period of metamorphism that garnetized the limestone and represents the excess silica of the garnetizing solutions.

SILVER BELL MINE

Development:

The Silver Bell Mine is developed by two tunnels, the upper of which extends through the hill and joins the South Belmont workings. This tunnel is in garnet nearly the entire distance and passes through a narrow fracture filled with about two feet of sulphide ore. A branch from this tunnel was used for developing and extracting the downward continuation of the Silver Bell surface ore bodies.

The lower tunnel runs beneath the Silver Bell surface stopes and practically all of the ore above this level has been stoped out. There are two exposures of sulphide ore in the bottom of this tunnel which have had a small amount of stoping done on them. A three-foot cut sample on one exposure assayed 3.5 Ag, 1.86 Cu, 1.5 Pb and 21.0 Zn.

SOUTH BELMONT MINE

Development:

The South Belmont mine is developed by a connecting raise from the upper Silver Bell tunnel and by a 200-foot vertical shaft near the south end of the large surface stope. This shaft is inaccessible but it is reported to be in the oxide zone the entire depth.

NORTH BELMONT MINE

Development:

The North Belmont mine is developed by a 200-foot tunnel about 100 feet below the ore body mined on the surface, and by a winze in the ore body extending a reported 100 feet below the tunnel level. The lowest workings from the winze, which are inaccessible, are said to be in mixed oxides and sulphide ore with a low zinc content.

Above the tunnel level oxide ores were stoped for a length of about 100 feet and for widths of from three to fifteen feet.

POCAHONTAS

The Pocahontas claim, located off the northeast corner of the property is mostly in chert (probably silicated limestone) and is surrounded by intrusive igneous rocks.

The west end of the claim is strongly fractured and in this area there are several large surface stopes from which reported high grade silver-lead oxide ores have been shipped. The deepest working is about 100 feet below the surface. There are no sulphide ores visible and only low grade oxide ores remain on the walls of the stopes.

Nothing is known of the attitude or character of the unaltered ore bodies in the Pocahontas area. Geologic structures indicate fissure-filling-type of deposits. The largest surface ore bodies, as indicated by the stoping, were undoubtedly enriched by alteration of the sulphides.

Mill Site:

There are several excellent mill sites on the property so that a mill can be constructed at a point close to the largest ore supply.

Water Supply:

The Bonanza mine is estimated to contain sufficient water to supply a 200-ton milling operation for about six months, if water is recovered from tailings.

Shallow wells in the San Rafael Valley, near the Santa Cruz River, four miles distant, tap an abundant ground water supply.

Several mines in the property make small amounts of water which might be of benefit in supplying water for the mill needs.

Power Source:

The most economic power source is that to be obtained from the construction of a Diesel-power plant on the property.

The nearest point from a Public Utilities power line is about 16 miles distant toward Nogales.

Transportation:

The nearest railroad point is Patagonia, about 20 miles from Duquesne over a dirt surfaced county road with gentle grades. Another railroad point, about the same distance by dirt surfaced county road, is Nogales, but the route extends over the Patagonia Mountain range and has about six miles of steep grades.

Railroad rates on concentrates of the expected grades are \$4.25 to \$4.75 per ton from Patagonia to the El Paso lead-copper smelter and \$6.60 per ton to the Dumas, Texas, zinc smelter.

Concentrates can be handled by contract to truckers for \$1.50 per ton from the mill bins to the railroad in Patagonia.

Supplies:

Heavy equipment and supplies for mining will have to come from Los Angeles by truck to Nogales, or by rail to Patagonia or Nogales, and by truck from either point to the property.

Tools and miscellaneous supplies can be obtained from Phoenix, Arizona, or from El Paso, Texas.

Mine timbers can be purchased for \$30.75 per 1000 board feet delivered on railroad cars at Patagonia.

Labor:

Ample labor, mostly Mexican, can be obtained at the prevailing wage rate of the region, at present \$4.50 for muckers and \$5.00 for miners.

Houses:

There are three buildings on the property that are in fair condition and usable for housing purposes. The Duquesne Club is a nine-room building that will house 16 men. The other buildings are residences, at present occupied by U. S. Customs Border Patrol Men.

Respectfully submitted,

S. K. GARRETT

Tucson, Arizona
April 20, 1939