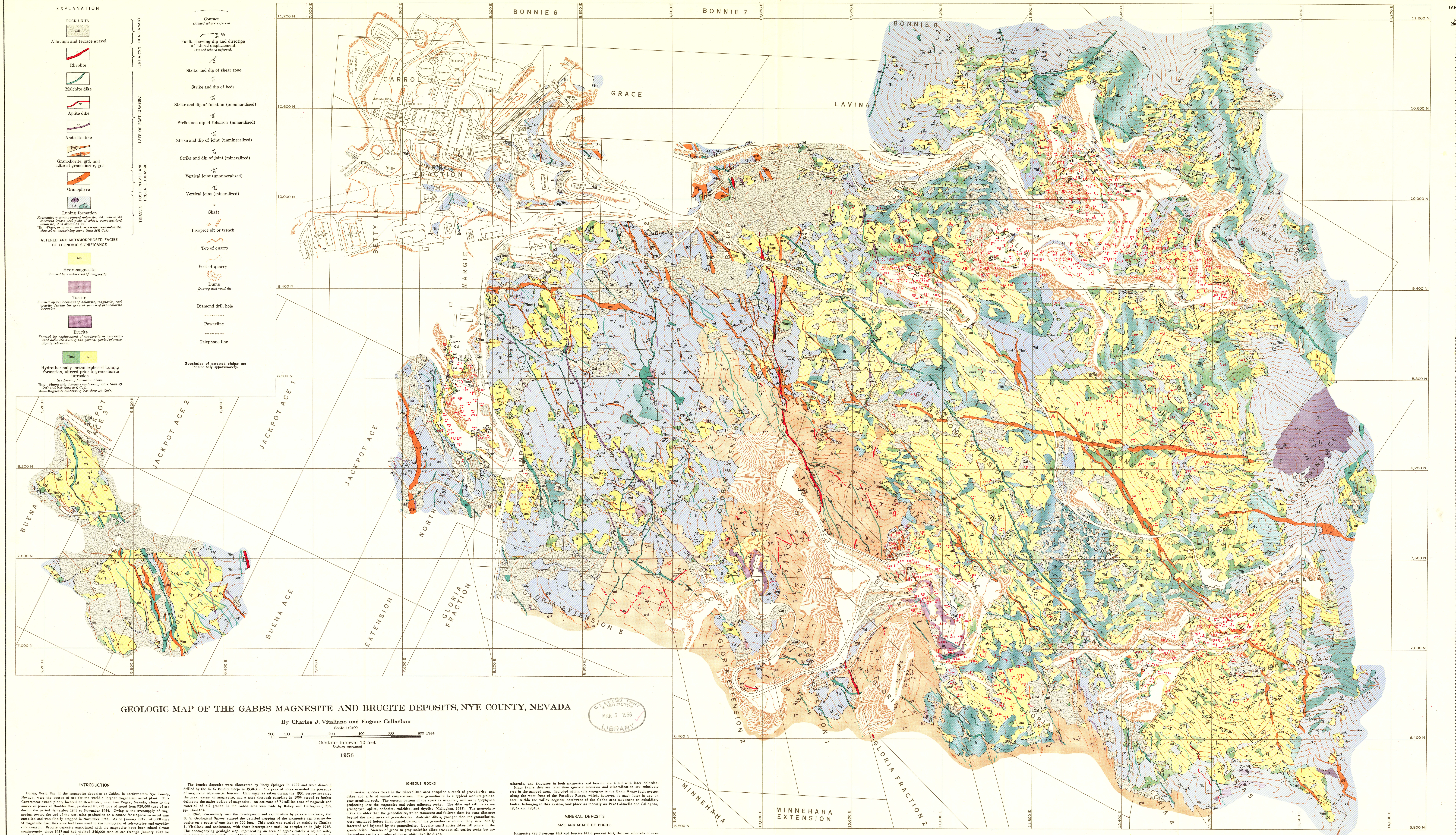
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
W. E. WRATHER, DIRECTOR

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF 35



GEOLOGIC MAP OF THE GABBS MAGNESITE AND BRUCITE DEPOSITS, NYE COUNTY, NEVADA

By Charles J. Vitaliano and Eugene Callaghan

Scale 1:2400

Contour interval 10 feet
Datum assumed

1956

INTRODUCTION

During World War II the magnesite deposits at Gabbs, in northwestern Nye County, Nevada, were the source of ore for the world's largest magnesium metal plant. This Government-owned plant, located at Henderson, near Las Vegas, Nevada, close to the source of power at Boulder Dam, produced 81,272 tons of metal from 920,000 tons of ore during the period September 1942 to November 1944. Owing to the oversupply of magnesium toward the end of the war, mine production as a source for magnesium metal was curtailed and was finally stopped in November 1944. As of January 1947, 241,000 tons of magnesite from this area had been used in the production of refractories and oxychloride cement. Brucite deposits associated with the magnesite have been mined almost continuously since 1935 and had yielded 246,000 tons of ore through January 1945 for use in the refractories industry of Ohio.

The U. S. Geological Survey in cooperation with the Nevada Bureau of Mines mapped most of the deposits in 1931 and 1933. Preliminary estimates of reserves of both magnesite and brucite were published and provided the initial basis for the establishment of the wartime industry.

The magnesite and brucite deposits are in secs. 26, 35, 36, T. 12 N., R. 36 E., Mount Diablo base and meridian, in the extreme northwest corner of Nye County, Nevada. The deposits, which are reached by a paved highway, are 349 miles from Las Vegas and 29 miles from Luning, a shipping point on a branch of the Southern Pacific Railroad.

The deposits are in the rugged western face of the Paradise Range, which rises abruptly from the desert valley at an altitude of 4,600 feet to a maximum altitude at Sherman Peak of 8,657 feet. The deposits range in altitude from 5,000 to 6,500 feet, and are distributed about a northwest-trending prong of granodiorite.

Ownership of the patented claims covering the magnesite deposits is divided. The Federal Government purchased claims around the outer border of the patented area from Basic Magnesium, Inc., the locator. These claims include the June 1, June 2, Capella, and Margie magnesite quarries. Standard Slag Co. holds five claims in the area east of the granodiorite prong. Basic Magnesium, Inc., as a lessee, opened the Duplex quarry at the northwest end of the Standard Slag property, and another lessee, Sierra Magnesite Co., opened its Bluestone quarry at the southeast end. Sierra Magnesite Co., as a lessee, opened also the Segerstrom quarry on two claims of the Nevada Massachusetts Co., in the eastern part of the area. All these quarries are north or east of the granodiorite prong. The central core of claims distributed around the granodiorite contact and containing almost all the brucite is the property of U. S. Brucite Corp.

Six quarries were opened in the magnesite by Basic Magnesium, Inc., which supplied the ore for the metal plant. Selectively mined ore was crushed, hand sorted, and treated in flotation circuits in the large mill on the property to eliminate the greater part of siliceous and dolomitic impurities. During early operations about half of the finely ground mill product was calcined at the mill, and both calcined and uncalcined material was shipped to the metal plant. Improved metallurgical techniques eliminated the need for shipping uncalcined magnesite to the Henderson plant after May 1944. The Permanente Metals Corp. and the Sierra Magnesite Co., a subsidiary of Westvaco Chemical Division of the Food Machinery & Chemical Corp., opened two quarries from which magnesite was selectively mined and shipped untreated to plants in California. In 1946 the Sierra Magnesite Co. started underground mining on its lease.

Two quarries were opened in brucite by Basic Refractories, Inc., but the bulk of the yield has been from the larger of the two quarries. Brucite was shipped directly to Ohio, where it was calcined and mixed with other materials in the production of specialized refractories.

The brucite deposits were discovered by Harry Springer in 1927 and were diamond drilled by the U. S. Brucite Corp. in 1930-31. Analyses of cores revealed the presence of magnesite adjacent to brucite. Chip samples taken during the 1931 survey revealed the great extent of magnesite, and a more thorough sampling in 1933 served to further delineate the major bodies of magnesite. An estimate of 71 million tons of magnesitized material of all grades in the Gabbs area was made by Rubey and Callaghan (1936, pp. 142-143).

In 1942, concurrently with the development and exploitation by private interests, the U. S. Geological Survey started the detailed mapping of the magnesite and brucite deposits on a scale of one inch to 100 feet. This work was carried on mainly by Charles J. Vitaliano and assistants, with short interruptions until its completion in July 1946. The accompanying geologic map, representing an area of approximately a square mile, is a product of this work. In addition, the 15-minute Paradise Peak quadrangle, which includes the deposits, was mapped on scales of 1 inch to 1,000 feet and 1 inch to 2,500 feet. The various grades of magnesite shown on the large-scale map (1 inch equals 200 feet) were delineated on the basis of microscopic examination of more than 18,000 chip samples correlated with chemical analyses of samples taken and provided by the companies. Vast amounts of quantitative chemical data in the company files, in part representing logging and analysis of more than 100,000 feet of diamond drill core, were made available. The companies interested in the deposits provided access to all data on the results of exploration, mining, and milling. Their courtesy and helpfulness is gratefully acknowledged.

GEOLOGY

SEDIMENTARY ROCKS

The magnesite and brucite deposits at Gabbs are in the upper member of the Upper Triassic Luning formation (Muller and Ferguson, 1939, p. 40). The Luning formation in the Paradise Peak quadrangle consists of a limestone member, a shale member, and an upper dolomite member, all of which have been altered in places by thermal and dynamothermal metamorphism. Only the upper dolomite member is in the area covered by the detailed map.

The dolomite member of the Luning formation is subdivided on the detailed map into three basic units. The first of these is a massive, dense, dark-gray to black, fine-grained dolomite. The minute dolomite grains of this rock are elongated and have excellent parallel orientation. The rock contains minor amounts of sporadically distributed silicate minerals, mainly tremolite and talc. The second unit is a white, coarse-grained recrystallized dolomite formed by thermal metamorphism of the dark, massive dolomite. Entire beds and irregular-shaped beds with no apparent relation to the dark dolomite have been recrystallized to this rock. The third unit is a light- to dark-gray, medium- to coarse-grained dolomite that weathers to a reddish brown owing to the presence of iron compounds. In this rock recrystallization appears to have been brought about by hydrothermal solutions, which introduced the iron, probably as pyrite. This third unit is related to the magnesite mineralization but includes only the hydrothermally altered dolomite of the Luning formation that contains more than 26 percent calcium oxide. Where the dolomite is more intensely replaced by magnesite and contains less than 26 percent calcium oxide, it is separated on the map into magnesitic dolomite and magnesite rocks that are described in a following section. Chemical analyses of these rocks are in table 1.

IGNEOUS ROCKS

Intrusive igneous rocks in the mineralized area comprise a stock of granodiorite and dikes and sills of varied composition. The granodiorite is a typical medium-grained gray granitoid rock. The outcrop pattern of the stock is irregular, with many apophyses projecting into the magnesite and other adjacent rocks. The dike and sill rocks are granophyre, aplite, andesite, malchite, and rhyolite (Callaghan, 1935). The granophyre dikes are older than the granodiorite, which transects and follows them for some distance beyond the main mass of granodiorite. Andesite dikes, younger than the granodiorite, were emplaced before final consolidation of the granodiorite so that they were locally fractured and injected by the granodiorite. Locally small aplite dikes fill joints in the granodiorite. Swarms of green to gray malchite dikes transect all earlier rocks but are themselves cut by a number of dense white rhyolite dikes.

Most of the magnesite is north of the granodiorite stock and is transected by all of the igneous rocks mentioned above. The brucite, however, is distributed as both large and small bodies along or near the granodiorite contact. Many dikes and lenses of altered granodiorite as well as subsequent dikes cut the brucite bodies.

ROCK ALTERATION

Alteration of the regionally metamorphosed Triassic dolomite has yielded recrystallized dolomite, magnesite, brucite, and silicate minerals. Most of the recrystallized dolomite is distinguished from regionally metamorphosed dolomite by its larger grain size, massive structure, color, and weathering surface. Some parts of the recrystallized dolomite is white, very fine grained, and a fresh fracture surface has an almost vitreous appearance. Other parts of the recrystallized dolomite are gray to dark gray and weather to a brown-colored friable mass. Both dolomite and magnesite have been recrystallized in the vicinity of the granodiorite stock, indicating that both minerals were present as such when the granodiorite was emplaced. Later coarse-grained dolomite also replaces magnesite and brucite. The relationships of magnesite to both types of dolomite indicate that both magnesitization and recrystallization of dolomite are parts of the same general process. The formation of brucite, though related, was later than the magnesitization, as magnesite and recrystallized dolomite are invaded and replaced by brucite. The brucite deposits are always close to the contact of the granodiorite with the magnesite and dolomite, and are clearly related to the granodiorite intrusion. Silicate minerals seem to be closely related in origin to the intrusion of the granophyre and granodiorite bodies and are formed in, or replace, dolomite, magnesite, and brucite as a result of contact metamorphism. Masses of silicate minerals are shown as tactite on the map.

STRUCTURE

All the rocks represented on the geologic map are in the over-riding plate above a thrust fault. Within the Paradise Peak quadrangle, but outside the magnesite area, the thrust fault brings dolomite of the upper member in contact with limestone of the upper member of the Luning formation. These two rock types are considered as two distinct facies of the same formation (Muller and Ferguson, 1939, p. 1597). Within the thrust plate the thin-bedded metamorphosed dolomite has a regional dip of about 60°W. but is broken by minor faults and is locally folded. Clastic layers in the dolomite in or near the mineralized area are isoclinally folded, with the fold axes parallel to the regional dip. Nearly all the faulting and folding within the mineralized area took place prior to mineralization and igneous invasion. The igneous intrusives follow a pattern of fractures in the metamorphosed sedimentary rocks that trends dominantly northwest, though some dikes and fractures trend nearly north and some trend west. Joints and fractures in the original dolomite influenced only slightly the distribution of magnesite. Similar structures in magnesite are filled with both brucite and silicate minerals, and fractures in both magnesite and brucite are filled with later dolomite.

Minor faults that are later than igneous intrusion and mineralization are relatively rare in the mapped area. Included within this category is the Basin Range fault system along the west front of the Paradise Range, which, however, is much later in age; in fact, within the valley segment southwest of the Gabbs area movement on subsidiary faults, belonging to this system, took place as recently as 1932 (Gianella and Callaghan, 1934a and 1934b).

MINERAL DEPOSITS

SIZE AND SHAPE OF BODIES

Magnesite (28.8 percent Mg) and brucite (41.6 percent Mg), the two minerals of economic importance in the area, are associated with dolomite and many contact-metamorphic minerals, which, together with the igneous rocks, constitute the wall rocks and impurities of the deposits. The magnesite deposits of commercial grade are north and northwest of the stock of granodiorite in an area of about a square mile. The largest area of magnesite, approximately 5,000 feet long and 3,000 feet wide, is east and north of a prong of granodiorite that projects northwest from the main part of the stock. Material ranging from nearly pure magnesite to nearly pure dolomite occurs in this area. The areas containing different grades of magnesite are too complex to describe and are generalized on the map as three different types: less than 5 percent CaO, 5 to 26 percent CaO, and more than 26 percent CaO. Diamond drilling and excavation has revealed that distribution of these different grades is as complex in depth as in plan. Magnesite extends to the greatest depth (600 feet) reached in drilling, and its maximum depth is unknown. With the exception of one quarry, all the commercial development prior to 1948 was in the eastern part of the area. Magnesite bodies west of the granodiorite prong are relatively small, and only one quarry was opened there.

Brucite is distributed in bodies of varied size along the contact of the north side of the granodiorite stock with adjacent magnesite and dolomite. Two large bodies of brucite are known. One, known as the Upper Brucite deposit, is on the east side, and the other, known as the Lower Brucite deposit, is on the west side of the granodiorite prong. Quarries have been opened in both brucite deposits.

The Upper Brucite deposit, approximately 1,000 feet long and 200 feet wide, has been the source of most of the production. As of 1948, nearly all the brucite recoverable by open-pit methods had been removed. Diamond drilling in the Upper deposit has shown that brucite continues below the present floor of the quarry.

The Lower Brucite deposit, triangular in plan and approximately 400 feet long and 250 feet wide, contains too many impurities for the ore to be utilized without beneficiation. With the exception of experimental shipments made mainly in 1930-31 by the U. S. Brucite Corp., all the brucite has been quarried by Basic Refractories, Inc., a lessee.

COMPOSITION AND IMPURITIES

The composition of the magnesian material is of utmost importance, not only in the selection of the parts of the deposit to be mined but also in the determination of the most effective method of beneficiation and eventual use. Analyses of selected samples are given in table 1, and a log of part of a diamond drill core with partial analyses is given in table 2.

Individual crystals of magnesian carbonate are either magnesite or dolomite. Evidently neither mineral exists in solid solution in the other in excess of 4 percent. However, crystals of dolomite are mixed with crystals of magnesite in nearly all proportions both areally and in depth. Magnesite and recrystallized dolomite are so similar in appearance that they cannot always be distinguished by the unaided eye. Both range from coarse-grained to very fine grained, have a brown weathering surface, and show intricate replacement structures. They are, however, readily distinguished by chemical analysis, by examination in index oils under the microscope, and by difference in appearance on polished surfaces. Iron is present as iron oxide or, more rarely, as iron sulfide rather than iron carbonate in solid solution. Alumina is present either in talc or possibly in minute quantities of clay. Lime, in addition to that in dolomite, is present as films of caliche on joint surfaces or as calcite or aragonite in what probably were channelways of springs long since dried. Silica occurs in a variety of silicate minerals of which serpentine and forsterite are probably the most abundant. The numerous igneous rocks that have intruded the magnesite are possibly the most troublesome impurity of all, as a small amount of igneous rock in the ore noticeably lowers the grade.

As brucite is a highly reactive material chemically, it contains even more impurities than the magnesite. Residual cores of dolomite or magnesite remain within the brucite, which is itself further altered in large masses to late dolomite. Brucite was particularly susceptible to igneous invasion and is cut by many dikes or lenses of igneous rock. Silicate minerals are abundant in zones surrounding these igneous masses, or they occur along fractures in the brucite. Brucite has weathered to a depth of about 50 feet to hydromagnesite ($3MgCO_3.Mg(OH)_2.3H_2O$) and artinite ($MgCO_3.Mg(OH)_2.3H_2O$) (Hurlbut, 1946). Open fractures in the brucite are lined with these minerals to a much greater depth, and in one diamond drill hole hydromagnesite was reported at a depth of 197 feet. Dense white or "bone" magnesite is found in some fractures. All these impurities are readily recognized in brucite.

ORIGIN

Crystalline magnesite and recrystallized dolomite were formed by replacement of regionally metamorphosed dolomite of the Luning formation by solutions moving upward through the dolomite. This process took place at moderate to great depth. These solutions are believed to have been genetically related to an earlier igneous intrusion, a coarse-grained granite, which does not crop out in the mineralized area. The various related intrusive bodies crop out separately in scattered stocks and bosses throughout the Paradise Range; but in one locality, about 7 miles beyond the northern boundary of the mapped area, all of these granitoid rocks are associated in a single intrusive complex, in which the relationship of the various rock types to each other is clearly shown.

RESERVES

The intricacy of replacement structures and the gradational nature of the boundaries of the different grades of material make the reserves very difficult to calculate. To sample the deposits accurately, diamond drill holes were spaced not more than 50 feet apart. Diamond drill holes spaced 100 feet or more apart only served to supply a rough estimate of the ore reserves. In attempting to predict the continuity of ore of a certain grade, advantage was taken of the ore-to-waste relationships revealed in the quarrying operations of the several companies in the district. The distribution of various grades of ore on the surface was taken into account in the areas that had been drilled in order to determine the area beyond the outermost drill hole that was to be included in the ore block. Ordinarily estimates of ore were not carried beyond 50 feet from the drill hole. Estimates were carried only to the depth of drilling, even though the lower limit of magnesite beyond that depth is unknown. Outside the drilled areas estimates based on grade established by surface sampling were carried to a depth of 50 feet only. In other words, the estimates given in table 3 represent a high degree of assurance in so far as ore of this type is concerned and are regarded as "measured" within the limits of a definition adopted by the U. S. Geological Survey and the U. S. Bureau of Mines. As defined in a joint memorandum by these agencies "measured ore" is ore for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling, and measurement must be so closely spaced and the geologic character so well defined that the size, shape, and mineral content are well established. A cutoff grade of 5 percent CaO was chosen as reasonable, in the light of beneficiation studies and possible refractory use as well, although the Sierra Magnesite Co. maintained a cutoff grade of 2 percent CaO in the Bluestone quarry. The tonnages given in the first column represent material within the measured blocks that could be selectively mined to yield ore with not more than 5 percent CaO. The second column represents material within the measured blocks that ranges between 5 and 26 percent CaO, and the third column represents dolomite so closely associated with magnesite within the measured blocks that it would probably have to be handled in removing the magnesite. The estimates do not take into account the depth of overburden or the engineering details of extraction such as locations of benches, slopes of quarry walls, or methods of underground mining. The estimates do take into account the probable volume of igneous rocks within the ore blocks.

Indicated ore, as shown in table 3, is defined in the same joint memorandum as ore for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit outlining the ore completely or establishing its grade throughout.

The results of the very detailed diamond drilling program carried on by the various companies that mined magnesite and brucite in the Gabbs area were made available to the U. S. Geological Survey in their entirety. Coordinates and collar elevations of the diamond drill holes plus logs and a complete suite of partial chemical analyses to accompany the log records were supplied.

These drill hole records are made up in a different manner by each individual company. Thus the holes from one company are prefixed by various letters depending on their location. The records of another company contain a numeral prefix instead of a letter, and in one instance lettering of one company's work was superseded by an entirely different lettering symbol when exploratory drilling was resumed several years later.

For the purpose of publication, it was deemed advisable to regroup the various designations under a single system. The diamond drill holes were thus plotted on an overlay of the map, and were numbered consecutively from 1 to 745. These numbers start in the upper right part of the map and end in the lower right. In order to retain the identity of the holes as drilled by the various companies, a key was set up giving the new number of the drill hole and its old designation along with its coordinates.

It will be noted that the diamond drill holes are grouped roughly into four areas of concentration. The largest of these is in the northeastern part of the mapped area and constitutes the June-Greenstone Addition area of diamond drill hole exploration. The westernmost area of concentration is the Margie group of diamond drill holes. In the south-central part of the mapped area an oval-shaped area of concentration of diamond drill holes represents the exploration work done mainly on the brucite deposits. In the south-eastern part of the mapped area is a small irregular-shaped concentration area that represents the exploratory work done largely by Sierra Magnesite Co. and its associated companies.

The new numbers of the diamond drill holes plus their former designations and coordinates are given in table 4.

RECOMMENDATIONS

The reserves of magnesite are so large that specific recommendations for further exploratory work are not presented here. Measured reserve estimates could be increased by extending exploration by diamond drilling in the areas containing magnesite of the highest grades and having the least concentrations of dikes. Brucite underlying the present Upper Brucite quarry would have to be removed by underground mining methods, so that exploration beyond that already done would doubtless be necessary to justify the investment. Property lines are so laid out that it is difficult to plan economic and effective quarry systems in magnesite on one property without affecting other properties. Consolidation and unit operation are recommended for any attempt to quarry magnesite on a large scale.

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TABLE 1.--ANALYSES OF MAGNESITE, DOLOMITE, AND BRUCITE FROM GABBS AREA, NYE COUNTY, NEVADA

[W. W. Brannock, analyst, U. S. Geological Survey.]

	1	2	3	4	5	6	7	8	9	10
SiO_2	0.37	0.65	0.46	0.76	0.49	0.11	0.70	0.10	1.54	1.28
Al_2O_3	0.17	0.15	0.11	0.13	0.13	0.12	0.09	0.13	0.30	0.05
Fe_2O_3	0.21	0.34	0.29	0.31	0.57	0.19	0.21	0.35	0.49	0.42
FeO	--	--	--	--	--	--	--	--	--	0.40
MgO	46.97	47.35	46.87	45.06	44.26	47.14	21.54	21.75	21.61	65.91
CaO	0.79	0.36	1.05	2.99	3.69	0.19	30.14	30.36	30.55	1.31
H_2O	--	--	--	--	--	1.33	--	--	--	0.50
H_2O+	--	--	--	--	--	--	--	--	--	28.88
TiO_2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CO_2	51.52	51.04	51.48	50.86	51.02	51.14	47.06	47.26	45.42	1.27
MnO	--	--	--	--	--	--	--	--	--	0.04
	100.04	99.90	100.27	100.12	100.17	100.23	100.02	99.96	99.92	100.07
Sp. gr.	3.01	2.99	3.01	2.99	3.01	2.82	2.89	2.91	2.89	2.34

1. Fine-grained, white magnesite, Capella Hill quarry, Capella claim, sec. 26, T. 12 N., R. 36 E.
2. Dark-gray magnesite, from Bluestone quarry of Sierra Magnesite Co., sec. 36, T. 12 N., R. 36 E.
3. Fine-grained, light-gray magnesite, from June 2 quarry of Basic Magnesium, Inc., sec. 26, T. 12 N., R. 36 E.
4. Dense, light-gray magnesite with dolomite veinlets, Capella Hill quarry, sec. 26, T. 12 N., R. 36 E.
5. Dark-gray, veined, coarse- and fine-grained magnesite, June 2 quarry, sec. 26, T. 12 N., R. 36 E.
6. Dense, clean "bone" magnesite, from west side of Lower Brucite quarry, sec. 35, T. 12 N., R. 36 E.
7. Black dolomite--not recrystallized--Betty O'Neal No. 2 claim at machine shop, sec. 36, T. 12 N., R. 36 E.
8. Coarse recrystallized dolomite, from June 2 quarry, sec. 26, T. 12 N., R. 36 E.
9. Gray, fine-grained recrystallized dolomite at the southwest entrance to the Lower Brucite quarry, sec. 35, T. 12 N., R. 36 E.
10. Brucite with grains of dolomite and possibly a small amount of silicate minerals, Lower Brucite quarry, Gloria Extension claim, sec. 35, T. 12 N., R. 36 E.

TABLE 2.--RECORD OF PART OF DIAMOND DRILL CORE DG-K 27-g FROM GREENSTONE ADDITION CLAIM

Depth in feet From	To	Insol.	R_2O_3	CaO	
70.0	74.0	1.5	0.8	28.9	70.5-74.5 feet medium- and fine-grained carbonate; locally vuggy with patches of brown vuggy fine-grained carbonate.
74.0	77.3	0.9	0.6	11.2	74.5-84.0 feet light-gray blotchy friable fine-grained carbonate with dark medium-grained carbonate veins. Shattered core at 79.0 feet. A 1½ inch steep very coarse grained carbonate vein at 82.6 feet.
77.3	82.8	1.3	0.5	7.1	
82.8	86.0	0.8	0.5	19.2	84.0-107.5 feet medium-gray fine-grained carbonate; locally light gray; also locally blotchy owing to dark-gray veins. A few scattered spots of iron oxide and tight iron-stained veins.
86.0	91.5	1.9	0.4	12.5	
91.5	97.7	1.5	0.4	3.8	
97.7	101.0	0.0	0.7	2.9	107.5-113.3 feet dark-gray fine-grained carbonate; flat iron-stained streaks common in lower part. Also a few prominent steep joints with silicate coatings.
101.0	102.1	0.7	0.5	3.5	
102.1	109.0	0.8	0.7	1.8	
109.0	113.5	2.0	1.0	2.8	113.3-125.5 feet light-gray blotchy fine-grained carbonate. A few vuggy streaks of iron oxide. Brown fine-grained blotchy carbonate near 118.9 feet.
113.5	117.5	0.8	0.7	1.8	
117.5	118.9	0.6	2.5	14.9	

Drilling and partial analyses by Basic Magnesium, Inc.
Descriptions quoted from log by W. P. Fuller, Jr.
Average core recovery, 74.3 percent.

TABLE 3.--ORE RESERVES OF MAGNESITE IN THE GABBS AREA

	Less than 5 percent CaO (tons)	5 to 26 percent CaO (tons)	More than 26 percent CaO (tons)
Measured ore	27,000,000	18,000,000	7,000,000
Indicated ore	2,000,000	100,000	

TABLE 4. KEY TO DIAMOND DRILL HOLES

New Number	Old Number	Northing (in feet)	Easting (in feet)
1	J-480	10,700.3	12,256.2
2	J-484	10,694.2	12,449.2
3	J-488	10,700.44	12,648.5
4	J-313	10,546.9	11,946.5
5	J-254	10,502.1	11,801.8
6	J-255	10,503.4	11,850.3
7	J-256	10,497.6	11,898.0
8	J-257	10,499.7	11,954.9
9	J-250	10,501	12,055
10	J-264	10,502.3	12,151.6
11	J-412	10,498.3	12,353.6
12	J-416	10,503.2	12,546.0
13	J-420	10,498.9	12,755.1
14	K-444	10,497	12,953
15	J-252	10,443.4	11,800
16	J-253	10,459.8	11,845.3
17	J-59	10,448.9	11,905.7
18	J-60	10,454.4	12,010.4
19	J-63	10,451.4	12,043.51
20	J-61	10,447.7	12,094.5
21	J-80	10,401.7	11,801.2
22	J-58	10,403.8	11,855.2
23	J-81	10,399.3	11,904.3
24	J-57	10,402.7	11,949.5
25	J-56	10,402.1	12,047.3
26	J-391	10,400.5	12,298.0
27	J-50	10,353.9	11,808.5
28	J-132	10,349.5	11,847.4
29	J-51	10,350	11,900
30	J-52	10,345.1	12,000.4
31	J-130	10,344.5	12,054.9
32	J-53	10,346.1	12,104.3
33	J-128	10,355.7	12,241.4
34	J-49	10,297	11,850.3
35	J-138	10,295.5	11,887.2
36	J-48	10,320.5	11,942.6
37	J-139	10,302.8	12,007.3
38	J-47	10,297.9	12,041.6
39	J-140	10,297.5	12,092.6
40	J-141	10,313.3	12,179.9
41	J-371	10,302.1	12,282.8
42	J-374	10,297.3	12,449.5
43	J-378	10,304.4	12,651.8
44	K-362	10,304	12,849.7
45	K-366	10,302.1	13,048.9
46	J-32	10,254.2	11,804.8
47	J-31	10,251.6	11,898.9
48	J-178	10,252.5	11,954.9
49	J-30	10,258.6	11,996.1
50	J-77	10,249	12,055
51	J-29	10,261.0	12,090.4
52	J-176	10,268.2	12,140.2
53	J-28	10,258.8	12,197.3
54	J-361	10,250.1	12,295.3
55	J-21	10,971.8	11,858.8
56	J-22	10,198.5	11,955.3
57	J-184	10,201.6	12,000.6
58	J-23	10,200.3	12,052.2
59	J-185	10,204.3	12,106.4
60	J-24	10,195.2	12,158.2
61	J-25	10,191.1	12,252.2
62	J-14	10,152.1	11,001.9
63	J-15	10,150.2	11,899.8
64	J-220	10,156.4	11,958.9
65	J-16	10,149.6	12,006.7
66	J-219	10,151.2	12,051.8
67	J-17	10,150.4	12,096.0
68	J-218	10,158.5	12,148.1
69	J-18	10,154.3	12,200.8
70	J-217	10,156.1	12,255.4
71	J-19	10,151.0	12,304
72	J-216	10,151.3	12,349.1
73	J-48	10,302.5	11,942.6
74	J-215	10,153.8	12,449.7
75	J-20	10,098.3	11,848.0
76	J-10	10,103.0	11,959.2
77	J-224	10,101	12,006
78	J-11	10,100.3	12,050.0
79	J-225	10,101.9	12,099.2
80	J-12	10,097.1	12,150.8
81	J-225	10,093.4	12,189.0
82	J-13	10,101.5	12,750.3
83	J-227	10,106.4	12,305.1
84	J-43	10,098.7	12,349.4
85	J-228	10,097.8	12,395.6
86	J-44	10,098	12,451.2
87	K-284	10,119.6	12,989.9
88	K-288	10,093.8	13,146.7
89	H-556	10,048	10,450
90	H-565	10,050	10,996
91	J-5	10,045.4	11,904.7
92	J-34	10,055.7	11,959.8
93	J-4	10,049.01	12,002.9
94	J-35	10,045.6	12,054.5
95	J-3	10,051.9	12,103.0
96	J-38	10,005.4	12,095.8
97	J-2	10,050.5	12,200.4
98	J-37	10,051.7	12,249.0
99	J-1	10,052.2	12,310.3
100	J-247	10,047.9	12,353.9
101	J-42	10,048.3	12,403.5
102	J-246	10,063.3	12,451.0
103	H-524	10,002	10,951
104	J-319	10,003.9	11,915.3
105	J-320	9,998.4	11,949.3
106	J-6	9,998.8	12,046.8
107	J-38	10,005.4	12,095.8
108	J-7	10,000.7	12,148.7
109	J-39	10,000.4	12,199.3
110	J-8	10,000.2	12,252.8
111	J-248	10,000	12,300
112	J-41	10,002.8	12,347.6
113	J-249	10,002.8	12,400.4
114	B-321	9,997.7	12,006.3
115	B-250	9,972.4	12,256.0
116	H-475	9,952	10,501
117	H-477	9,947	10,597
118	H-481	9,948	10,797
119	B-62	9,495.7	11,848.3
120	B-245	9,949.2	12,020.4
121	B-246	9,953.11	12,053.5
122	B-247	9,960.9	12,104.3
123	B-248	9,954.8	12,151.7
124	9-J	9,949.5	12,200.9
125	B-227	9,915.7	12,103.7
126	B-226	9,897.9	12,050.5
127	B-22	9,904.9	12,151.6
128	B-229	9,896.3	12,200.7
129	G-230	9,902.6	12,250.5
130	B-231	9,899	12,296.0
131	B-236	9,898.7	12,549.5
132	B-238	9,900.1	12,651.6
133	K-202	9,898.9	12,849.3
134	K-204	9,898	12,969
135	K-206	9,898.8	13,048.9
136	B-208	9,864.4	12,153.8
137	H-399	9,847	10,701
138	H-404	9,848	10,965
139	H-410	9,848.9	11,251.7
140	H-412	9,845.5	11,351.0
141	B-211	9,850.7	12,304.9
142	B-212	9,844.0	12,345.9
143	B-213	9,850	12,399
144	B-214	9,848.7	12,499.2
145	B-216	9,848.4	12,544.2
146	H-1	9,835.6	11,546.1
147	B-193	9,812.8	12,391.4
148	B-196	9,805.1	12,552.3
149	H-361	9,804	10,799
150	H-367	9,800	11,100
151	H-374	9,798.9	11,453.2
152	H-376	9,796.5	11,559.1
153	H-377	9,799.6	11,600.5
154	H-379	9,795.0	11,705.2
155	B-191	9,803.9	12,299.7
156	B-192	9,802.1	12,351.9
157	B-195	9,812.8	12,391.4
158	B-197	9,800.8	12,598.5
159	B-200	9,802	12,762
160	K-161	9,801	12,805
161	H-3	9,765.7	11,312.4
162	H-2	9,768.4	11,375.8
163	B-8	9,758.9	12,084
164	B-7	9,761.6	12,137.8
165	B-14	9,778.5	12,214.9
166	H-323	9,754	10,905
167	H-324	9,755	10,954
168	H-332	9,723	11,345
169	H-333	9,732	11,403
170	H-334	9,754.5	11,451.9
171	H-336	9,753.5	11,547.8
172	H-337	9,748.2	11,602.0
173	B-172	9,749.9	12,347.6
174	B-173	9,746.9	12,416.3
175	B-174	9,745.8	12,455.3
176	B-175	9,746.7	12,504.9
177	B-176	9,748.8	12,549.2
178	B-177	9,745.1	12,595.6
179	B-178	9,735	12,635
180	B-179	9,749	12,703
181	B-180	9,750	12,748
182	K-141	9,751	12,799
183	K-142	9,750	12,852
184	K-143	9,748	12,901
185	H-282	9,701	10,855
186	H-283	9,697	10,907
187	H-284	9,698	10,946
188	H-285	9,699	10,998
189	H-286	9,703	11,048
190	H-291	9,702	11,298.0
191	H-294	9,703.9	11,450.5
192	H-9	9,707.3	11,520.5
193	H-297	9,701.6	11,603.9
194	H-298	9,691.8	11,649.4
195	B-15	9,702.5	12,044.3
196	B-1	9,701.4	12,091.3
197	B-9	9,708.9	12,157.0
198	B-6	9,709.9	12,232.3
199	B-12	9,689.5	12,268.4
200	B-151	9,700.6	12,304.4
201	B-152	9,699.5	12,346.9
202	B-153	9,707.8	12,398.9
203	B-154	9,701.9	12,443.2
204	B-155	9,697.7	12,503.4
205	B-156	9,698.4	12,554.1
206	B-157	9,693.5	12,600.5
207	B-158	9,687.0	12,659
208	B-159	9,781	12,681
209	B-160	9,697.8	12,751.1
210	K-121	9,700	12,799
211	K-122	9,701	12,845
212	K-123	9,696	12,899
213	K-124	9,702	12,948.0
214	K-129	9,699.7	13,204.8
215	H-240	9,626.9	10,724.5
216	H-243	9,659	10,894
217	H-244	9,647	10,947
218	H-245	9,649	10,997
219	H-246	9,649	11,044
220	H-247	9,652	11,102
221	H-249	9,651	11,197
222	H-252	9,648	11,339
223	H-24	9,675	11,377
224	H-253	9,657	11,394
225	H-254	9,646	11,450
226	H-255	9,647	11,502.0
227	H-10	9,676.1	11,573.9
228	H-259	9,649	11,702
229	H-260	9,650	11,748
230	B-121	9,649.1	11,801.1
231	B-122	9,649.7	11,851.2
232	B-123	9,649.1	11,902.5
233	B-124	9,645.7	11,945.7
234	B-125	9,647.8	12,001.4
235	B-126	9,464.2	12,048.1
236	B-127	9,639.5	12,098.2
237	B-8	9,642.9	12,084.0
238	B-10	9,644.9	12,239.5
239	B-131	9,645.7	12,290.0
240	B-132	9,652.0	12,346.6
241	B-133	9,665.8	12,393.2
242	B-134	9,648.4	12,447.8
243	B-135	9,646.4	12,502.3
244	B-136	9,644.5	12,549.5
245	B-137	9,647.1	12,596.6
246	B-138	9,649	12,653
247	B-139	9,631.0	12,682
248	B-140	9,648	12,751
249	K-101	9,650	12,799
250	K-102	9,649	12,848
251	K-103	9,664	12,901
252	K-104	9,649	12,943
253	H-201	9,604.4	10,791.1
254	H-160-1	9,573	10,749.5
255	H-202	9,591.6	10,835.8
256	H-204	9,594.1	10,951.7
257	H-205	9,591	10,999
258	H-206	9,599	11,056
259	H-207	9,594	11,101
260	H-209	9,599	11,199
261	H-210	9,599	11,248
262	H-250-51	9,688	11,242
263	H-212	9,605	11,343
264	H-213	9,605	11,400
265	H-214	9,598.7	11,451.6
266	H-215	9,593	11,498
267	H-8	9,617.7	11,539.6
268	H-217	9,600.5	11,601.9
269	H-11	9,615	11,661.8
270	H-219	9,599	11,699
271	H-220	9,600	11,748
272	B-101	9,603	11,800
273	B-102	9,603.5	11,851.6
274	B-104	9,603.8	11,953.4
275	B-105	9,600.5	12,066.2
276	B-106	9,604.9	12,045.6
277	B-5	9,582.0	12,103.1
278	B-108	9,595.2	12,142.7
279	B-11	9,608.9	12,270.3
280	B-111	9,600.5	12,299.5
281	B-112	9,602.9	12,345.3
282	B-113	9,597.9	12,396.3
283	B-114	9,595.0	12,448.5
284	B-115	9,597.2	12,497.0
285	B-116	9,600.1	12,550.8
286	B-117	9,599.1	12,594.9
287	B-118	9,599	12,648
288	B-119	9,599	12,701
289	B-120	9,599	12,740
290	K-81	9,598	12,800
291	K-82	9,601	12,849
292	K-83	9,600	12,902
293	K-84	9,598	12,950
294	K-85	9,602	12,990
295	H-160	9,538	10,734
296	H-161	9,540.6	10,792.2
297	H-162	9,550.5	10,898.4
298	H-163	9,548.6	10,898.8
299	H-164	9,551	10,949
300	H-165	9,553.2	11,001.1
301	H-166	9,556	11,049
302	H-172	9,545	11,351
303	H-173	9,544.5	11,395.9
304	H-174	9,558	11,451
305	H-5	9,559.5	11,492.2
306	H-176	9,566	11,546
307	H-177	9,552.2	11,599.0
308	H-180	9,566	11,755
309	B-85	9,557.6	11,796
310	B-86	9,549.9	12,002.5
311	B-86	9,551.0	12,051.3
312	B-87	9,551.0	12,100.4
313	B-88	9,553.3	12,270.3
314	B-3	9,570	12,239.4
315	B-97	9,547	12,599
316	B-98	9,553	12,699
317	B-99	9,552	12,702
318	B-100	9,550	12,747
319	K-61	9,549	12,801
320	K-62	9,550	12,847
321	K-63	9,549	12,895
322	K-64	9,553	12,948
323	K-65	9,553	12,993
324	K-66	9,551	13,050
325	H-119	9,499.5	10,702.3
326	H-121	9,501.7	10,800.0
327	H-123	9,504	10,901
328	H-125	9,499	11,002
329	H-126	9,497.7	11,053
330	H-127	9,496.0	11,101
331	H-134	9,499	11,461
332	H-135	9,503	11,495
333	H-136	9,504.6	11,545.9
334	H-7	9,517.2	11,642.7
335	B-62	9,553.3	12,150.2
336	B-66	9,505.5	12,045.2
337	B-67	9,507.0	12,098.2
338	B-4	9,520.5	12,183.9
339	B-74	9,510.8	12,453.7
340	B-78	9,498.2	12,653.6
341	B-80	9,499	12,748
342	K-42	9,503.8	12,851.6
343	K-43	9,501	12,901
344	K-44	9,499	12,948
345	K-45	9,499	12,999
346	K-46	9,509.7	13,044.7
347	K-47	9,494	13,099.5
348	K-50	9,505.8	13,247.5
349	H-79	9,439.8	10,683.7
350	H-80	9,499.5	10,752.0
351	H-81	9,457	10,798
352	H-82	9,451	10,850
353	H-83	9,465.3	11,104.4
354	H-84	9,451	10,950
355	H-85	9,453	10,997
356	H-86	9,448	11,053
357	H-87	9,450.5	10,896.9
358	H-183	9,467	11,104
359	H-88	9,451.5	11,150.3
360	H-98	9,450	11,671
361	H-100	9,444	11,754
362	K-23	9,448	12,902
363	K-24	9,450	12,946
364	K-25	9,450	13,000
365	K-26	9,450	13,050
366	K-27	9,445	13,099
367	H-46	9,403.7	10,050.3
368	H-47	9,420	11,099
369	H-55	9,406	11,491
370	H-6	9,423.1	11,614.5
371	A-77	9,405.3	12,197.5
372	K-6	9,410	13,053
373	H-43	9,401	10,897
374	H-45	9,399	11,005
375	H-48	9,400	11,148
376	K-3	9,400	12,899
377	K-4	9,398	12,950
378	K-5	9,400	13,005
379	A-87	9,356	13,097
380	K-7	9,399	13,100
381	K-8	9,398	13,145
382	D-25	9,351	10,999
383	D-26	9,350	11,051
384	D-27	6,181.4	9,358
385	D-28	9,355.4	11,167.8
386	D-37	9,349	11,596
387	A-13	9,338.8	12,309.5
388	A-85	9,356	13,004
389	A-86	9,351	13,051
390	B-87	9,551	12,100
391	D-46	9,295	11,045.8
392	D-47	9,312.2	11,090.1
393	D-49	9,320.8	11,210.5
394	A-104	9,296.7	11,944.8
395	A-108	9,300.9	12,153.6
396	A-16	9,278.4	12,473.0
397	A-120	9,313.5	12,749.7
398	A-124	9,297.1	12,951.1
399	A-128	8,800	13,000
400	A-132	9,308.2	13,343.0
401	DDH-3	9,232	11,157
402	A-15	9,193.1	12,582.7
403	A-266	9,098.7	12,049.2
404	A-270	9,101.0	12,251.0
405	A-275	9,099.6	12,502.1
406	A-16	9,095.4	12,674.7
407	A-28	9,106.3	12,943.7
408	A-290	9,097.8	13,253.9
409	3M	9,020	7,868
410	A-22	9,015.4	12,875.6
411	2M	8,978	7,905
412	1M	8,938	7,931
413	A-17	8,984.3	12,492.2
414	A-9	8,965.9	12,643.5
415	A-19	8,944.9	12,942.8

TABLE 4. KEY TO DIAMOND DRILL HOLES
(Continued)

New Number	Old Number	Northing (in feet)	Easting (in feet)
416	4M	8,896	7,964
417	10M	8,877	8,047
418	A-428	8,895.4	12,158.7
419	A-432	8,904.7	12,353
420	A-47	8,896.1	12,570.6
421	A-46	8,883	12,724.1
422	A-446	8,914.6	13,054.1
423	A-450	8,914.6	13,225.1
424	9M	8,863	7,990
425	8M	8,822	8,082
426	DDH-4	8,849	11,473
427	A-8	8,827.8	12,499.3
428	A-30	8,845.5	12,633.0
429	A-45	8,812.9	12,674.8
430	A-10	8,804.2	12,807.6
431	A-528	8,798.3	13,150.5
432	5N	8,754	7,885
433	15N	8,761	7,949
434	6M	8,780	7,995
435	5M	8,798	8,035
436	A-48	8,763.8	12,424.1
437	A-44	8,760.9	12,604.0
438	27N	8,737	8,011
439	7M	8,513	7,881
440	A-40	8,738.0	12,758.3
441	A-35	8,735.5	12,923.4
442	17N	8,703	8,067
443	S-31	8,716	11,024
444	DDH-1A	8,683	12,361
445	A-32	8,399.3	12,823.1
446	A-43	8,682.8	12,519.3
447	A-7	8,827.8	12,499.3
448	A-36	8,658.9	12,859.2
449	A-34	8,693.9	13,034.3
450	A-23	8,674	13,275
451	4N	8,662	7,792
452	16N	8,660	7,978
453	1N	8,641	7,897
454	11N	8,631	8,039
455	30N	8,655	8,082
456	10N	8,624	8,131
457	DG-K27-9	8,630	12,095
458	DG-032-15	8,643	12,327
459	A-42	8,621.4	12,453.9
460	A-11	8,621.9	12,970.4
461	A-33	8,626.4	13,101.9
462	31N	8,613	7,996
463	DG-N32-14	8,593	12,244
464	A-41	8,600	12,618.8
465	A-37	8,588.7	12,791.3
466	32N	8,574	7,872
467	2N	8,564	7,962
468	3N	8,573	7,992
469	19N	8,581	8,068
470	9N	8,557	8,091
471	S-30	8,554	10,886
472	DG-GH26-S-2	8,557	11,942
473	DG-K32-S-5	8,556	12,160
474	DG-037.19	8,549	12,377
475	A-52	8,565.6	12,924.5
476	A-27	8,568.3	13,042.3
477	A-26	8,470	13,166.5
478	18N	8,549	7,983
479	8N	8,535	8,041
480	MA-C	8,524	7,800
481	7N	8,513	7,881
482	DG-M37-13	8,511	12,283
483	DDH-2A	8,535.7	12,530
484	A-38	8,538.9	12,706.5
485	A-39	8,501.9	12,622.5
486	A-6	8,510.2	12,881.2
487	A-12	8,512.3	13,166.1
488	35N	8,386	7,907
489	29N	8,463	7,852
490	20N	8,466	8,073
491	DG-K32-10	8,461	12,206
492	DG-042-23	8,468	12,425
493	A-51	8,480.4	12,799.1
494	DDH-3A	8,448.9	12,717.9
495	A-31	8,469.8	12,967.8
496	MA-F	8,447	7,895
497	6N	8,455	7,656
498	12N	8,438	7,901
499	28N	8,429	8,102
500	33N	8,423	8,163
501	DG-Q47-29	8,431	12,565
502	A-50	8,440.8	12,898.5
503	A-5	8,432.6	13,042.5
504	34N	8,399	7,955
505	MA-I	8,359	7,964
506	DG-047-24	8,379	12,483
507	A-32	8,399.3	12,823.1
508	A-49	8,393.7	12,990.2
509	13N	8,356	7,968
510	S-23	8,366	11,145
511	S-24	8,346	11,619
512	DG-R52-33	8,370	12,662
513	DG-355-34	8,359	12,744
514	A-4	8,352.8	12,936.6
515	A-22	9,015.4	12,875.6
516	S-29	8,317	11,348
517	S-25	8,310	11,764
518	DG-T57-35	8,349	12,794
519	A-20	8,307	13,007
	X-65		
520	14N	8,260	8,000
521	21N	8,273	8,339
522	DG-P55-8	8,280	12,596
523	DG-T60-30	8,286	12,822
524	S-22	8,215	11,287
525	S-26	8,200N	11,770E
526	DG-L53-31	8,200	12,396
527	DG-N55-6	8,226	12,510
528	DG-R60-17	8,141	12,735
529	DG-T65-25	8,208	12,868
530	DG-V65-27	8,238	12,954
531	24N	8,189	8,397
532	DG-P60-12	8,186	12,651
533	DG-S65-32	8,358	12,739
534	DG-N-60-3	8,137	12,559
535	DG-R56-21	8,155	12,783
536	S-28	8,120	11,518
537	DG-P65-11	8,100	12,698
538	25N	8,085	8,428
539	DG-R70-18	8,062	12,827
540	DG-L55-S6	8,037	12,525
541	DG-N65-1	8,048	12,607
542	S-21	8,001	11,404
543	DG-L60-2	8,087	12,417
544	DG-P70-7	8,011	12,747
545	DG-N70-5	7,961	12,656
546	DG-L70-4	7,915	12,571
547	DG-P75-16	7,931	12,793
548	S-27	7,895	11,731
549	DG-N75-28	7,884	12,707
550	DG-L75-31	7,826.5	12,628
551	V-26	7,794.7	10,944.1
552	S-20	7,789	11,584
553	BR-211	7,781.04	10,928.9
554	BR-210	7,759.6	10,865.2
555	BR-428	7,762.9	11,072.2
556	V-27	7,732.3	11,196.8
557	BR-214	7,721.4	10,951.7
558	BR-213	7,698.5	10,887.6
559	BR-212	7,677.1	10,823.1
560	BR-420	7,699.3	11,022.72
561	V-28	7,683	11,170
562	BR-430	7,674.4	11,230.8
563	BR-209	7,645.9	10,899.4
564	BR-216	7,657.3	10,971.2
565	BR-423	7,641.3	11,116.02
566	BR-215	7,612.5	10,844.3
567	V-4	7,626.14	10,969.9
568	BR-421	7,582	11,140.8
569	BR-217	7,592.4	10,992.7
570	BR-436	7,593.1	11,392.2
571	BR-218	7,578.1	10,928.3
572	BR-425	7,565.0	11,083.3
573	V-3	7,547.5	10,889.2
574	BR-422	7,550.7	11,273.8
575	BR-239	7,544.0	10,866.1
576	V-25	7,544.0	10,982.8
577	BR-426	7,520.7	11,162.8
578	BR-230	7,510.23	10,949.2
579	V-2	7,493.5	11,119.3
580	BR-208	7,345.4	10,975.0
581	V-5	7,479.8	11,026.4
582	BR-231	7,471.7	11,032.1
583	BR-448	7,475.4	11,429.8
584	V-18A	7,461.5	11,288.3
585	101	7,000	10,000
586	BR-232	7,433.9	11,117
587	BR-438	7,436.9	11,315.62
	BR-243		
588	BR-244	7,409.8	11,058.8
	V-1		
589	BR-233	7,389.6	10,988.7
590	V-24	7,391.5	11,141.3
591	BR-220	7,353.2	11,076.3
592	BR-223	7,339.9	11,220.3
593	V-22	7,331.5	11,074.8
594	V-21	7,322.5	11,057.1
595	V-23	7,303.5	11,104.3
596	V-20	7,314.5	11,158.3
597	BR-201	7,273.0	10,850.6
598	BR-219	7,281.2	11,032.5
599	BR-228	7,285.3	11,241.02
600	V-6	7,245.0	11,124.3
601	BR-207	7,254.3	11,057.7
602	V-8	7,231.8	11,238.8
603	S-13	7,000	9,400
604	SM-18	7,000	8,200
605	SM-22	7,228.41	13,179.3
606	SM-24	7,229.99	13,227.87
607	SM-25	7,243.25	13,285.2
608	BR-205	7,195.4	11,300.18
609	V-7	7,199.3	11,299.8
610	S-12	7,184.0	11,379
611	SM-14	7,192.02	12,929.72
612	SM-15	7,197.0	12,978.0
613	SM-16	7,203.34	13,027.82
614	SM-1	7,206.1	13,104.5
615	T-1	7,205	13,112
616	NM-1	7,194	13,110
617	V-14B	7,169.5	11,194.8
618	BR-241	7,155	11,158
619	SM-11	7,143.18	12,938.15
620	SM-10	7,149.13	12,990.98
621	SM-9	7,157.21	13,040.54
622	SM-2	7,170.82	13,063.45
623	SM-8	7,162.47	13,086.82
624	SM-7	7,169.78	13,138.84
625	SM-23	7,169.05	13,193.61
626	SM-26	7,163.87	13,247.26
627	SM-27	7,172.25	13,316.34
628	SM-5	7,120.80	13,147.83
629	SM-6	7,121.31	13,193.30
630	SM-4	7,108.28	13,064.29
631	SM-3	7,107	13,102
632	V-17	7,085.6	11,280.6
633	S-17	7,094	12,470
634	SM-21	7,093.34	12,906.09
635	SM-20	7,095.27	12,951.34
636	SM-19	7,092	12,998
637	SM-40	7,089.80	13,298.26
638	BR-203	7,097.1	11,167.9
639	V-13	7,062.3	11,216.8
640	V-16	7,070.5	11,337.3
641	1-B	7,075.0	12,750
642	SM-36	7,072.60	13,110.41
643	SM-37	7,075.39	13,161.03
644	SM-39	7,098.94	13,302.94
645	V-19A	7,033.5	11,195.9
646	4-B	7,040.0	12,700
647	SM-35	7,060.96	13,054.75
648	SM-32	7,041.71	12,904.36
649	SM-33	7,039.65	12,953.21
650	SM-34	7,050.82	13,019.77
651	BR-202	7,024.2	11,324.6
652	S-18	7,219.9	13,127.9
653	SM-49	7,035.62	13,277.84
654	SM-50	7,035.25	13,327.98
655	9-B	7,000	12,650
656	PW-3	7,009	12,806
657	SM-44	7,020.11	13,040.76
658	SM-45	7,018.31	13,086.94
659	SM-46	7,024.96	13,120.06
660	SM-47	7,027.55	13,192.40
661	V-12	6,977.5	11,175.3
662	V-15	6,987.0	11,244.3
663	BR-236	6,975.5	11,205.9
664	BR-468	6,996.1	11,468.9
665	19B	6,980.0	12,495.5
666	2-B	6,982.0	12,750.0
667	SM-42	6,988.36	12,911.88
668	SM-43	6,984.62	12,971.53
669	BR-248	6,960.6	11,186.5
670	V-9	6,951.5	11,347.3
671	BR-237	6,947.2	11,350.2
672	BR-418	6,656.9	11,456.5
673	BR-419	6,953.2	11,547.4
674	14-B	6,982.5	12,600
675	5-B	6,962.5	12,700
676	SM-52	6,961.6	12,983.2
677	SM-56	6,966.61	13,206.9
678	SM-51	6,989.5	12,926.8
679	SM-53	6,941.28	13,036.72
680	BR-204	6,933.11	11,281.9
681	BR-224	6,915.2	11,230.4
682	V-11	6,916.5	11,256.3
683	BR-461	6,951.5	11,427.9
684	BR-463	6,912.9	11,624.7
685	S-19	6,909	11,769
686	S-8	6,926	12,071
687	DDH-9	6,926	12,540
688	10-B	6,925.0	12,650.0
689	PW-2	6,928	12,749
690	SM-60	6,905.47	12,957.77
691	SM-62	6,920.0	13,077.0
692	SM-64	6,927.7	13,153.1
693	BR-238	6,875.3	11,308.9
694	BR-462	6,874.3	11,504.1
695	BR-410	6,867.8	11,701.3
696	PW-5	6,901	12,611
697	15B	6,887.5	12,600
698	SM-68	6,868.7	13,085.2
699	BR-206	6,851.48	11,248.6
700	BR-417	6,835.7	11,396.6
701	BR-409	6,849.3	11,645.4
702	18-B	6,847	12,549
703	11-B	6,850	12,650
704	PW-1	6,841	12,692
705	SM-76	6,833.0	12,168.0
706	BR-411	6,830.1	11,587.7
707	BR-413	6,809.9	11,582.5
708	BR-406	6,792.1	11,621.3
709	BR-408	6,806.9	11,721.3
710	16-B	6,815.0	12,593.0
711	SM-72	6,790.5	12,978.4
712	SM-74	6,815.5	13,089.0
713	BR-242	6,785.8	11,268.3
714	V-10	6,789.8	11,263.1
715	BR-460	6,767.8	11,473.7
716	BR-412	6,772.6	11,611.7
717	21-B	6,770.5	12,615.0
718	BR-407	6,744.3	11,744.2
719	BR-415	6,749.0	11,552.5
720	20-B	6,748	12,618
721	SM-88	6,740.7	13,218.4
722	BR-225	6,728.9	11,290.0
723	BR-401	6,705.3	11,625.4
724	BR-403	6,726.9	11,687.2
725	PW-4	6,714	12,719
726	SM-84	6,695.97	13,033.4
727	SM-86	6,719.7	13,124.4
728	BR-226	6,675.1	11,313.5
729	BR-416	6,688.1	11,574
730	BR-459	6,670.9	11,519.1
731	BR-402	6,760.4	11,703.7
732	BR-405	6,686.9	11,765.9
733	V-29	6,643.8	11,559.7
734	BR-404	6,646.7	11,650.2
735	BR-414	6,624.3	11,595.2
736	BR-470	6,630.9	11,786.9
737	SM-104	6,647.0	13,248.7
738	SM-102	6,632.8	13,153.8
739	SM-100	6,615.0	13,031.0
740	BR-458	6,589.1	11,401.8
741	BR-469	6,590.1	11,672.5
742	BR-472	6,551.6	11,748.9
743	BR-457	6,548.3	11,556.3
744	BR-471	6,513.8	11,634.6
745	SM-111	6,529.3	13,069.5

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