DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION

FIELD TEAM, REGION I

Northwest District

FINAL REPORT

Contract Idm-E605

by

Webster S. Anderson
Mining Engineer
U. S. Bureau of Mines

Willard P. Puffett
Geologist
U. S. Geological Survey

GRANDVIEW MINES
310 Radio Central Building
Spokane 4, Washington

Docket No.:	DMEA-3073
Commodity:	Lead-Zinc
Contract date:	September 22, 1953
Termination date:	October 28, 1954

DOSSER-MAKI-LOTZE PROSPECT
Northport Mining District
Stevens County, Washington

Spokane, Washington

March 1955

FINAL REPORT

GRANDVIEW MINES
Dosser-Maki-Lotze Prospect
Northport Mining District
Stevens County, Washington

Contract Idm-E605

* * * *

INTRODUCTION

This report describes an exploration project conducted jointly by Grandview Mines and the Defense Minerals Exploration Administration on the Dosser-Maki-Lotze prospect in the Northport mining district, Stevens County, Washington.

Summary

The purpose of the project was to explore for lead-zinc ore by diamond drilling the down-dip extension of a gossan which was exposed by bulldozing and trenching in the summer of 1952. Channel samples cut across the gossan showed values in lead and zinc. The diamond drilling program was intended to test this zone at a depth sufficient to encounter the sulfide portion of the ore body and to test its extension laterally and at depth.

Diamond drilling under the DMEA contract was started October 1, 1953. Boyles Bros. Drilling Company of Salt Lake City, Utah, had two drill rigs at the property, one drill operating on two shifts and the second drill operating on one shift.

Nine diamond drill holes were completed for a total length of 3,885 feet. The unit cost was $7.00 per foot for a total cost of $27,195.00 in which Government participation was 50 percent, or $13,597.50.

The holes were all drilled to the north of the exposed gossan zone which, on the surface, strikes east-west and dips approximately 60° N. Sulfide was intersected in DDH No. 1 approximately 300 feet down dip from the outcropping gossan. From 179.5 to 195 feet the core was predominantly pyrite and assayed 35.7 percent iron, 0.1 ounce of silver per ton, 0.4 percent lead, and 0.2 percent zinc. This same zone was intersected with DDH Nos. 4, 5, and 6 adjacent to DDH No. 1, as shown on the attached plan map. DDH Nos. 2, 3, and 7 to the west and north of DDH No. 1 did not intersect the pyrite zone. DDH Nos. 8 and 9 cut the same pyrite zone as was encountered in Holes No. 1, 4, 5, and 6, but it was not over 1 foot in thickness.

The pyrite zone indicated by the drilling is shown on figure 3. The western half of the zone is estimated to contain only from 5 to 10 percent iron. The eastern half of the zone, having a volume of about 230,000 tons, contains an estimated 30 to 40 percent iron. If all the iron indicated by assays of the diamond drill cores is in the form of pyrite, there is estimated to be 123,750 tons of iron and 138,600 tons of sulfur in the zone. Much larger pyrite bodies in the Pacific Northwest are known which are not being currently exploited, and it is doubtful that the pyrite zone on the Dosser-Maki-Lotze property is of commercial proportions.

Recommendations

As the diamond drilling intersected only a strong pyrite zone containing very sparse amounts of galena and sphalerite, it is recommended that no Certification of Discovery or Development be issued.

If a market for pyrite ever develops in the Northwest, then further exploration would be warranted; currently, there is no market for pyrite.

LOCATION AND ACCESSIBILITY

The Dosser-Maki-Lotze prospect is on the north side of Currant Creek, approximately half a mile southeast of Deep Lake in northern Stevens County, Washington. The property is in secs. 26, 27, 34, and 35, T. 39 N., R. 41 E., W.M., Northport mining district. Graveled roads connect the property with the Great Northern Railroad at Northport, Washington, 15 miles to the west, and with Leadpoint, Washington, 4½ miles to the north. The altitude at the property ranges from 2,150 feet at the west end to 2,800 feet at the east end. Currant Creek, a tributary of the North Fork of Deep Creek, flows westerly across the south of the property. Water for diamond drilling was pumped from this stream.

PROPERTY

Grandview Mines had leased the mineral rights in the following properties in T. 39 N., R. 41 E., W.M.:

A - (Dosser Lease)

In sec. 27, that part of Government Lot 5, except the north 450 feet thereof, lying south and east of the county road.

In sec. 34, the S$\frac{1}{2}$ of the NE$\frac{1}{4}$; Government Lot 1; that part of the SE$\frac{1}{4}$ of the NW$\frac{1}{4}$ lying south and east of Deep Creek; that part of Government Lot 2 lying south and east of Deep Lake and Deep Creek.

B - (Maki Lease)

In sec. 35, the SW$\frac{1}{4}$ of the NE$\frac{1}{4}$, S$\frac{1}{2}$ of the NW$\frac{1}{4}$, and NW$\frac{1}{4}$ of the SW$\frac{1}{4}$.

C - (Lotze Lease)

In sec. 34, the NE$\frac{1}{4}$ of the NE$\frac{1}{4}$
In sec. 35, the N$\frac{1}{2}$ of the NW$\frac{1}{4}$
In sec. 26, the S$\frac{1}{2}$ of the SW$\frac{1}{4}$

excepting approximately 2 square acres in the extreme northwest corner, which area is enclosed by a line running 416 feet east from the northwest corner of the S$\frac{1}{2}$ of the SW$\frac{1}{4}$ of sec. 26; thence 208 feet south; thence 416 feet west; and thence north 208 feet to the point of beginning.

Owner's Consent to Lien forms, signed by the owners of the above properties, were attached to the contract.

Grandview Mines relinquished its lease on the Maki property on April 21, 1954; in October 1954, the company relinquished its lease on the Lotze property. As of March 1955, Grandview Mines still was leasing the Dosser property.

GEOLOGY

Northeastern Stevens County, Washington, is underlain by a thick series of phyllite, schist, slate, marble, and dolomite of early Paleozoic age that trend in a general northeast direction. Granitic intrusive rocks of late Mesozoic age crop out in the northern and southern part of the area. The Dosser-Maki-Lotze property is in the southeastern part of the area near a contact between granodiorite and dolomite.

Three formations are exposed on the Dosser-Maki-Lotze property. Dark-gray to black, carbonaceous, slaty argillite crops out in the northern part; light-gray to gray, thin-bedded, dolomitic limestone crops out in the central part; and coarse-grained biotite granodiorite crops out in the southern part of the property. In an open-file report showing maps of this area, Campbell 1/ has correlated the granitic rocks with the hornblende-biotite granodiorite of the Kaniksu batholith of Cretaceous(?) age, the dolomitic limestone with the Upper Metaline limestone of Cambrian age and the slaty argillites with the Ledbetter slate of Ordovician age. Campbell indicates that the dolomite and the slaty argillites form the south limb of a syncline overturned to the south, the axial plane of which dips about 35° NE.; thus, according to Campbell's interpretation the beds in the Dosser-Maki-Lotze area are on the normal limb of the syncline and are not overturned.

The bedding in the dolomite strikes from due west to N. 70° W.; dips range from 45° to 80° N. and NE. The slaty argillite conformably overlies the dolomite, strikes in a general east-west direction, and dips from 35° to 60° N.

The contact between the dolomite and the granitic rocks trends in a general east-west direction and probably dips to the north. Insofar as is known, the dolomite-granodiorite contact is an intrusive contact in the Dosser-Maki-Lotze area, as no faulting has been found along it. On the Farmer property (Docket No. DMEA-2166), about half a mile to the west, the contact is marked by a strong normal fault dipping about 60° NW.

Ore minerals occur at widely scattered localities within the dolomite. These ore minerals consist of galena and sphalerite in a pyritic, siliceous gangue. In general, the sulfides have been oxidized near the surface, resulting in a mixture of limonite and lead and zinc carbonates.

On the Maki property the ore minerals are confined to narrow stringers which parallel the bedding in the dolomite. In most exposures sphalerite predominates, but some of the stringers contain mostly galena. These stringers have been prospected in at least 10 shallow shafts. Observation strongly suggests that these stringers are distributed erratically throughout the dolomite near the granite contact.

To the west of the exposures on the Maki property, and in the same dolomite formation, trenching has disclosed a few small areas on the Dosser property near the granodiorite contact which contain disseminated lead, zinc, and iron minerals. Sampling has indicated

---

1/ Campbell, C. D., Northport district maps, Stevens County, Washington: U. S. Geol. Survey Open File, pls. 2 and 2a, January 1946.

that the zinc content ranges from less than 1.0 to slightly more than 5.0 percent, whereas the lead content is less than 1.0 percent. No production has been obtained from these areas.

A strongly oxidized zone crops out in the northeast part of the Dosser property near the slate-dolomite contact. This oxidized area, or gossan, has been well exposed by bulldozing which has revealed that the gossan is nearly 450 feet long in an east-west direction, and, in places, as much as 65 feet wide. The oxidized material consists mainly of limonite in a siliceous and dolomitic gangue. Channel samples across the central part of the zone indicate an area 130 feet long and from 60 to 65 feet wide which contains 0.8 ounce of silver per ton, 1.6 percent lead, 0.0 percent zinc, and 41.3 percent iron (fig. 1).

H. D. Hess, of the Petrographic Section, Bureau of Mines, Region I, made a detailed examination of samples of the oxidized material taken from the bulldozed area. He reports that the rock is an impure, carbonaceous, dolomitic limestone, with associated tremolite, chlorite, diopside, talc, chert, some calcite and clay minerals, plus plumbojarosite, anglesite, smithsonite, limonite, and goethite.

From his description it is suggested that the original rock was an impure, carbonaceous dolomitic limestone. The calcium-magnesium silicates were probably formed as a result of contact metamorphism related to the nearby igneous intrusion. The iron, lead, and zinc minerals, and possibly much of the silica, were probably introduced by hydrothermal solutions.

The drilling completed under the DMEA program explored the down-dip extension of the gossan. This drilling was successful in intersecting a strong pyrite zone which is evidently the unoxidized zone indicated by the gossan. The highest intersection of the pryite zone is about 250 feet down dip from the surface (Lotze DDH No. 1), and at this intersection there is no evidence of oxidation in the pyrite zone; thus, it is not known exactly to what depth the oxidized zone extends, but it is assumed that the oxidized zone may extend from 50 to 100 feet down dip from the surface.

The drilling indicated that the pyrite zone is somewhat lenticular in outline, being thicker and richer in pyrite in the eastern portion and narrowing to separate bands of sparsely disseminated pyrite in the western portion. DDH Lotze No. 9 intersected 1 foot of pyrite 740 feet down dip from the gossan, and this represents the deepest diamond drill hole intersection of the zone. This zone of pyrite is nearly parallel to the bedding and occurs within 100 to 150 feet of the dolomite-slate contact. There is a suggested plunge of the zone to the northeast.

Although the gossan is nearly 450 feet long and averages about 60 feet wide, the drilling indicates that the pyrite zone gradually thins with depth. At an altitude of 2,300 feet, nearly 550 feet down dip from the surface, the maximum length of the pyrite zone is from 450 to 500 feet, and the maximum thickness is less than 10 feet. The higher-grade portion of the pyrite zone contains from 30 to 37 percent iron.

The outline of the pyrite zone indicated by the drilling is shown on the attached plan map and sections (fig. 3). As is shown on this map, the drill holes were located to intersect the zone at intervals from 150 to 200 feet. As the indicated zone is from only 400 to 500 feet long, it has been necessary to do considerable extrapolation beyond known intersections in drawing the outlines of the indicated zone.

Only very sparse amounts of sphalerite and galena are associated with the pyrite zone at depth. There is no indication that the pyrite represents a halo of iron minerals around a lead-zinc ore body.

At depth the dolomite contains scattered amounts of calcium-magnesium silicates, mostly tremolite and some talc. Disseminated pyrrhotite occurs at scattered intervals.

THE PROJECT

During the summer of 1952 Grandview Mines exposed a rather wide oxidized zone in dolomite on the Dosser property. The indicated dip of this zone was to the north, dipping across the north boundary of the Dosser property into the Lotze property. Channel samples taken across the zone average 0.8 ounce per ton of silver, 1.6 percent lead, nil zinc, and 41.3 percent iron. It was believed that this oxidized and iron-stained zone might be a gossan representing the surface outcrop of a lead-zinc sulfide ore body. Diamond drilling appeared justified to explore for deeper extensions of the zone. Figure 1 shows the results of the channel samples taken across the gossan.

Diamond drilling at the Dosser-Maki-Lotze prospect was started October 1, 1953. As the exploration was unsuccessful in finding significant amounts of lead and zinc, the project was terminated by mutual agreement on September 10, 1954.

Amendment No. 1 to the contract authorized a recess in project work from November 22, 1953, to not later than July 1, 1954. This recess was granted as winter conditions were such that it was considered impractical to continue with the diamond drilling program.

The program as originally proposed was to test by diamond drilling the downward extension of the mineralized zones on the Maki property and the lateral and vertical extent of the gossan exposed in the northeast corner of the Dosser property. In a telegram to the Operating Committee, dated August 14, 1953, the Field Team recommended drilling eight holes totaling 4,000 feet from the Lotze property to test deeper extensions of gossan exposed on the Dosser property. Drilling on the Dosser-Maki property as proposed by the applicant was not recommended. The change of location from the Dosser-Maki property to the Lotze property was recommended as the Field Team considered that the drilling of the Lotze property would provide more information pertinent to an expanded exploration program if more drilling was indicated.

The contract specified that the diamond drilling be done in two stages. Stage I included four holes not to exceed a total length of 2,000 feet. If the results of these four holes indicated the advisability of further drilling, Stage II was to be undertaken; it included the drilling of an additional 3,200 feet of diamond drill hole.

The four holes under Stage I of the contract were completed by November 22, 1953. These holes indicated the existence of a sizable pyrite zone containing only sparse amounts of galena and sphalerite. Since some of the ore occurrences in the district are known to have a halo of iron sulfides surrounding the lead-zinc ore shoots, it was thought advisable not to overlook this possibility at the Dosser-Maki-Lotze property; consequently, Stage II work was authorized. The contract was recessed until April 28, 1954, when drilling under Stage II was commenced. Five drill holes were completed in the summer of 1954, but the results from these holes conclusively proved that, although the pyrite zone continues in depth, it did not represent a halo of iron sulfide minerals around the periphery of a lead-zinc sulfide ore body. Because of these findings, the contract was terminated by mutual agreement between the Operator and the Government prior to the completion of all the diamond drilling permitted by the contract.

The location of the drill holes are shown on figure 2, and sections through the holes showing the outline of the indicated pyrite zone are shown on figure 3. Copies of the logs of the DMEA diamond drill holes, compiled by the Operator, are in the map holder with this report; also included are logs of holes drilled on other parts of the property prior to the contract.

Reserves

Only very minor amounts of galena and sphalerite were found in the diamond drill core. Obviously, no lead-zinc ore body is indicated by the contract work.

The drilling indicated that the iron-stained and oxidized zone on the surface represents the outcrop of a pyrite zone in the dolomite. This pyrite zone extends from the surface to a known depth of 700 feet down dip. The zone averages more than 400 feet in strike length but thins from about 60 feet at the surface to less than 1 foot at its deepest extension. The eastern portion of the zone contains nearly solid pyrite, whereas its western extensions consist of separate bands of moderately to sparsely disseminated pyrite.

At the surface the oxidized zone contains slightly more than 41 percent iron. The diamond drill hole intersection nearest the surface is about 250 feet down dip from the outcrop. At this intersection there is no evidence of oxidation of the pyrite, and it contains about 36 percent iron.

Using a tonnage factor of 8.5 cubic feet per ~~cubic~~ ton (tonnage factor for solid pyrite is 6.3 cubic feet per ton), the indicated pyrite zone contains 560,000 tons. The higher grade or eastern half of the zone contains 230,000 tons of 30 to 40 percent iron. The lower-grade areas, which form an estimated 50 percent of the zone, are not expected to contain more than 5 to 10 percent iron.

The sulfur content of the indicated pyrite zone is perhaps of more economic interest than the iron content. It is assumed that practically no sulfur remains in the gossan area. If the oxidized zone persists to a depth of 100 feet, it would decrease the tonnage in which sulfur occurs by about 10,000 tons; therefore, for purposes of calculation it is assumed that there are 275,000 tons of 35 percent iron and 275,000 tons containing 10 percent iron. Assuming that all the iron is in the form of pyrite in which the sulfur-pyrite ratio is 1.14, the indicated zone contains 138,600 tons of sulfur and 123,750 tons of iron.

Summary of Factual Data

Boyles Bros. Drilling Contractors, Salt Lake City, Utah, completed a total of 3,885 feet of diamond drilling in nine holes at a unit cost of $7.00 per foot for a total cost of $27,195.00, of which the Government contributed 50 percent, or $13,597.50.

Exploitation Possibilities

Grandview Mines wrote the Texas Gulf Sulphur Company under date of August 13, 1954, describing the pyrite deposit at the Dosser-Maki-Lotze prospect and inquiring if that company would be interested in the deposit. In its reply of August 23 the Texas Gulf Sulphur Company stated that it was not interested in pyrite deposits of the type explored at the Dosser-Maki-Lotze prospect.

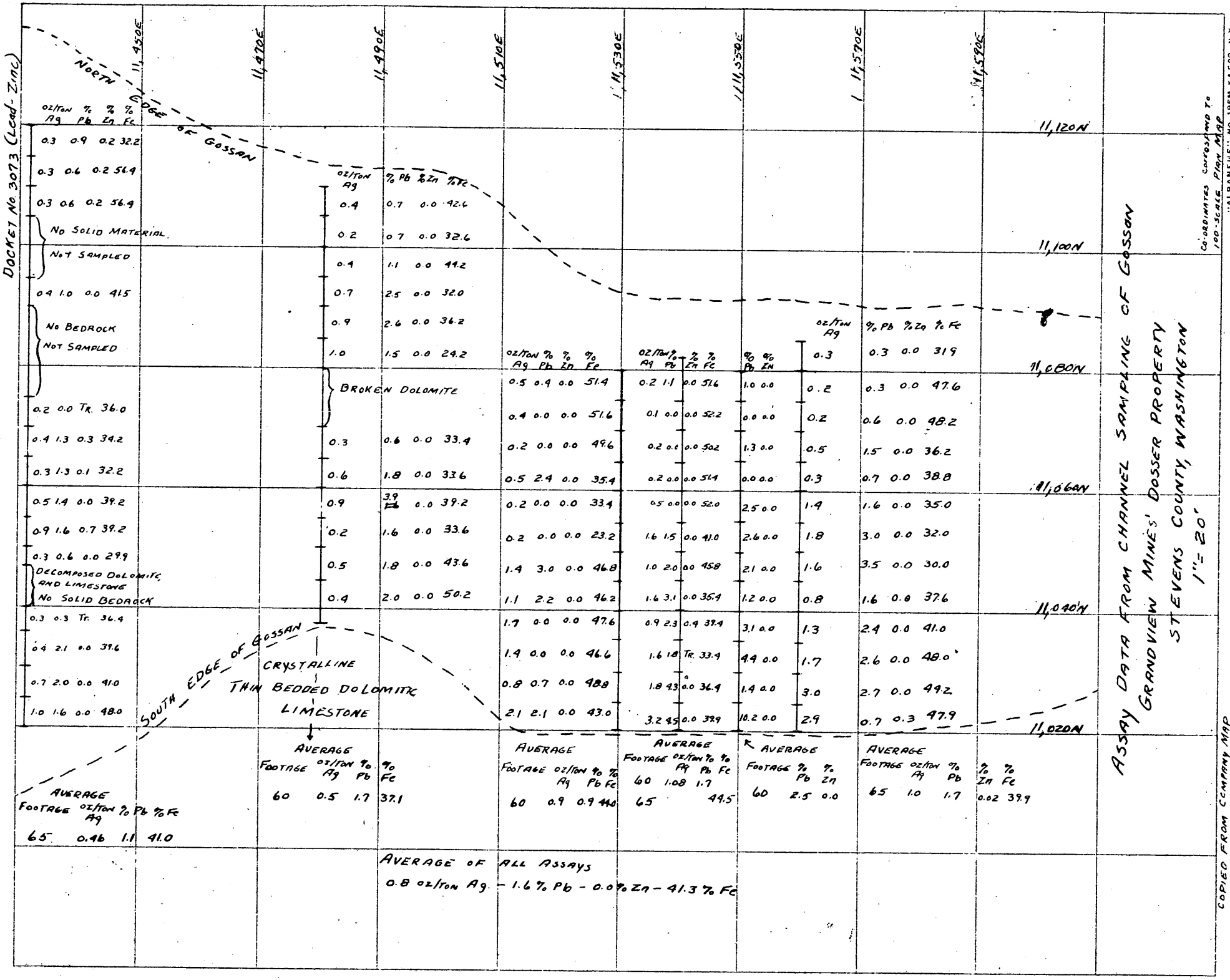
The pyrite deposit of the Lockwood Mining & Refining Company near Sultan, Washington, in Snohomish County, is much larger than the one at the Dosser-Maki-Lotze prospect. The Lockwood property has been examined by both the Bureau of Mines and the Washington State Division of Mines and Geology. Estimates of potential reserves range from 500,000 to 3,500,000 tons. The property has not been exploited commercially to date.

The acid plant of the Sullivan Zinc Smelter at Kellogg, Idaho, is currently inoperative due to lack of a market for sulfuric acid.

It seems unlikely that the pyrite body at the Dosser-Maki-Lotze property will be exploited for its sulfur and iron in the foreseeable future.

Enclosures
Distribution:
DMEA(4)
USBM(5)
USGS(SRO)
Docket
Puffett

FIGURE 1
DOCKET No. 3073 (Lead-Zinc)



DIAMOND DRILL RECORD

Standpipe
Casing 17' NX. 2'EX. 362' EX
Started 10/6/53
Finished 11/3/53
Hole Size EX
Depth 468
% Core Rec. 81

Mine Lota
Location Garrett Cr., Stevens Co., Wash.
Logged by Ethel Anderson Date 10/24/53
Drilled by Forseir & Johnson (Boyles)

Hole No. 1
Level
Grid
Latitude
Departure
Elevation 2630
Bearing S.
Inclination -65°

Depth Feet	Feet Core	Lithologic Description	Sample No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-19	0	Overburden & shattered slate	709	179.5-185	5.5	5.50	37-(.1(Fe 0.1 (Fe-24.6)	0.4	0.2
19-109	85	Black slate with bands of pyrite up to 1" thick, and white calcite stringers. Slate gradually becomes limy.	710	185-195	8.6	10.0		0.4	0.2
109-179.5	68.3	Dark gray fine-grained dolomite with few slate bands. Gouge and crushed material from 143 to 150							
179.5-195	15.5	Yellow pyrite with a few spots and seams of PbS & ZnS.							
195-317	101.1	Light and dark gray banded dolomite with some pyrite disseminated and on seams.							
317-332.5	12.0	Much broken material, talcose, slatey & calcareous with some black gouge							
332.5-36.2	12.0	Gray dolomite with pyrite as in 195-317							
362-468	72.0	EX core to end of hole. Drillers unable to go further without reaming hole to EX from beginning. Gray dolomite with scattered pyrite & pyrrhotite & few ZnS & PbS shines. Slatey dolomite with white calcite veinlets between 390 & 420. Broken black talcose & graphitic gouge material from 442 to 447. Some white tremolite xls present.							

Form 103 2M 3-53 SHAW & BORDEN CO. 308150

DIAMOND DRILL RECORD

Standpipe
Casing [illegible]
Started 10/1/53
Finished 11/7/53
Hole Size NX
Depth 498'
% Core Rec. 85

Mine Lotze
Location Currant Cr., Stevens Co., Wash.

Logged by Vahil Anderson Date 10/25/53
Drilled by Purdell & Link (Boyles)

Hole No. 2
Level
Grid
Latitude
Departure
Elevation 2582
Bearing S
Inclination -55°

Depth Feet	Feet Core	Lithologic Description	Sample No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-49	0	Drilled in shattered black slate which did not core	668	192.5-209	7.0	16.5	Tr(4.3)	0.0	0.0
49-143	76.2	Black slate, thin-bedded with calcite & pyrite spots and seams Slate gradually becomes more calcareous. Black gouge from 143 to 143	669	254-261	6.0	7.0	Tr(3.1)	0.0	0.0
143-346	176.3	Gray dolomite with spots and seams of calcite, serpentine & pyrite and talcose material. Gouge from 168 to 170. Moderately strong pyritized zone, few ZnS & PbS shines, from 192-209; 250-261; 263-280. Core badly crushed and broken. Dark gray slaty dolomite with crushed zones, white calcite, and fibrous talc, few pyrite specks, from 298 to 346.							
346-498	132.5	Finely xline dark blue gray dolomite with pyrrhotite & pyrite seams; white calcite seams; & some graphitic or black & white talcy partings. Few light brown mica flakes at 362'. Some fibrous talcose bands present. Few dark brown ZnS shines and PbS spots from 420 to 430.							
		Sludges	1034(4')	411-4191	4.0	8.0		0.0	0.5

DIAMOND DRILL RECORD

Standpipe
Casing 24'BX 68' AX

Started 11/9/53
Finished 11/21/53
Hole Size AX
Depth 295
% Core Rec. 88

Mine Lotze
Location Current Cr., Deep Lake, Wash.

Logged by Eskil Anderson Date 12/1/53
Drilled by Link & Purcell(Boyles)

Hole No. 3
Level
Grid
Latitude
Departure
Elevation 2546.1
Bearing S
Inclination -55°

Depth Feet	Feet Core	Lithologic Description	Sample Data						
			No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-24	0	Overburden & shattered slate							
24-71	40.5	Black slate with pyrite & calcite spots & seams. Bedding at right angles to axis of core.							
71-274.5	183.5	Gray thin banded dolomite with occasional slaty sections, calcite & serpentine seams & few specks of pyrrhotite. Banding generally within 10° of right angles to core axis. Few flakes of bronze colored talcy micaeous material. Strong pyritization from 259.2 to 261.5							
274.5 284.5	8.5	Basic dike.							
284.5-295	8.0	Dark gray dolomite, as above with badly broken black, slaty & calcareous material on both sides of the dike.							
	88	No Pb or Zn mineralization observed.							

DIAMOND DRILL RECORD

Standpipe
Casing NX-7. BX-5
23' AX
Started 11/5/53
Finished 11/21/53
Hole Size AX
Depth 310
% Core Rec. 51

Mine Lotz
Location Currant Creek, Deerl Lake, Stevens Co., Washington
Logged by Eskil Anderson Date 12/1/53
Drilled by C. R. Johnson (Boyles)

Hole No. 4
Level
Grid
Latitude
Departure
Elevation 2680.6
Bearing South
Inclination -73°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-12		Overburden & crushed slate.	694	263-283	14.2	20.0	Tr(Fe-33.6)	0.3	0.0
12-152	126	Black slate with pyrite, pyrrhotite & calcite seams, gradually becoming more & more calcareous	695	283-293	8.9	10.0	Tr(Fe-30.2%)	0.4	0.0
152-236	62.0	Gray thin banded dolomite with calcite seams & pyrite & pyrrhotite spots, occasional slaty bands. Banding at about 15° to plane across core.							
236-263	22.4	Gray dolomite with small spots, spots & seams of calcite, serpentine, & pyrite. Dolomite almost without banding. Pyritization gradually increasing from 258.							
263-293	23.6	Pyrite with a little residual dolomite & specks & seams of PbS Blue mineral on seams at 2678 about ½" glob of PbS. More PbS from 283-288, & blue oxidation products on seams.	Sludge 795	283-290(4.3#)	5.5	7.0	(Fe-29.4) 0.2	0.3(Au-Tr)	Tr
			796	290-298(4.7#)	7.5	8.0	0.1(Fe-18.0)	Tr	0.0
293-310	9.5	Gray dolomite with some pyrite.	Sludges 784	263-265.5(2#	1.7	2.5	Tr(Fe-6.7)	0.0	0.0
			798	265.5 269(3.7#)	2.5	4.5	0.2(Fe 35.2)	0.5(Au-Tr)	0.2
			797	269-271 (3.2#)	1.0	2.0	0.2 (Fe-30.6)	0.3 (Au-Tr)	0.2
			780	271-276(6.4#)	3.0	5.0	0.2(Fe-19.0)	Tr(Au-Tr)	0.0
			779	276-282(8.1#)	4.3	6.0	0.2(Fe 31.8%	0.2(Au-Tr)	0.6

Form 108 2M 3-53 SHAW & BORDEN CO. 306150

DIAMOND DRILL RECORD

Standpipe
Casing BX drive -12' AX-40'
Started 4/28/54
Finished 5/24/54
Hole Size Ax. Bx to 298'
Depth 546'
% Core Rec. 99% in 1s

Mine Lotze
Location Current Cr., Stevens Co., Wash.
Logged by E A Date 5/15/54
Drilled by Forcier (Boyles)

Hole No. 5
Level
Grid
Latitude
Departure
Elevation 2690'
Bearing S
Inclination -90°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-12 12-310	0	Overburden & shattered slate (Hole drilled BX to 298' when A X coring began. (BX core saved on dump but not in boxes.) Black thin banded hard slate with some gray calcareous bands, calcite seams, and irregular bands and blobs of pyrite & pyrrhotite. Very distinct bedding planes formed by black slate interlayered with knife edge & thick seams of white calcareous material. Slate dips average between 35°-40°. Slate probably dipping ab. 38°N	900	398-404.2	6.2	6.2			
310-336	21	Fine grained gray dolomite predominate, with minor slate bands to 336, & thin calcite & talc seams. Crushed zones at 310 to 317 and gauge at 333'. Banding at 15° to 40° to plane across core.							
336-398	58.5	Med. to coarse grained dark gray dolomite with some calcite & some vertical seams with mountain leather Dark brown zinc, and pyrite, thinly scattered from 373' on in purer, gray & light gray coarsely xline dolomite.							
398-404.2	6.2	Almost pure pyrite, few inches of gray dolomite, with few specks of lead in pyrite.							
404.2-530	125.8	Blue-gray dolomite with some banding at ab. 25° to plane across core. Occasional seams & blobs of pyrrhotite Some short sections of ab. ½ pyrite & pyrrhotite in dolomite. More talc seams & serpentine, more metamorphosis, as 530 is approached, also some black dolomite slate							
534.4 530-534.4	4.0	Basic dike							
534.4-546	10.8	Dark blue gray dolomite with serpentine & talc. Metamorphosed							

Form 108 2M 3-58 SHAW & BORDEN CO. 308150

N. B. Hole caved between 320 and 340.

DIAMOND DRILL RECORD

Standpipe
Casing 3X drive -8'
3X-218'
Started 5/25/54
Finished 6/1/54
Hole Size 3X
Depth 330'
% Core Rec. 95%

Mine Lotze
Location Currant Cr., Stevens Co., Wash.
Logged by Earl Emerson Date 6/2/54
Drilled by Forsolr & Johnson (Ceylon)

Hole No. 6
Level
Grid
Latitude
Departure
Elevation 2650
Bearing
Inclination -90°

Depth Feet	Feet Core	Lithologic Description	Sample Data: No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-215	95	Black slate with some pyrite, pyrrhotite, and calcite seams Bedding ab. 45° to plane across core							
215-286	69	Fine grained blue gray dolomite interlayered with black slate, white calcite seams and few spots of pyrite and pyrrhotite in slate. Proportion of dolomite gradually increasing bedding flattening somewhat. From 264-285, crushed and altered slaty dolomite, gouge, and talcose material probably mark fault							
286-318.5	24	More pure, coarser-grained blue gray dolomite with less distinct banding and disseminate pyrite near 316. Probably considerable pyrite lost near 318.							
316.5-332.5	10.5	Pyrite with ab. 1' of dolomite 3.5' of core lost presumably pyrite, Banding generally at less than 45° across core							
332.5-365	23.5	Same as 286-318.5 except containing 2-3 feet of solid pyrite in scattered bands. Considerable core lost, presumably largely pyrite, as recovery elsewhere is good							
365-380	14.7	Impure slaty dolomite, metamorphosed with highly irregular and distorted banding of slate & dolomite							
		J. B. Hole caved and filled with black mud between 260' and 284'.							

DIAMOND DRILL RECORD

Standpipe BX drive-8'
Casing 222' AX

Started 6/14/54
Finished 6/15/54
Hole Size AX
Depth 405.
% Core Rec. 98%

Mine Lotze Prospect
Location Current Cr, Stevens Co. Wash.

Logged by Eskil Anderson Date 6/16/54
Drilled by Howard & Link (Boyles)

Hole No. 7
Level
Grid
Latitude
Departure 2578
Elevation
Bearing
Inclination -90°

Depth Feet	Feet Core	Lithologic Description	Sample Data						
			No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-190		BX plug and core. Black slate, siliceous near bottom with seams of whire calcite and occasional pyrite seams and spots. Banding at about 45o							
190. 405	210	Impure fine grained gray slaty dolomite with minor bands of black slate, banding at 20° to 40°. White calcite seams, abundant but very thin. Also white talcose material and a pinkish bronze talcose mica. Some very thin pyrite bands between 210 and 220. About 1" of pyrite between 245' and 255'. Mineralized dolomite band of previous drill holes not present. 3" black dike at 400' and 3' at 402.0'. N.B. Very good core recovery in soft talcose zones as well as in more solid dolomite							

DIAMOND DRILL RECORD

Standpipe 11' BX drive
Casing 392' AX

Started 6/18/54
Finished 7/3/54
Hole Size 500'
Depth 83%
% Core Rec.

Mine Lotze Prospect
Location Current Cr., Stevens Co. Wash.
Logged by Eskil Anderson Date 7/6/54
Drilled by Howard & Link (Boyles)

Hole No. 8
Level
Grid
Latitude
Departure
Elevation 2731
Bearing S.
Inclination -70°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-211	Bx	Black thin bedded slate with white calcite seams parallel to bedding less than 1/8" thick usually. Occasionally pyrite and pyrrhotite blobs and thin bands. Bedding at about 5° to 20° from plane across core.	825	407-411	3.5	4.0			
211-343	BX & Ax	Dolomite & slate, dolomite becoming predominate towards end of run. Colorless, white, and soapy talc abundant.							
343-398.5	54	Mainly fine grained dolomite with much talcose material, little slate remaining and few spots of pyrite. Much broken soapy material and gouge from 356 to 392 with bad caving. Bedding at almost rt angles to core.							
398.5 500'	85	Gray med. coarsely xline dolomite with slate absent. Dolomite band same as heavy pyrite bearing dolomite of other holes. Occasional spots and seams of yellow pyrite from 405' on. From 406' to 411' small spots of pyrite (est. less than ½" Zn). 11" of solid pyrite between 467.5 and 469.2 in 5" and 6' band. Banding at about 15° to plane across core. Few spots of pyrite continuing to 500' where hole was stopped. N.B. No commercial mineralization							

DIAMOND DRILL RECORD

Standpipe
Casing 7' BX drive

Started 7/7/54
Finished 7/29/54
Hole Size AX
Depth 483
% Core Rec. 96

Mine Lotze
Location Currant Cr. Stevens Co., Wash.

Logged by Eskil Anderson Date 7/29/54
Drilled by Akers & Link (Boyles)

Hole No. 9
Level
Grid
Latitude
Departure
Elevation 2642
Bearing
Inclination -90°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-7	0	Overburden							
7-147	BX	BX core set aside for observation but not in boxes. Black slate as below.							
147-379	232	Black slate with some find white calcite bands parallel to bedding, some pyrite and pyrrhotite. Bedding at about 20° to plane across core. Slate siliceous and very hard to drill, gradually becomes more calcareous with some white calcite and dolomite bands up to 6" thick after 225'.							
379-411	30	Impure slaty gray dolomite with minor bands of slate. At 383-385 crossed black gouge representing crushed zone overlying dolomite in all holes							
411-476	65	Medium to coarsely xline dolomite in which strong pyrite zones were encountered in other holes. Yellow pyrite on seams and in spots increasing in abundance but not exceeding few percent towards 476							
476-477	1	~~BX~~ 1' pyrite and pyrrhotite with some red primary hematite & minute specks of PbS. Pyrite grades into black dike.							
477-477.5	0.5	Black coarse xline dike with little pyrite							
477.5-480	2.5	Altered vuggy dolomite with qtz ~~Blue coarse xline dike with a little pyrite~~ xls in vugs.							
480-483	3.0	Basic dike with white and green talc							

DIAMOND DRILL RECORD

Standpipe
Casing

Started 10/28/52
Finished 2/15/53
Hole Size AX
Depth 400
% Core Rec.

Mine Maki Prospect
Location Current Cr. ½ mi. E. of Deep Lake, Stevens Co., Wash.
Logged by E A Date 2/25/53
Drilled by Newman and Kellams (Boyles)

Hole No. 1
Level
Grid
Latitude
Departure El. 2402.
Elevation N.4°W.
Bearing Horizontal
Inclination

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-400		Coarse grained biotite granite. Drill stuck repeatedly from 180' on by caving and running sugary granite. Hole abandoned at 400'. Drillers could make no progress.							

Form 108 2M 3-53 SHAW & BORDEN CO. 308150

27

DIAMOND DRILL RECORD

Standpipe
Casing 83

Started 10/6/52
Finished 10/14/52
Hole Size AX
Depth 214
% Core Rec. 30

Mine Dosser Prospect
Location Current Cr., East of Deep Lake, Stevens Co., Wash.
Logged by E A Date 10/24/52
Drilled by Olds-Kellams (Boyles)

Hole No. 1
Level
Grid
Latitude
Departure
Elevation 2623'
Bearing S.
Inclination ~ 29°

Depth Feet	Feet Core	Lithologic Description	Sample No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-27	0	Overburden							
27-83	0	No core. Sludge mainly FeOxs from 50' to 83'. First sludges, 50' to 83'. Driller recovered no sludge before 50' and as a result almost no information was obtained from first part of hole. Ac. to drillers from 27' to 50' drilling was in bedrock with oxides							
83-101	3	About 1' of 3' of core is somewhat porous, hard FeO_x.							
101-214	52	Gray, finely crystalline banded dolomite with red FeO_x scattered sparsely throughout and no fresh sulfides. Sludges contain slight to moderate quantities of FeO_x particles beyond 110. Bedding near right angles to hole. Note: Failure of driller to save much core, and incomplete sludge recovery, make results obtained from hole worth very little.							
		Sludges		60-65	0	5	0.1	0.6	0.1
		Sullivan Mining Co. assays		65-70	0	5	0.4	0.8	0.1
				75-80	0	5		0.1	0.0
				80-85	0	5	0.2	0.1	0.3
				85-90	0	5	0.4	0.8	0.4
				90-95	0	5	0.3	0.9	0.5

DIAMOND DRILL RECORD

Standpipe 12
Casing 21

Started 10/16/52
Finished 10/24/52
Hole Size AX
Depth 215
% Core Rec. 41

Mine Dosser Prospect
Location Current Cr., just east of Deep Lake, Stevens Co. Wash.
Logged by EA Date 10/24/52
Drilled by Olds-Kellams (Boyles)

Hole No. Dosser #2
Level
Grid
Latitude
Departure
Elevation 2623'
Bearing S
Inclination -67°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-12	0	Overbuden							
12-21	0	No core.							
21-215	88	Gray, light and dark banded dolomite with oxidation spots scattered sparsely throughout. Strongest oxidation in sludges at about 57' to 75' Banding not far from right angles to hole. N. B. Very little core and incomplete sludge recovery.							
		Sludge Sullivan Mining Co. assay		57-65	0	8	0.4	1.0	0.0

Form 105 2M 8-53 SHAW & BORDEN CO. 308150

DIAMOND DRILL RECORD

Standpipe
Casing 6

Started 10/25/52
Finished 11/17/52
Hole Size AX
Depth 605
% Core Rec. 73%

Mine Donner Prospect
Location Currant Cr. just east of Deep Lake, Stevens Co., Wash.
Logged by EA Date 11/16/52
Drilled by Olds (Boyles)

Hole No. 3
Level
Grid
Latitude
Departure
Elevation 2333'
Bearing N
Inclination 0°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-75	44	Coarse grained biotite granite							
75-188	98	Blue-white xline dolomite metamorphosed & knotty from proximity to granite Few thin bands of ZnS, and occasional ZnS shines and pyrite from 85' to 95' ZnS bands scarce, less than 1/8" thick. About ½" ZnS at 154'. Considerable pyrite and pyrrhotite from 164' to 170' in narrow bands. Oxidation at 182'							
188-193	3½	Thin banded ls, often wafer cored, iron stained.							
193-478	218.5	Blue-white xline ls, banded to Knotty & contact metamorphosed. Many 1/16" to ½" pyrite and pyrrhotite bands from 198 to 252'. Ls darker, denser, somewhat silicified from 267' to 300'. Strong pyritization from 428' to 445.							
478-605	78	Ls becoming finer-grained darker, and sometimes slaty and impure with some narrow bands of black, siliceous slate; poor recovery.							

DIAMOND DRILL RECORD

Standpipe
Casing 80

Started 11-8-52
Finished 11-15-52
Hole Size AX
Depth 161
% Core Rec. 90

Mine Dosser
Location Currant Cr., just east of Deep Lake, Stevens Co., Wash.
Logged by EA Date 12/3/52
Drilled by Johnson (Boyles)

Hole No. 4
Level
Grid
Latitude
Departure
Elevation 2198
Bearing S25°W.
Inclination -25°

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-22	7	Gray banded dolomite with iron oxide in spots and along seams. BX chips more than core							
22-125	93.5	Wavy gray and dark gray banded dolomite-banding mostly at right angles to core axis. Very narrow seams, and spots, of ZnS beginning at 60' and sparsely distributed throughout rest of section. Occasional zones containing much pyrite with a little ZnS & PbS. Some pyrrhotite. (Piece of high (Zn split core removed from 92') Core 100% except in first few feet	527	79-82	3.0	3.0	Tr	0.0	0.8
			528	90.-94	4.0	4.0	Tr	0.0	1.0
125-161	35	Dolomite becoming lighter gray and less distinctly banded, med. xline, with less pyrite, tremolite. No Zn and Pb shines observed.	529	105-108.5	3.5	3.5	Tr	0.0	0.5

DIAMOND DRILL RECORD

Standpipe
Casing 25

Started 11-17-52
Finished 11-25-52
Hole Size AX
Depth 175
% Core Rec. 97

Mine Dosser Prosp.
Location Current Cr., just east of Deep Lake, Stevens Co., Wash.
Logged by EA Date 11-25-52
Drilled by C.R.Johnson (Boyles)

Hole No. 5
Level
Grid
Latitude
Departure
Elevation 2198
Bearing Vertified
Inclination

Depth Feet	Feet Core	Lithologic Description	Sample Data No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-25	20	Chips of BX core. Gray to black dolomite with Fe stained spots. Pyrite, pyrrhotite, & tremolite between 8' & 10'							
25-77.5	51.5	Gray banded to knotty dolomite with occasional narrow calcite veinlets. Banding at 15° to 40° angle from plane across core. Few oxidized spots. Specks of pyrite from 55' (and tremolite)							
77.5-80.5	3.0	Gray to dark gray banded ls with tiny seams of dark brown ZnS and pyrite and PbS shines.	524	77.5 -80.5	3.0	3.0	Tr	0.0	0.5
80.5-97	16.5	Gray banded dolomite with occasional shines of Pb & ZnS. Less than 1/8" bands of dark brown ZnS							
97-147	50	Gray banded dolomite with occasional spots of Zn and Pbs, and pyrite bands totalling ab.18", between 97' and 112'. Pb and Zn sulfides sparsely and uniformally distributed throughout 50'.	525	97-102	5.0	5.0	Tr	Tr	0.4 9.7Fe
			526	139-144	5.0	5.0	Tr	0.0	0.0 9.3Fe
		Pyrrhotite and pyrite between 139 & 144.							
147-175	28	Dolomite type remains same with less Zn & PbS, less pyrite, and tiny tremolite Xls common.							

DIAMOND DRILL RECORD

Standpipe
Casing 15

Started 11/25/52
Finished 12/6/52
Hole Size AX
Depth 174.5
% Core Rec. 92.5%

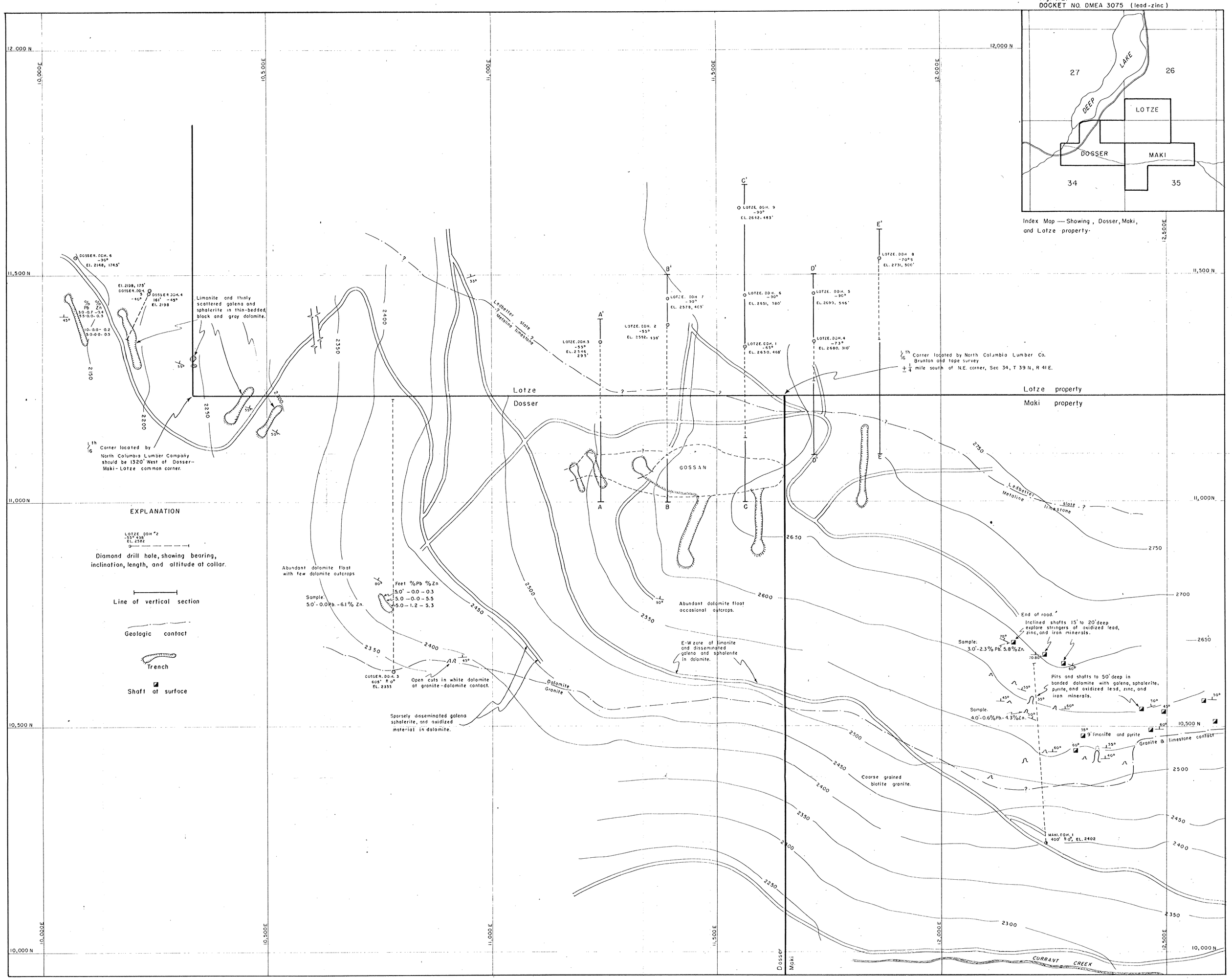
Mine Dosser
Location Current Cr., just east of Deep Lake
Stevens Co., Wash.
Logged by EA Date 12-15-52
Drilled by C R Johnson (Boyles)

Hole No. 6
Level
Grid
Latitude
Departure
Elevation 2148'
Bearing
Inclination Vertical

Depth Feet	Feet Core	Lithologic Description	Sample Data						
			No.	Interval	Core Feet	Sple. Feet	Oz. Ag	% Pb	% Zn
0-12		Overburden - shattered bedrock particles							
12-174.5	156	Gray and dark gray fine grained dolomite, with slate bands Pyrite at 46' Dolomite becoming more distinctly banded with spots of pyrite, calcite, and dark brown ZnS Shines from 80' on Banding at about 45° Dolomite becomes lighter gray from 155 on. No sections mineralized enough for assay.							

Form 108 2M 8-53 SHAW & BORDEN CO. 308150

Figure. 2.
DOCKET NO. DMEA 3075 (lead-zinc)

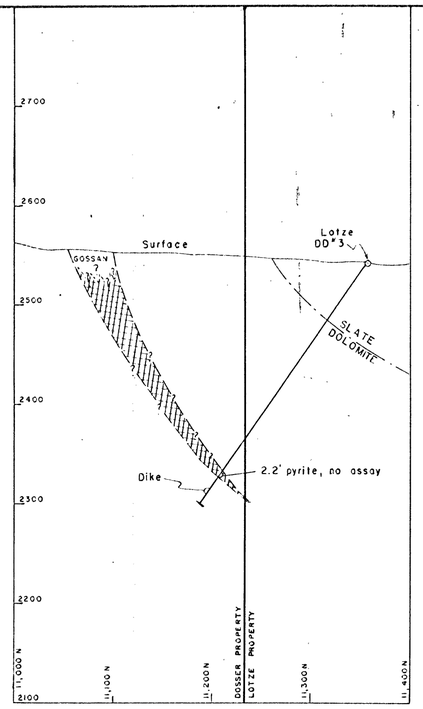


All data from company maps, 1954

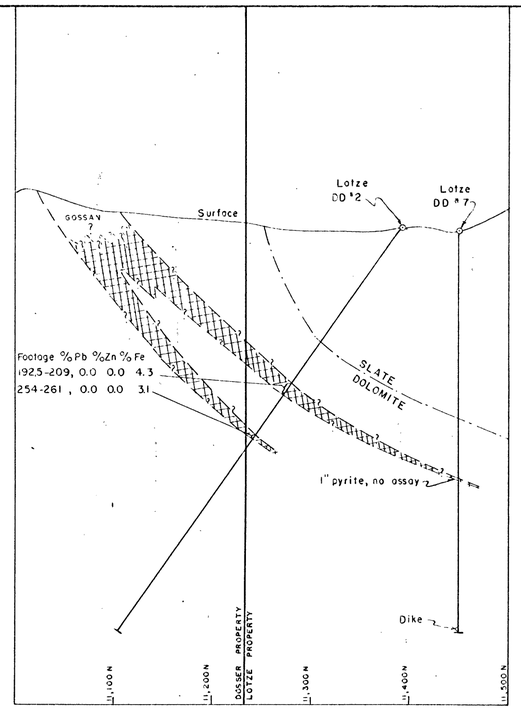
PLAN MAP SHOWING DIAMOND DRILLING AT GRANDVIEW MINES, DOSSER-MAKI-LOTZE PROPERTY

T.39 N. R.41 E. W.M., STEVENS COUNTY, WASHINGTON

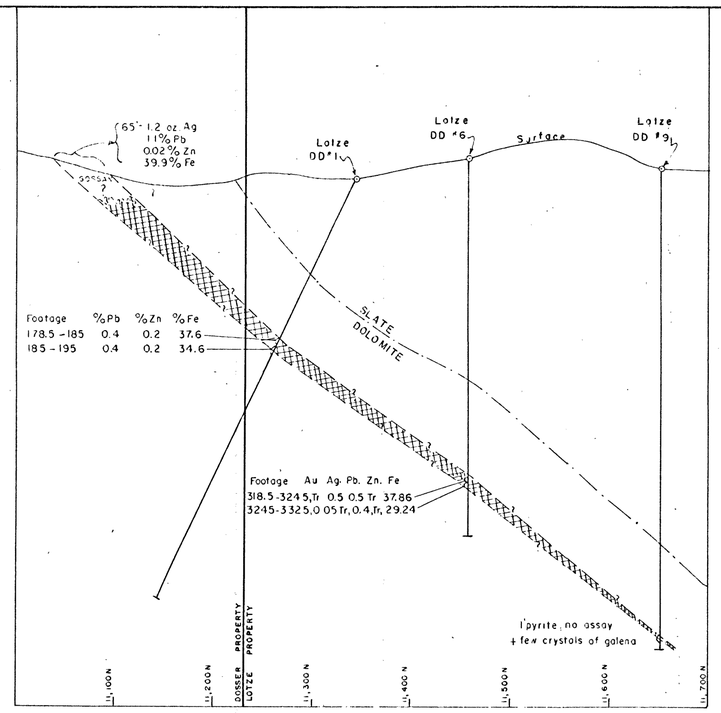
Figure 3
DOCKET No. DMEA 3073 (lead—zinc)



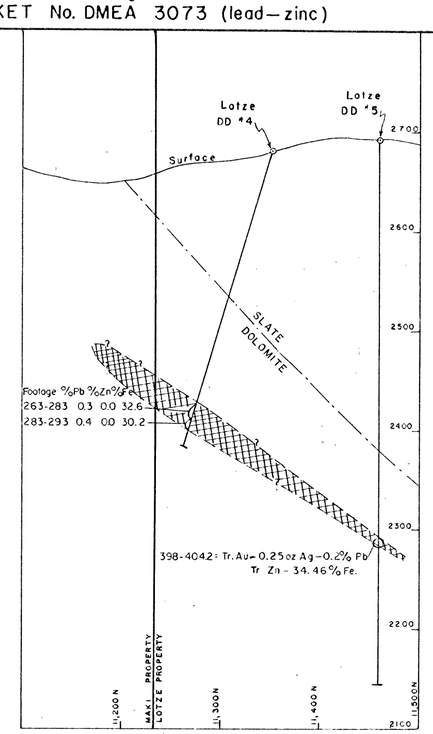
VERTICAL SECTION A-A' (11,240 E)



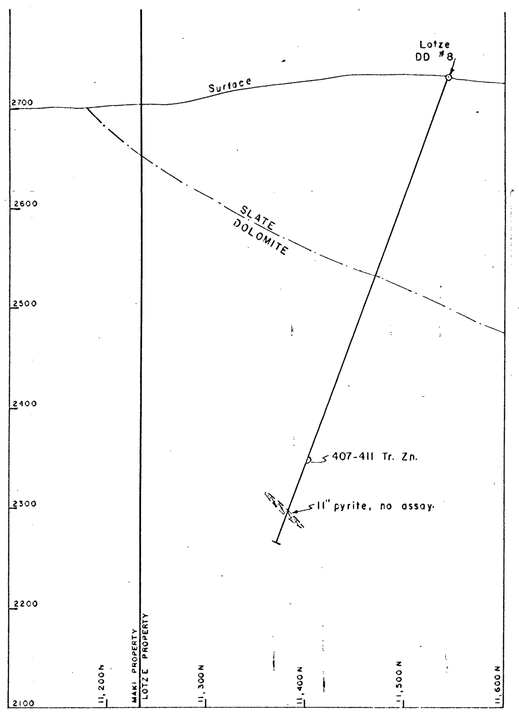
VERTICAL SECTION B-B' (11,390 E)



VERTICAL SECTION C-C' (11,560 E)



VERTICAL SECTION D-D' (11,710E)



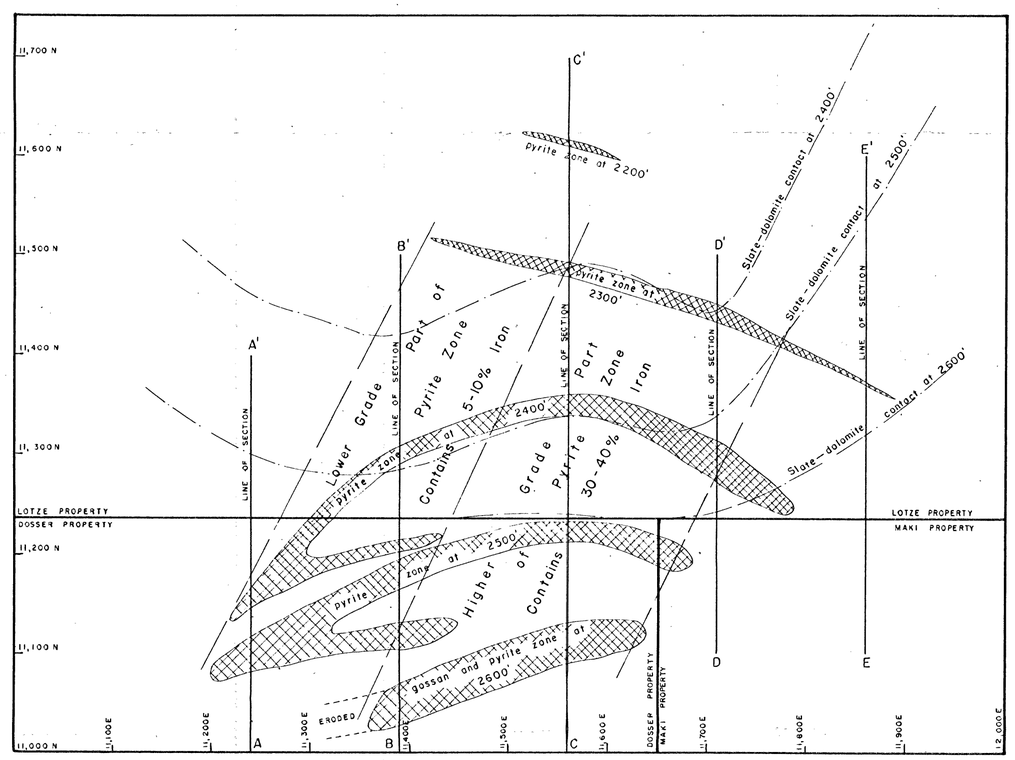
VERTICAL SECTION E-E' (11,860E)

EXPLANATION

Indicated pyrite zone

Contact between slate and dolomite

Lotze DD #2
Diamond drill hole



COMPOSITE PLAN SHOWING OUTLINE OF INDICATED PYRITE ZONE AT 5 ALTITUDES

PLAN AND SECTIONS SHOWING PYRITE ZONE INDICATED BY DIAMOND DRILLING AT GRANDVIEW MINES
DOSSER—MAKI—LOTZE PROPERTY
Stevens County, Washington

Sections and plan compiled from company records 1954.
W.P.PUFFETT, USGS