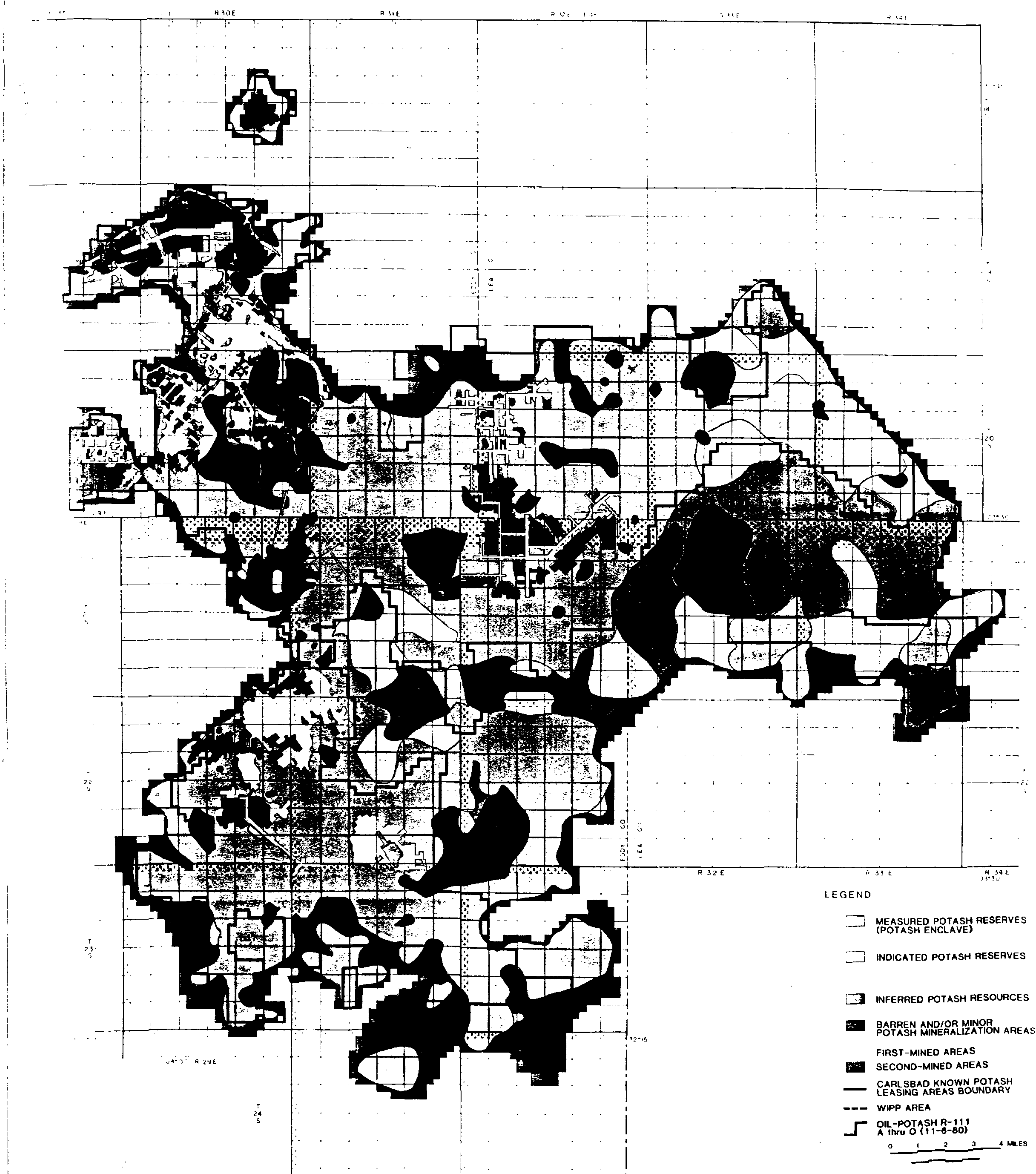
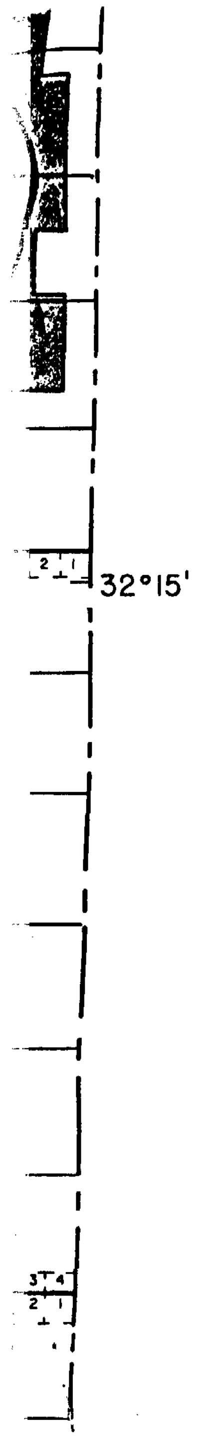
YATES PETROLEUM CORP.
BEFORE THE COMMISSION
NMOCD CASE NOS. 10446-10449
DATE: 09/09/92 DE NOVO
EXHIBIT NO. 32

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



PRELIMINARY MAP SHOWING DISTRIBUTION OF POTASH RESOURCES, CARLSBAD MINING DISTRICT, EDDY AND LEA COUNTIES, NEW MEXICO

BY
BUREAU OF LAND MANAGEMENT
1984



ECONOMIC GEOLOGY

The potash deposits in the Carlsbad Mining District in southeastern New Mexico are about 15 miles (24.1 km) east of the city of Carlsbad. The deposits occur within the McNutt potash zone of Kroenlein (1939, p. 1691) of the Salado Formation of Permian age. The McNutt zone is 150 feet (45 m) to 500 feet (150 m) thick. Depth to the Salado in the district, ranges from 175 feet (53.4 m) along the western margin to 2,000 feet (610 m) in the northeastern portion. The main potash ore minerals are sylvite and langbeinite, of which sylvite is predominant. Potash ore minerals occur in 12 ore zones, which range from a few inches to 10 feet (3.05 m) in thickness, with no one ore zone extending over the entire district. These zones were named by Jones, Bowles, and Bell (1960, p. 25). Eleven of the ore zones occur within the McNutt potash zone and a 12th ore zone lies in the upper part of the Salado Formation. Six of the 12 ore zones have been mined by one of two methods: a modified long-wall method is used in one mine; the room-and-pillar method is used in the remaining mines. In these mines, about 60 percent of the ore is removed during the first mining and 40 percent is left in pillars to be extracted during a second phase of mining. The areas on the map designated as second-mined portray ores have been totally mined or lost during mining of a specific ore zone.

DELINEATION AUTHORITY AND CRITERIA

As part of the Bureau of Land Management resource evaluation responsibility, potash reserves have been identified per order of the Secretary of the Interior dated November 5, 1975 (40 FR 5186-87, Part III, D.). Minimum quality and thickness criteria used for this compilation are:
4 feet of 10 percent K_2O as sylvite or 4 feet of 4 percent K_2O as langbeinite or an equivalent combination of the two minerals.

REFERENCES CITED

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John, C.B., Pettengill, J.C., and Fulton, R.L., 1979, Preliminary map showing distribution of potash resources, Carlsbad Mining, Eddy and Lea Counties, New Mexico: U.S. Geological Survey Open-File Report 79-1579, scale 1:62,500

Jones, C.L., Bowles, C.G., and Bell, K.G., 1960, Experimental drill hole logging in potash deposits of the Carlsbad district, New Mexico: U.S. Geological Survey Open-File report, 25 pp.

Kroenlein, G.A., 1939, Salt, potash, and anhydrite in Castile Formation of southeast New Mexico: American Association of Petroleum Geologists Bulletin, v. 23, no. 11, p. 1682-1693

▨	MEASURED POTASH RESERVES (POTASH ENCLAVE): Resources for which tonnage is computed from dimensions revealed in workings and drill holes. The grade is computed from the results of detailed sampling. A minimum of three data points in any one ore zone meeting quality and thickness standards, no more than 1 1/2 miles (2.4 km) apart, have been used to delineate measured reserves.
▨	INDICATED POTASH RESERVES: Resources 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 the mineral bodies to be outlined completely or the grade established throughout.
■	INFERRED POTASH RESOURCES: Resources which are probable, but tonnage and grade cannot be computed due to the absence of specific data. Lithologic descriptions and Gamma Logs indicate probable mineralization, and the data can be reasonably correlated.
▨	BARREN AND/OR MINOR POTASH MINERALIZATION AREAS: Composed of subeconomic resources that would require a substantially higher market value or a major cost-reducing technology for economical production. Subeconomic resources also include other bittern mineral not presently being recovered.
□	FIRST-MINED AREAS: Partly extracted areas in one or more ore zones.
▨	SECOND-MINED AREAS: Areas where potash ores have been completely mined or lost during mining in one or more zones. Ore zone(s) above and/or below the mine level(s) may contain resources of proven or potential value.
—	CARLSBAD KNOWN POTASH LEASING AREAS BOUNDARY: Effective March 2, 1984, and pursuant to authority contained in the Act of March 3, 1879 (43 U.S.C. 31), as supplemented by Reorganization Plan No. 3 of 1950 (43 U.S.C. 1451, note), and 220 Departmental Manual No. 2 and Secretary's Order No. 2948. Boundary delineates and defines a total of 365,488 acres (1,479) km2.
— — —	BOUNDARY OF THE WASTE ISOLATION PILOT PLANT (WIPP) AREA

SCALE 1:62500

0 1 2 3 4 MILES

0 1 2 3 4 KILOMETRES

PRELIMINARY MAP SHOWING DISTRIBUTION OF POTASH RESOURCES, CARLSBAD MINING DISTRICT, EDDY AND LEA COUNTIES, NEW MEXICO

BUREAU OF LAND MANAGEMENT

1984

This map is published for use as a general planning and management tool. This map is a static representation of the 12 individual ore zone maps and 7 different mining companies activities.

YATES PETROLEUM CORP.
BEFORE THE COMMISSION
NMOCD CASE NOS. 10446-10449
DATE: 09/09/92 DE NOVO
EXHIBIT NO. 33

SME
Mining Engineering Handbook

In Two Volumes

Volume 1

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Society of Mining Engineers
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The American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc.

New York, New York

1973

Diamonds—Most diamonds come from placers, with little bedrock production from kimberlite pipes, dikes and sills. Exploration of diamond placers is similar to gold placers except that diamonds are even more rare and erratically distributed, so that large samples from drill holes, shafts and trenches are required. In the initial stages of prospecting, indirect methods involve panning of alluvium in search of diagnostic heavy minerals, such as the magnesian ilmenite, pyrope garnet and chromium diopside characteristic of the kimberlite at Kalondje, Congo Kinshasa.

Diamond placer samples can be "assayed" by passing them through hand jigs or sluice boxes and panning the concentrates. The grade is recorded as total carats (1 carat = 200 mg), size distribution, percent industrial and percent gem. In comprehensive evaluations, where larger samples are involved, a small washing plant, with jigs or heavy medium, produces a concentrate which goes to grease tables or electrostatic separators, or is hand-picked.

Kimberlite (blue ground) is the host rock for bedrock occurrences of diamonds, (peridotites rarely carry diamonds). Kimberlite is a breccia of a variety of rocks cemented by a matrix composed of crystals of peridot, enstatite, garnet and minor biotite. Most kimberlites are barren. Moreover, the diamonds vary widely in size and color in different pipes. Chemical characteristics can guide geochemical prospecting in soil-covered areas, and magnetic and gravity surveys have been useful in exploration.

The marketing of diamonds is controlled by a few international groups and poses a major problem to a newcomer.

Phosphate—A clear understanding of the marine sedimentation processes involved in the formation of commercial phosphate beds is a major aid in regional prospecting for new deposits. Some phosphate ore is remarkably uniform in thickness and grade over broad areas—e.g., the Phosphoria formation of the northwestern U.S. and the Pungo River formation in North Carolina, which were not subject to deep weathering before burial. Drill samples 5 mi apart will outline favorable areas with reasonable accuracy.

In other deposits—for example, the land pebble beds of Florida—exposure to weathering has solubilized the phosphate and it has percolated downward, upgrading the deeper zones (Cathcart[94]). Because leaching and enrichment are not uniform, phosphate values vary within wide limits, and drilling on centers of 200 to 400 ft is necessary for reserve calculation. Individual ore concentrations are several square miles in extent, more or less.

Leaching of phosphate from outcrop progresses more rapidly than of associated calcium and magnesium carbonates. Outcrop samples therefore give erroneous results.

Impurities are often undesirable, particularly those which consume or react with reagents during processing, or are undesirable in the final product.

Potassium (Potash)—Regional exploration for bedded marine salts is confined to large sedimentary basins, which can be established by geophysical methods (gravity, magnetics, seismic), stratigraphic guides and by water wells and wildcat oil tests. Geophysical logs of oil tests can identify evaporite horizons—evaporites are electrically very resistive. The gamma log can identify potassium, and with ideal conditions, even the percentage of K_2O. In the search for potash, paleographic reconstruction may suggest the corner of the evaporite basin where the last seawater bitterns, rich in potash, may have accumulated.

Potash beds can be widespread, uniform and regular, or very irregular, within a very much larger and thicker mass of bedded halite. Salt basins may be extensive, covering 150,000 sq mi and 5,000 ft or more thick. Potash usually occurs in the upper portions of the sequence, but not necessarily at the very top. Subsequent erosion or recrystallization may locally remove or distort the potash.

Individual Saskatchewan deposits are continuous over 50 sq mi. Ore reserves are considered proven on diamond drill holes (cored with special muds to prevent solution) spaced 1 mi apart. Original exploration drilling can be on centers of 5 to 10 mi. Because of salt flow under pressure, underground mining presently is limited to a depth of 3,500 ft, but solution mining can go deeper.

At Carlsbad, N.M., individual deposits are several square miles in area, and

can be located by exploration drilling on 1-mi centers. [redacted] Complexities, such as salt domes, anticlines, etc., [redacted] ruin an otherwise minable deposit.

Brines—Naturally occurring salt solutions can be a source of one or more products, depending upon the concentration and composition of the dissolved salts and the ingenuity of the chemist-engineer in recovering them. Seawater is a worldwide source of common salt, and has been a source of magnesium for many years. Connate brines and brines associated with inland lakes usually contain complex dissolved salts and are important sources of potassium, boron, lithium, magnesium, soda ash and bromine.

The important brine installations throughout the world, except those related to seawater, are in Tertiary and Recent intermontane basins, exhibiting internal drainage and playa conditions. Present-day arid conditions are not essential, as geologically earlier aridity may have formed brines. Salt flats are encouraging evidence that at shallow depth bitterns may be enriched with more valuable minerals. Geologic mapping may indicate buried lacustrine beds with favorable connate waters. A clue to the composition of possible buried and/or bedded saline concentrations may be found in springs and seeps.

Salines in terrestrial sediments originate from the salts dissolved in stream waters that drained into closed basins and evaporated. Three types of stream waters are recognized: (1) chloride type with resultant salts halite, potash and magnesian chlorides; (2) carbonate type with resultant salts trona, borates, sodium sulfate; (3) mixed waters (chlorocarbonate). Hot springs, volcanic vents and weathering of extensive sulfide occurrences modify the three types (sulfate type). Type 1 results from the weathering of sedimentary rocks of marine origin. The Carbonate Type 2 indicates watersheds of igneous lithologies typified by hydrolysis of silicate minerals during weathering. The silicates in acidic igneous rocks, especially volcanics, seem particularly responsive.[96] Explorers for trona, borates and lithium salts should search for areas where (young) acid volcanics and igneous rocks form much of the drainage area. Eugster (Ref. 95, p. 165) believes bedded trona deposits form from evaporation of sodium carbonate-sodium bicarbonate-bearing waters.

In exploration, boreholes are sunk, or drainage ditches dug for near-surface brines, to measure how fast the brine can be collected and whether rapid drawdown precludes a long life. Test evaporating ponds, each measuring an acre or more, are built so evaporation and leakage rates can be carefully measured. A chemist with experience in this field must plot changing chemistry and density of the brines during evaporation and design a recovery system to maximize product yield at lowest cost. This test program may last 1½ to 3 yr, depending upon evaporation rates.

Lithium—Lithium is produced from playa brines in California, Nevada and Utah, and from pegmatites in North Carolina and Africa. The Kings Mountain area of North Carolina was known for a long time for isolated spodumene crystals and small tin lodes, but vast quantities of spodumene were found by mapping and drilling in the early 1950s, when lithium exploration was spurred by high AEC demand. These pegmatites are unusual for large size and continuity of mineralization. Prospecting guide is an alteration halo up to 70 ft wide of coarse biotite (some chlorite) of the amphibolite and mica schist wall rock. In form, the pegmatites range from 20 to 100 ft thick to drilled depth of 600 to 700 ft.

The lithium-pegmatites in southern Africa also are large and consistently mineralized, but are zoned to permit selective mining. The ore minerals in Rhodesia are lepidolite and petalite, with minor spodumene, amblygonite, eucryptite, beryl, tantalite and cassiterite; in South West Africa, ore minerals are mainly lepidolite, petalite and beryl.

Borates (Boron)—Two types of deposits are exploited: (1) bedded salts and (2) boron-rich brines. Boron is relatively common in the earth's crust, but only a few minerals in a few localities are economic. Southern California is the main source of the boron for the chemical industry in the Eastern U.S., and Turkey supplies Western Europe.

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PER THE "1984 MAP"
ACRES IN POTASH AREA-R111P & SECRETARY AREA

TOWNSHIP	SECRETARY AREA	R-111-P AREA	MEASURED ORE	INFERRED ORE	INDICATED ORE	MINED AREA	BARREN
18S-30E	16,021	2,880	1,080	0	0	940	860
19S-29E	9,612	3,240	1,420	0	0	670	1,150
19S-30E	23,070	17,800	5,340	10	0	9,560	2,890
19S-31E	5,127	800	400	20	0	0	380
19S-32E	6,406	1,240	530	0	0	0	710
19S-33E	10,253	6,640	1,460	810	1,940	0	2,430
19S-34E	3,845	80	0	10	0	0	70
20S-29E	10,253	5,040	1,530	60	0	2,640	810
20S-30E	23,075	21,600	6,860	20	0	8,100	6,620
20S-31E	23,075	20,560	14,280	580	0	780	4,920
20S-32E	23,075	22,140	15,230	0	0	3,320	3,590
20S-33E	23,075	23,040	10,630	5,000	5,200	0	2,210
20S-34E	19,225	11,600	5,700	1,720	2,600	0	1,580
21S-29E	14,419	8,520	3,930	60	0	2,280	2,250
21S-30E	24,997	24,960	13,520	5,080	0	2,360	4,000
21S-31E	24,997	24,960	11,830	2,330	850	6,980	2,970
21S-32E	24,997	22,720	4,090	3,860	8,780	0	5,990
21S-33E	24,997	22,780	1,990	7,190	11,130	0	2,470
21S-34E	8,331	1,800	0	970	0	0	830
22S-28E	1,280	160	0	0	0	0	160
22S-29E	21,147	16,520	8,580	20	0	5,920	2,000
22S-30E	23,075	23,040	13,140	2,450	0	4,540	2,910
22S-31E	23,075	19,680	12,300	900	1,030	0	5,450
22S-32E	7,690	320	0	0	0	0	320
22S-33E	7,690	1,800	0	0	780	0	1,020
22S-34E	640	120	0	0	0	0	120
23S-28E	640	40	0	0	0	0	40
23S-29E	18,584	15,960	9,720	180	0	440	5,620
23S-30E	23,075	20,040	10,290	280	0	860	8,610
23S-31E	23,075	17,300	11,060	50	0	0	6,190
24S-29E	2,560	160	0	0	0	0	160
24S-30E	11,525	4,760	1,600	0	0	0	3,160
24S-31E	12,816	3,680	820	0	0	0	2,860
25S-31E	1,280	480	330	0	0	0	150
	497,002	366,460	167,660	31,600	32,310	49,390	85,500

SECRETARY AREA	R-111-P AREA
74% IN R-111-P	
26% OUTSIDE R-111-P	
34% MEASERED ORE	46% MEASURED ORE
6% INDICATED ORE	9% INDICATED ORE
7% INFERRED ORE	9% INFERRED ORE
10% MINED AREAS I OR II	13% MINED AREAS I OR II
17% BARREN AREA	23% BARREN AREAS

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SME Mining Engineering Handbook

In Two Volumes

Volume 2

ARTHUR B. CUMMINS

Chairman, Editorial Board

IVAN A. GIVEN

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Society of Mining Engineers
of
The American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc.
New York, New York
1973

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Assay			Remarks

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The assay of a sample cut from the wall of a trench or pit is representative of that length of the cut. It may be averaged with other similar line-cut samples to obtain an integrated average of any given length of wall exposed. In other words, the linear extent of any or all assays can be ascertained by properly weighting each sample assay with respect to its length and grade. Depending upon the orientation of the excavation, the averaging process is that used to determine average value estimates of material exposed in a drift, raise or crosscut.

Grab-Sample Assays—The foregoing discussion has been concerned largely with assay estimates that result from measured sample lengths or volumes. Grab sample assays do not fall into such a category because, as the name signifies, they represent random samples.

At best, they usually serve only as general indicators of the tenor of the mass from which the samples were obtained, and the examining engineer can rarely credit such analyses to particular unit occurrences of material. In addition to the factor of the random manner in which the samples often are taken, they generally represent also only the thin surface zone of the mass.

32.2.4—INTEGRATION OF ALL FACTORS AND ORE-RESERVE COMPUTATIONS

The investigator, upon having properly prepared the maps which will be used as bases in calculating the quantity of economically valuable materials in the mine under consideration, and upon having determined and assembled all controlling elements pertinent to the analysis, is then ready to undertake a formal computation and classification of the quantity and quality of the ore or materials sought.

This procedure is known as an ore-reserve analysis, and it is an engineering process wherein due credit is assigned to the occurrence and classification of all ore tonnages so that a developed or semideveloped mineral deposit can be evaluated.

Ore-Reserve Classifications—So far as the classification, i.e., group segregation, of ore reserve tonnages is concerned, there are two schools of thought. The concepts in both instances are of such a similar legitimate nature that, in their respective applications, essentially the same total quantity of ore will be arrived at, but because of a different outlook or mode of approach, the ore classifications into unit types often are at variance. For example, the U.S. Geological Survey and the U.S. Bureau of Mines, both governmental agencies, are primarily and fundamentally concerned with the determination of the future potential mineral resources of a given mine which either, or both, may be studying. That is, although they are directly interested in an ore-reserve classification, their distinction of class types is based largely upon a projected rather than upon a present potential.

On the other hand, a reserve analysis made by, or for, a private enterprise usually is designed to resolve the estimate in such a way as to show the various ore tracts classified on the basis of their currently minable nature. This distinction between two points of view may become clearer in the following discussion.

The classification used by the Geological Survey and the Bureau of Mines are summarized in the material which follows. The Securities and Exchange Commission (SEC) also uses classifications of Proven Ore and Probable Ore in its work in relation to interpretations of ore-reserve appraisals and stock-market listings of mineral deposits. Their respective meanings are the essential equivalents of Measured Ore and Indicated Ore, as such designations are employed by the Bureau and the Geological Survey.

Measured Ore—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 are so closely spaced and the geologic character is so well-defined, that the size, shape and mineral content are well-established. The computed tonnage and grade are judged to be accurate within stated limits, and no such limit is judged to differ from the computed tonnage or grade by more than 20%.

Indicated Ore—Indicated ore is 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 outline the ore completely or establish its grade throughout.

Inferred Ore—Inferred ore is ore for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit, and for which there are few, if any, samples or measurements. The estimates are based on an assumed continuity or repetition for which there is geologic evidence. This evidence may include comparison with deposits of similar type. Bodies that are completely concealed may be included if there is specific geologic evidence of their presence. Estimates of inferred ore should include a statement of the special limits within which the inferred ore may lie.

In commercial mining geology, which is guided primarily by direct economic factors, we find that ore reserves often are classified as follows: *developed* or *proved ore, probable ore*, and *possible* and/or *extension ore.*

Developed Ore—As the term is used, "developed ore" signifies ore which is so completely exposed that its existence as to tons and tenor is essentially certain and which, in addition, is available for immediate withdrawal by the mining method being employed. Here there is a distinction between *measured ore* and *developed ore,* for although both are subject to the same fundamental controls as to limiting exposures, the factor of ready minability may not always be equal. For example, assume an ore-bearing, well-defined, uniform, epigenetic vein which is exposed only on one mine level by a drift. The mining practice is to raise on the ore and stope it by an overhand method. *Measured ore* is computed to occur both above and below that drift, whereas *developed ore* will exist only above the level, as the ore below the drift is not immediately minable under the method being followed.

The theoretical concept held by some engineers is that developed ore within a tabular mass must be bounded on four sides by mine workings, that is, by an upper and a lower drift and by two raises, one at each lateral extent. This is an ideal condition, but in practice such a rule is seldom applicable. If it were, the quantity of proved or developed ore accredited to most mines would be far out of line with the actual situation. This is not to leave the impression, however, that the undesirable practice of basing ore-reserve estimates or structural interpretations through and about inaccessible mine workings is here proposed as proper procedure.

Probable Ore—Probable ore is ore whose occurrence is for all essential purposes reasonably assured but not absolutely certain. A definite grade can be assigned for the tons thus classified, but mining excavations have not progressed to the stage where the probable tons are available for current mining, although it could become available for withdrawal in a relatively short time. The grade assigned to many probable ore blocks may be the grade determined for contiguous developed blocks. Some *probable ore* thus distinguished may be the essential counterpart of some *measured ore* as classified under the governmental plan.

Possible and/or Extension Ore—Possible ore, which is called by some engineers *future ore,* is a class whose existence is a reasonable possibility, based primarily upon the strength and continuity of geologic-mineralogic relationships and upon the extent of ore bodies already developed, and for which therefore a measure continuity is available as an indication of what may be expected as mining excavations progress into farther reaches. Because of the comparative absence of mine workings which would reveal assay values, *possible ore* cannot be assigned a grade with any practicable certainty, nor can the quantity be expressed as a definite absolute amount.

Extension ore is essentially possible ore believed to exist ahead of ore exposed in the face of a drift.

Both *possible ore* and *extension ore* are, to all intents and purposes, the equivalent of *inferred ore*. Because specific grades of mineral contents cannot be credited to such ores, they cannot be used in the direct evaluation of a mineral deposit.

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Calculation Procedures—The general procedure in an ore-reserve calculation is the same regardless of the concept employed in making the ultimate classification, since it follows that no classification of any ore reserve can be visualized completely until all necessary working data have been properly treated in the total process.

Longitudinal Sections—A longitudinal section will be used to demonstrate the further procedure of making an ore-reserve calculation. Fig. 32-15 is an example of such a map, completely prepared for ore-reserve purposes. The sequence in assembling a similar section in actual practice follows:

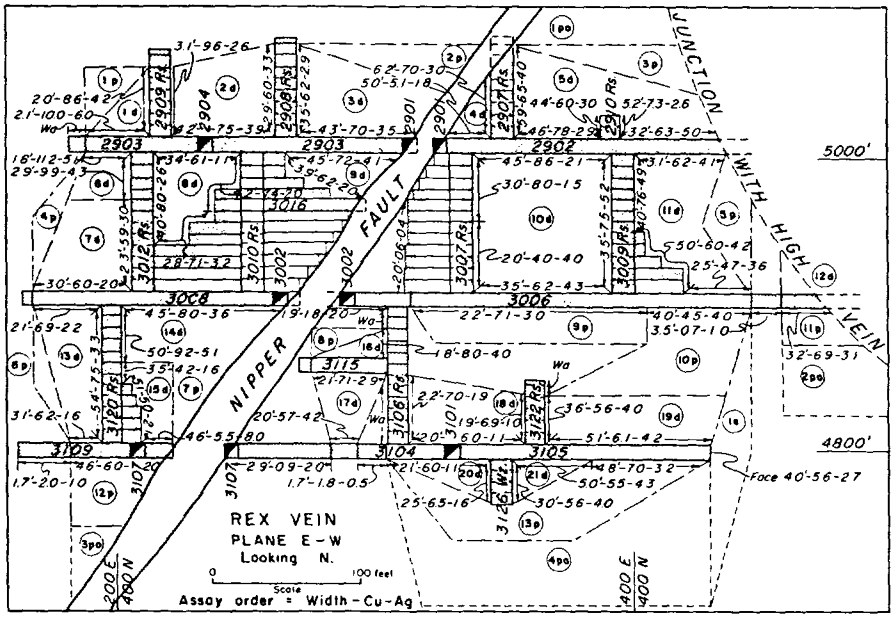

Fig. 32-15—Longitudinal section with assays posted and ore blocks delineated. Complete as a base control for ore-reserve tonnage calculations. Shading indicates gray and red colors employed in practice.

1. Construct as a base, to receive working data, the longitudinal section of all mine excavations made in a vein. Determine and indicate the position of pertinent limiting geologic structures—for example, the Nipper Fault and High Vein junction.
2. Post assay averages on all excavations driven on the particular structure. A commonly used and satisfactory method is then to color the ore expanses in red and the waste or protore lengths in gray. Such a practice makes ore-waste contrasts readily apparent for the interpretations to follow. These assay averages and ore-protore determinations are based upon the controlling limiting factors previously discussed.

It sometimes develops that a vein structure may change strike slightly or have minor variations in its general trend within the limits of its exposure by mine excavations. Inasmuch as longitudinal sections are projected into some selected vertical plane, these characteristics, together with a common habit of veins to dip less than 90°, induce a minor shortening of true horizontal and vertical distances, respectively, when such distances are shown in the section. That is, sample locations in drifts and raises are determined by measuring along the excavations from some known point of origin. Hence, all such distances are actual, whereas drifts, if curved, do not so plat on long section, nor do raises on inclined structures show in slant heights. The resulting foreshortening must be accounted for and corrected. Otherwise the application of unit-assay averages will exceed the working place as it is platted. The adjustment-correction can be accomplished conveniently by the use of proportional dividers adjusted and set to equalize these comparatively minor, but nonetheless pertinent, discrepancies.

Further, it will be noted from a study of Fig. 32-15 that the assays have been determined as units in such a way between delimiting excavations as to make the assay average applicable to the extent of the excavation within the limits. In other words, if the assay average is needed for the extent of a drift between two raises, then that is the unit length of assay which is determined and applied. As noted before, the posted averages should not exceed the length of the unmined blocks they represent.

3. On the basis of controlling geologic-mineralogic characteristics, together with the extent of ore averages indicated, the dimensions and classification of the ore-reserve blocks are judged and delineated. In Fig. 32-15, a vein structure of comparatively medium strength and mineral persistency has been visualized, and the blocks are delimited accordingly. A number of complexities also have been introduced in an attempt to show as many block-outline types as possible.

It will be noted that in some cases (Blocks 14d and 15d) the ore assays are such as to necessitate delineation of two or more contiguous ore-reserve blocks of a similar classification where one might otherwise have occurred if the several ore assays had been more closely comparable. This method of making a distinction between blocks on the basis of ore width and grade, or both, is good practice, and thus one block would contain ore of a comparatively higher grade than another and would indicate the existence of high grade zones within the ore shoot as a whole. The ore-reserve estimate, in addition to giving a measure of the quantity of ore, also serves to aid the mine operator. By having the ore zones so distinguished, he can achieve better control in planning his mining program. The blocks are numbered in four separate individual sequences—developed ore blocks, probable ore, possible ore and extension ore, and each type of block has been properly distinguished by a symbol as well as by a sequence number.

The engineer, upon having thus determined and outlined the various ore blocks, then is ready to compute and record the ore tonnages. The sequence is:

1. Each block is analyzed individually as to area encompassed and average width and grade of ore revealed. Those blocks which fall into a developed ore classification are considered first. The area is determined either as a product of direct, linear scale measurements or, where the blocks are highly irregular in outline, by a planimeter. The average width and tenor value which apply to the particular block are calculated by a weighting process wherein due regard is given to the linear extent which each assay average represents. All assay units that specifically bound, or fall within, the outlines of the block should be used in calculating the average grade of ore. If one assay average is effective over twice the length of another with which it is to be combined, it should be weighted by factor of 2 in the calculation. The comparative importance of each assay unit can be determined readily by visual scanning of the relative lengths represented.

The data of area and average width and tenor for each block should be recorded as they are determined. Fig. 32-21, Sec. 33.3. Reports, with its self-explanatory column headings, is an example of a convenient form for this record.

2. The tons in each block are calculated by dividing the product of the area and the assay width by the tonnage factor previously determined. Cubic volume thus is converted into tons of ore in each ore block.

3. The tons in each block then are multiplied by the percent or ounces of metal (or metals) as indicated by the assays, and the result is recorded on the form sheet. This procedure assembles the statistics for ascertaining a properly weighted average grade of all ore-reserve blocks.

4. The total tons for each classification is found by adding the "tons" column after all blocks have been calculated. The average grade of the total tons in a given class for the given vein is calculated by simply dividing the total tons

Each of the foregoing methods is briefed as follows.

Weighted Volume Estimate—This method is most satisfactorily applicable where the distances between test holes are uniform and equal. In other words, with boreholes or test pits, a grid plan has been established at each corner of which a drill hole will permit an assay test. Each test hole is identified by number, and the depth at which ore was cut, together with the distance and assays of material exposed. may be recorded near the platted site of the hole. Each problem, depending upon its specific nature, may pose slight variations in the method of its recording. With such a grid plan map assembled, it becomes a simple matter of calculation to determine the volume or tonnage and average grade of material included within each grid square, as the area is fixed by the grid lines, and the depth of material is indicated by the four tests that establish the grid corners.

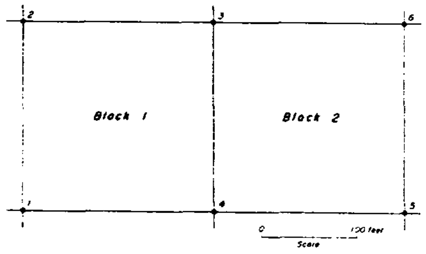

Fig. 32-16—Plan map showing ore blocks determined from data provided by regularly spaced drill holes. Block 1 is based on Holes 1, 2, 3 and 4; Block 2 on Holes 3, 4, 5 and 6. If desired, the tons and grade for each block, after being computed, can be recorded within each block outline.

Assuming the borehole project illustrated in Fig. 32-16, the resulting field and office data are tabulated below.

		Drill-Hole Data				
Hole No.	Location*	Collar Elevation, Ft	Depth to Ore, Ft	Length in Ore, Ft	Average Assays of Ore, % Cu	Length in Ore × Average Assay
1..........	200 ft W. of Hole 4	615	21	70	2.01	140.70
2..........	200 ft N. of Hole 1	620	15	90	1.45	130.50
3..........	200 ft E. of Hole 2	621	16	85	2.90	250.50
4..........	200 ft S. of Hole 3	616	20	75	2.37	177.75

* These locations are simply used to set the grid in this illustration. The survey in the field would be tied into a base control of some kind.

Area bounded by grid of Holes 1, 2, 3, 4 (Block 1) = 200 × 200 = 40,000 sq ft

$$\text{Average length of ore} = \frac{70 + 90 + 85 + 75}{4} = \frac{320}{4} = 80 \text{ ft}$$

$$\text{Volume of ore} = 40{,}000 \times 80 = 3{,}200{,}000 \text{ cu ft}$$

$$\text{Tons of ore} = \frac{3{,}200{,}000}{\text{Tonnage factor}}$$

$$\text{Grade of ore} = \frac{140.70 + 130.50 + 250.50 + 177.75}{320}$$

$$= \frac{699.45}{320} = 2.185+, \text{ or } 2.19\ \%\ \text{Cu}$$

The tons and grade of each grid block are thus indicated. The total tons of all grid blocks in the deposit may be determined by adding the tonnages of all blocks. The average grade of the total tonnage is found by properly weighting the grade of each block in proportion to its tonnage and then dividing the sum of these products by the total tonnage.

In the generally less desirable testing program where the holes are not uniformly

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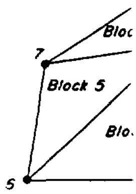

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into the total of the "Tons x %" or "Tons x Oz" column. Calculating and adding machines are useful, if available. The grand-total ore reserve (quantity and quality, or grade) of any or all classifications of ore in a particular vein or in a given mine, as desired, can be ascertained by combining in an appropriate manner, the various totals thus obtained.

Plan Maps—The general practices applicable in using longitudinal sections also are the same when the ore-reserve base maps are in plan (horizontal) projection. There are two basic types of such plan maps: (1) that for, on occasion, the ore-reserve analysis of semitabular masses and stringered vein zones that have been mined by underground methods, and (2) those, sometimes together with supplementary cross sections, used to determine the quantity and grade of materials in pervasive and disseminated deposits that have been tested by boreholes, pits or trenches.

Maps of Semitabular Masses—Plan maps often are used to delineate ore-reserve tracts where ore bodies are essentially flat-lying, irregular and lenticular in outline, or where metal-bearing stringered zones are so closely associated as to require the contemporaneous mining of intervening country rock.

Such plan maps are most useful when an individual plat is designed to depict the excavations on each working floor in a mine, and therefore 15 or 20 separate coordinated sheets frequently are required for the interval between two levels. After assay controls have been properly posted, the outlines of the ore-reserve blocks are laid out on each plan map with due cognizance of all controlling geologic-mineralogic data as well as the limiting factors of assays. The blocks are numbered and their classification shown on each floor plat, which entails the repetition of the same block identification as long as that block persists vertically from one floor to another.

It is apparent that, in this procedure, ore-reserve *areas* are shown in plan. Therefore to obtain the cubic volume per block it is necessary that the mean aggregate area of the several plans be multiplied by the vertical height through which each ore-reserve block extends. For example, assume that the engineer decides that a given block of developed ore will extend vertically 50.0 ft above the back of a drift and over a lateral distance of 57.0 ft, which has been determined to have an average minable content of 7.6 ft—9.0% Cu—1.5 oz Ag. The mean area thus is 57.0 × 7.6 ft = 433 sq ft, and the volume of the block will be the vertical height (50 ft) x the area, or 21,650 cu ft of ore with an average grade of 9.0% Cu—1.5 oz Ag. To convert to tons, the cubic feet are divided, of course, by the previously determined tonnage factors.

As some blocks do not have a similar regular area for each floor plan, a mean area must be ascertained before applying the vertical distance. Because of this, the recording of each floor area, to obtain a mean, may be a longer process than required for listing longitudinal blocks. However, a form essentially similar to that of Fig. 32-21 can be used to record data gathered during the analysis of the plan maps.

Assay units are applied as on longitudinal sections. In fact, the plan-map method yields results on the grade and quantity of ore in reserve in a mine similar to those obtained by use of a longitudinal section. The estimation of assay grade of probable ore blocks by the plan method is analogous to that followed in compiling averages of probable blocks delineated on longitudinal sections.

Maps of Borehole, Pit and Trench Tests—The three general methods whereby the volume and/or tonnage of an ore deposit tested by boreholes, pits and trenches may be determined from a plan-map base are:

1. A weighted volume estimate based on the lateral distance between respective test sites, together with an interpretation of the vertical extent of the ore or material sought as revealed at each site. Cross sections often are desirable to facilitate and verify the computations.
2. A volume calculation based on the "prismoidal fomula." This solution, for a satisfactory analysis, often requires the use of supplementary cross sections.
3. Volume of material ascertained by the use of contours.

or equally spaced, the overall volume, or tonnage, and grade can be determined satisfactorily by establishing a system of triangles or polygons. The volume or tonnage and grade that apply to each geometric unit are then calculated. In combining the several units, assays must be properly weighted.

Tonnages and grades calculated by triangular blocks (Fig. 32-17) are probably more nearly accurate than those estimated by the polygonal method. The apices of the triangles are fixed by the location of test holes and, therefore, each group of three holes influences the calculation of tons and grade for a particular triangle. The assays of each test hole should be properly weighted in a manner similar to that outlined previously.

Polygonal blocks are usually delineated by connecting each hole with lines to all other holes in closest proximity and then erecting perpendicular bisectors on these lines to establish the sides of the polygons. The method is shown in Fig. 32-18. Each test hole is within its own polygon and, therefore, its assay as to length and grade pertains to the material bounded by the particular polygon.

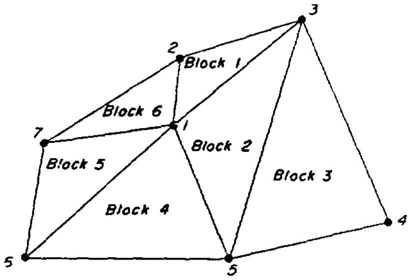

Fig. 32-17—Plan map showing ore blocks as determined by triangular system from data provided by irregularly spaced drill holes. Block 1 is based on Holes 1, 2 and 3; Block 2, on Holes 1, 3 and 5, etc.

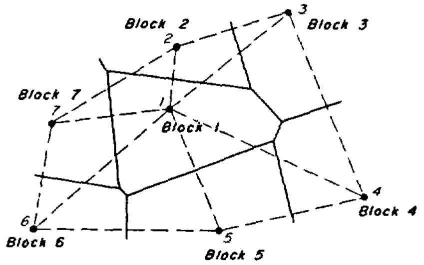

Fig. 32-18—Plan map showing ore blocks as determined by perpendicular bisector method from data provided by irregularly spaced drill holes.

The volume or tonnage of overburden, if any, which covers the economic materials can be ascertained roughly by the "weighted volume estimate," but a contour method generally gives more reliable results, particularly if the surface slopes are irregular.

Volume by the Prismoidal Formula—The prismoidal formula provides a mathematical method whereby the volume of many mineral deposits can be determined. It also is useful in computing the volume or tonnage of mine dumps, although it is not limited to these applications.

A prismoid is any solid having parallel end faces. The volume can be computed if the areas of the end sections and the linear distance between them are known or determinable. Either one of two formulas may be used:

$$V \text{ (in cu ft)} = \tfrac{1}{2}(A_1 + A_2) \times L \text{(end-area formula)}$$

$$V \text{ (in cu ft)} = \frac{(A_1 + 2A_2 + \ldots 2A_{n-1} + A_n) \times L}{2(n-1)} \quad \text{(prismoidal formula)}$$

where V = volume, A = area of end section, L = length or perpendicular distance between end areas, and n = number of areas or sections.

Solution by the end-area formula is not as exact as by the prismoidal formula. Where the middle section area is not involved, however, the end-area formula has a more rapid application and is the one commonly used. Both formulas are based on the same constants, and the process of their application is essentially similar.

A mine dump will be used to illustrate application of the formula. The dump (Fig. 32-19) has been surveyed and mapped, and all necessary data concerning the side slopes, the bottom and/or top slope are available. Trench sampling has been done, and the positions and depths of the cuts have been platted. The assays of the samples have been averaged and are ready for use. (If the samples were obtained by boreholes and test pits, they are used in accordance with the weighting methods previously discussed.)

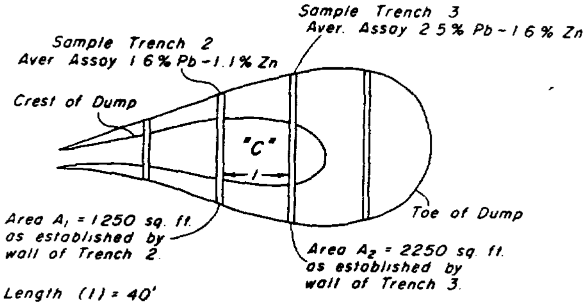

Fig. 32-19—Plan view of dump, showing sampled trenches, assays and data for volume estimates.

If the top and bottom, as delineated by the crest and toe of the dump, are nearly parallel, they can be used as end areas, and the vertical height of the dump (used as L) would provide enough data to calculate the volume. However, in such a procedure, some difficulty might be met in properly weighting the sample-assay averages. Ordinarily, a more satisfactory method is to use a series of cross-sectional areas. These are placed to take full advantage of the location of sample assays as a guide in determining the average mineral content of the dump. Thus, volume and grade are both satisfactorily determined.

Portion C of the dump (Fig. 32-19) is a prismoid, with a length of 40 ft and two end areas, A_1 and A_2, of 1,250 and 2,250 sq ft, respectively. By the end-area formula, the volume of C, as delimited by the sample trenches, is computed.

$$V = \tfrac{1}{2}(1{,}250 + 2{,}250) \times 40 = 1{,}750 \times 40 = 70{,}000 \text{ cu ft}$$

The volume (70,000 cu ft) divided by the cubic feet per ton of the material will give the equivalent tonnage, if desired.

The average grade of material in Block C is determined by the usual method of weighting items, as:

$$1{,}250 \text{ sq ft} = 1.6\,\%\ \text{Pb}—1.1\,\%\ \text{Zn}$$
$$2{,}250 \text{ sq ft} = 2.5\,\%\ \text{Pb}—1.6\,\%\ \text{Zn}$$

$$\begin{array}{llll}
1{,}250 \times 1.6 = 2{,}000 & & 1{,}250 \times 1.1 = 1{,}375 & \\
\underline{2{,}250} \times 2.5 = \underline{5{,}625} & & \underline{2{,}250} \times 1.6 = \underline{3{,}600} & \\
3{,}500 \qquad\quad 7{,}625 & & 3{,}500 \qquad\quad 4{,}975 & \\
\dfrac{7{,}625}{3{,}500} = 2.18\,\%\ \text{Pb} & & \dfrac{4{,}975}{3{,}500} = 1.42\,\%\ \text{Zn} &
\end{array}$$

Therefore, it is determined that 70,000 cu ft of material averages 2.18% Pb and 1.42% Zn.

The volume and grade of each portion of the dump can be found by the same method. The total tons and grade in the dump can be calculated by a proper, weighted summation of the several portions.

Volume by the Use of Contours—This method is not often used in making volume and grade estimates of metal-bearing deposits, chiefly on account of the difficulty in weighting assay averages obtained by the sampling. However, the contour method may serve satisfactorily for determining the quantity of many nonmetalliferous masses whose tenor may not be of such comparatively vital import in the analysis; and it may be used in estimating occurrences such as mill slime, tailings piles, and mine dumps which often have a nearly uniform metal content.

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32.2.5—EVALUATION

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The contour method is particularly adaptable to making volume estimates of bodies where surface slopes are abrupt and irregular.

Given sufficient knowledge of surface and subsurface elevations (generally the respective elevations are determined from test pits or drill holes, although in those problems involving mine dumps or tailings piles, a survey of the surface made prior to the stacking of the material will often give suitable data), and any other pertinent conditions, as they exist where revealed by the survey and testing program, the engineer is provided with such data that he can contour the upper and lower limits of the material in question. That is, by contours, any one of which encompasses a particular area in a horizontal plane, it is possible to ascertain the volume of a substance whose upper and lower extent is known. The upper surface may be either the earth's surface or any designated surface below that. The lower surface to be contoured is always, of course, below the ground.

There are several special procedures for the determination of volume by the contour method. In every case, a plan map or maps must be prepared. A map scale of 100 ft to the inch is considered a possible minimum limit for most purposes. However, the scale usually is the smallest that will accommodate the contour data. The contour interval should be such as will provide the degree of detail desired. A 5-ft contour interval (CI) usually will provide close enough control but this is not prescribed as a minimum unit. A solution for volume by use of an isopach map (a map analogous to a contour map, but instead of the lines connecting points of equal altitude they connect points of equal thickness of earth materials) illustrates the procedure:

1. A contour map is constructed of the upper surface of the region involved.
2. A second contour map, using identical scale and contour interval, is drawn for the lower subsurface. Transparent cloth or paper facilitates the procedure. The elevations for this map are, of course, posted from the field data.
3. The contour maps are then superimposed and a third map is produced by setting the points of intersection of the two series of contours. The difference in elevation, as given by the respective contours, at each intersection is the exact thickness of the material at that point. Lines of equal thickness of the material involved are drawn by connecting corresponding points and by interpolation.
4. The volume of the subsurface material in question is calculated from the resulting isopach map. Each line of equal thickness establishes a horizontal plane whose area is determined by planimeter or any other suitable process. The volume of each portion may be computed by multiplying the area of each plane by the average thickness between that plane and the next succeeding one. The total volume of material is the summation of the several portions.

Fig. 32-20 has been prepared to indicate a completed isopach map with a CI of 10 ft. It will be noted that the contours of both upper and lower surfaces also have been shown, although ordinarily in practice these work data are drawn most conveniently on separate plats. The area of Plane A times 100 equals the volume of that portion. The area of Plane B, which is the expanse bounded by Isopachous (equal thickness) Lines 90 and 100, times 95, equals the volume between elevations of 90 and 100 ft. The process is continued similarly for the portion delimited by each succeeding plane.

32.2.5—EVALUATION AND OWNERSHIP CONTROL

The engineer now should have progressed in his study to the stage where he has as complete knowledge of the controlling elements of a mineral deposit as is possible to obtain and as the needs of the examination may require. In other words, he is prepared to offer conclusive and specific recommendations in the solution of the given problem, which may be that of technically directing mine development work for the discovery of new ore bodies, or estimating the quantity and quality of economically valuable material in a given mineral deposit, or both.

YATES PETROL
BEFORE THE COMMISSION
NMOCD CASE NOS. 10446-10449
DATE: 09/09/92 DE NOVO
EXHIBIT NO. 36

ardless of where it came from, it is clear that the oil rated into the mine.

The oil seepage at the Lundberg Industries (old PCA mine) did not involve a breccia pipe. These oil seeps, however, traced to an improperly plugged well in the Getty Field ated about 700 feet away. Information on these oil seeps, ch were discovered in 1962, is attached as Exhibit 21.

If oil will migrate the distances involved in these cidents, we shudder to think what methane or hydrogen sulfide der high pressure would have done. We know from the Rutledge udies in 1963 [Exhibit 3, App. D] that the clay seams in the sin have a degree of permeability and will allow gases to grate a distance of at least seven feet when the pressure is psi [Exhibit 3, App. D, p. 64]. These clay seams are iform throughout the Basin so if they become charged with igh pressure gas, no one can say, without additional study, ow far they will migrate.

4. Industry Experience With Cementing

Our own experience also makes us question whether any casing and cementing program, unless supplemented with additional safeguards, is adequate protection against the hazards we are dealing with. In 1980, for example, AMAX drilled a bore hole from the surface to the mine workings to be used for electrical supply cables. In attempting to cement the casing, the cement was lost both above and in the salt section through, we assume, clay seams and fractures in the salt zone. In tances like this, we simply do not believe there is any iable way to be certain that the voids and annulus of the ing are completely filled. Information on this bore hole is ached as Exhibit 22.

More recently, International Minerals and Chemical poration experienced similar difficulties in a grouting gram to stop the migration of water. A summary of this erience is attached as Exhibit 23. If water at relatively w pressure can migrate as easily as occurred at IMCC, then we riously question whether cementing programs can effectively event the migration of flammable gases under much higher essures.

5. Corrosive Effects of Hydrogen Sulfide

Finally, we believe the well casing program, which has gone nchanged for over 30 years, needs to be reviewed in light of ew developments to ensure that it offers state-of-the-art rotection against the release of gases. Currently, R-111-A nly requires new or used casing "in good condition" [Exhibit 3, pp. 3-5] without specifications concerning the ability of he casing to resist corrosion from hydrogen sulfide or ithstand high pressures. The presence of hydrogen sulfide in he Basin has been known for years [See Exhibit 12, p. 9, testimony of S.J. Stanley] and was encountered during the core hole drilling by the U.S. Geological Survey in 1982 while investigating the breccia pipe and oil seeps at the MCC Mine [See Exhibit 19, p. 39] and along with high pressure (1500 psi)

22

X			

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Office Santa Fe
Lease No. M 26573
Unit

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL	X	SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

December 3, 19 80

Well No. 181 is located 2106 ft. from {~~N~~ S} line and 1178 ft. from {~~E~~ W} line of sec. 13

SW¼, Section 13 (¼ Sec. and Sec. No.) T 19S (Twp.) R 29E (Range) NMPM (Meridian)

(Field) Eddy County (County or Subdivision) New Mexico (State or Territory)

The elevation of the derrick floor above sea level is 3310 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

AMAX Chemical Corporation plans to drill bore hole at this location to be used for an electrical power supply to our underground mine workings in the western lease area. We will drill a 16-inch diameter hole into the top of the salt and cement 12-inch I.D. casing.

We will drill a 10-3/4" hole from the top of the salt to the mine workings in the 3rd ore zone; 8-inch casing will be cemented from the mine level to surface. Cement to be circulated on both strings of casing.

Drilling is to be done by cable-tool methods.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company AMAX Chemical Corporation
Address P. O. Box 279
Carlsbad, New Mexico 88220

R E Kirby
R. E. Kirby
General Mine Superintendent

APPROVED:
U. S. Geological Survey

By

Title ~~[illegible]~~

GPO 8E 3-752

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Artesia, New Mexico 88210
(505) 746- 6558
Mobil: 365-2516

AMAX ELECTRICAL HOLE – DRILLING SAMPLES

DEPTH IN FEET	DESCRIPTION (As Reported by Driller)
0-10'	Top soil
10-20'	Caliche
20-35'	Gravel-Caliche
35-40'	Red Sand (hard)
40-50'	Gravel & Shale
50-60'	Brown Shale
60-65'	Red Shale
65-75'	Red Sand
75-80'	Gray Anhydrite
80-95'	Red Bed
95-105'	Red Bed (Broken) Lost Water & Mud-Cracks
105-115'	Gray Anhydrite (Hard)
115-165'	Gray Anhydrite (NOTE: 130-45' WATER SAND)
165-170'	Gyp
170-185'	Broken Anhydrite
185-200'	Red-Blue Shale
200'-215'	Broken Anhydrite
215'-225'	Sand
225'-250'	Gray & Red Shale
250'-275'	Red Shale with some sand
275'-295'	Red Sand

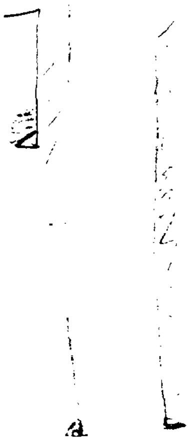
AMAX ELECTRICAL HOLE - DRILLING SAMPLES CONT'D.

DEPTH IN FEET	DESCRIPTION (As Reported by DRILLER)
295'-330'	Anhydrite & Shale
330'-360'	Gyp & Red Shale
360'-382'	Gyp & Red Shale With Salt Stringers
385'	CALL TOP OF SALT
385'-404'	Salt
404'	Set 13-3/8" Surface Casing
404-696'	Salt - Base 124 Bed approx. 696'
696'	Set 8-5/8" Casing
696-704'	Salt-Drill into Mine approx. 704'

NOTE: Use this same log for 145' Ground Cable Hole

#181 AMAX

SPUD: 12-22-80
COMP: 1-29-81



404' - 13 3/8" (16" hole)
400 - SXS "C" CMT NOT CIRC.

24#
696' - 8 5/8" (10 3/4" hole)
350 - SXS "C" - NOT CIRC.
CIRC. W/ 8 YD³ READY-MIX

MARNEL PIPE & SUPPLY CO.

NEW – USED OIL FIELD PIPE & EQUIPMENT
SHALLOW POOL CASING PULLING & WELL PLUGGING
PIPE THREADING & TESTING

O. Box 1037
1 N. 1st St.

Artesia, New Mexico 88210
(505) 746-6558

AMAX ELECTRICAL HOLE - DRILLING PROGRESS

DATE	COMMENTS	Feet/Accum Feet	Hrs. & Accum. Hours
12-18-20	Moving & rigging-up	—	4/4
12-19-20	Rigging-Up	—	8/12
12-22-80	Spud Hole & Drilling	20'/20'	10/22
12-23-80	Drilling	20'/40'	9/31
12-24-80	Drilling - Shut down for Christmas	10'/50'	5/36
12-29-80	Drilling	25'/75'	10/46
12-30-80	Drilling-Lost Water & Mud in Crack	20'/95'	10/56
12-31-80	Drilling	20'/115'	9½/65½
1-1-81	Drilling	15'/130'	8½/74
1-2-81	Drilling-HIT WATER 130-145'(Fresh)	15'/145'	10/84
1-3-81	Drilling-Fresh Water 30' in hole	20'/165'	9/93
1-4-81	Drilling-Fresh Water 50' in hole	15'/180'	10/103
1-5-81	Drilling-Fresh Water 60' in hole Put on drilling-jars	15'/195'	10/113
1-6-81	Drilling-Fresh Water 70' in hole	20'/215'	9/122
1-7-81	Drilling-Fresh Water 90' in hole Drilling Slowed due to water	10/225'	9/131
1-8-81	Drilling-Fresh Water 100' in hole Bailed hole for 1-hr. & could not lower water level.	10/235'	10/141
1-9-81	Drilling-Fresh Water 105' in hole	15/250'	9/150
1-10-81	Drilling-Fresh Water 120' in hole	10/260'	10/160
1-11-81	Drilling-Fresh Water 120' in hole	10/270'	10/170
1-12-81	Drilling-Fresh Water 130' in hole	9/279'	10/180
1-13-81	Drilling-Fresh Water 130' in hole	16/ 295'	9½/189½

AMAX ELECTRICAL HOLE - DRILLING PROGRESS CONT'D.

DATE	COMMENTS	FT./ACCUM FT.	HRS. & / ACCUM. HRS.
1-14-81	Drilling-Build Up Bit Water@135'	10/305'	9/198½
1-15-81	Drilling-Water @130' Hole Caving	9/314'	8½/207
1-16-81	Drilling-Water @ 130'	11/325'	9/216
1-17-81	Drilling-Hole Caving Bad Water @135'	5/330'	10/226
1-18-81	Drilling-Hole Caving Water @135'	5/335'	9/235
1-19-81	Drilling-Hole standing better Water@ 135'	5/340'	10/245
1-20-81	Drilling-Reset Socket Water @135'	5/345'	9/254
1-21-81	Drilling-Water @ 130'	5/350'	9/263
1-22-81	Drilling-Water @135' Built up bit	5/355'	10/273
1-23-81	Drilling-Water @135' (HIT SALT STRINGERS)	10/365'	9/282
1-24-81	Drilling-Water @ 130'(IN SALT)	10/375'	10/292
1-25-81	Drilling-Water @ 130'	9/384'	8/300
1-26-81	Drilling-Water @ 130'	11/395'	10/310
1-27-81	Drilling-Water @ 130' Some Hole Cave	5/400'	9/319
1-28-81	Drilling-Water @ 130' String up 10" Tools & Get Ready to Run Csg.	4/404'	10/319
1-29-81	Run 404' of new 13-3/8" Casing & Cement with 400-sxs.(Denton Cement Co.) Did not circulate	-	10/329

TOTAL DEPTH TO SET SURFACE = 404 FEET

TOTAL RIG HOURS = 329

(ABOVE WORK BILLED ON OUR INV#0118)

1-30-81 1-31-81 2-1-81	Wait on Cement to Dry-Surface 13-3/8" Casing	-	-
2-2-81	Drill out Shoe - Check for Water-None-Drilling	21/425'	10/10
2-3-81	Drilling-Dry	40/465'	9½/19½
2-4-81	Drilling - Hard	15/480'	9/28½
2-5-81	Drilling	40/520'	10/38½

AMAX ELECTRICAL HOLE - DRILLING PROGRESS CONT'D.

2-6-81	Drilling	40/560'	10/48½
2-7-81	Drilling	40/600'	10/58½
2-9-81	Drilling	40/640'	10/68½
2-10-81	Drilling	36/676'	10/78½
2-11-81	Drilling - Cut 124 Bed(Sample)	16/692'	8/86½
2-12-81	Drilling-Get ready to run 8-5/8"	4/696'	9/95½
2-13-81	DID Not Run/Cement(Circulate) 8-5/8" Csg. to 696' - Denton Cmt. Co. 350-Sxs. Add 8-Yd^3 Cement		10/105½
2-14- 81	to back-side		-
2-15-81	Wait on Cement		-
2-16-81	Drill out Shoe-Drill into Mine(TD 704')	8/704'	10/115½

TOTAL DEPTH TO SET 8-5/8" = 696'

TD into Mine = 704' (base 124-bed approx. 696')

TOTAL RIG HOURS = 115½ Hrs.

- -

(Drill Ground Cable Hole per Alan Baldridge - approximately 30' SW above hole)

2-17-81	Move & Rig-Up	-	10/10
2-18-81	Drilling	20/20'	9½/19½
2-19-81	Drilling	20/40'	10/29½
2-20-81	Drilling	20/60'	10/39½
2-21-81	Drilling	20/80'	9½/49
2-22-81	Drilling	15/95'	10/59
2-23-81	Drilling	10/105'	8/67
2-24-81	Drilling-Water @ 138'	33/138'	10/77
2-25-81	Drilling - TD=145'	7/145' TD	10/87
2-26-81	Rig-Down	-	10/97

TD on Ground Cable Hole = 145'

Water @ 138'

Total Rig Hours = 97-Hrs.

N.M.O.C.D. COPY

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

RECEIVED

APR 9 1980

U.S. GEOLOGICAL SURVEY
ARTESIA, NEW MEXICO

1. OIL WELL ☒ GAS WELL ☐ OTHER
2. NAME OF OPERATOR: C.E. LA RUE & B.N. MUNCY JR. ✓
3. ADDRESS OF OPERATOR: Box 196 ARTESIA, N.M. 88210
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 2310' FNL & 990' FEL SEC. 13 - T19S - R29E
5. LEASE DESIGNATION AND SERIAL NO.: NM 025559
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: –
7. UNIT AGREEMENT NAME: –
8. FARM OR LEASE NAME: CULBERTSON & IRWIN
9. WELL NO.: FED #1
10. FIELD AND POOL, OR WILDCAT: BENSON YATES EAST
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SEC. 13 - T19S - R30E
12. COUNTY OR PARISH: EDDY
13. STATE: N.M.
14. PERMIT NO.: –
15. ELEVATIONS (Show whether DF, RT, GR, etc.): 3410.6' GR.

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:

TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐
REPAIR WELL	☐	CHANGE PLANS	☐
(Other)			

SUBSEQUENT REPORT OF:

WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☒
(Other)			

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

ID 2276

P&A WELL 3-26-80 - THRU - 4-4-80 PER THE FOLLOWING:

Posted ID-2 P&A 6-16-80

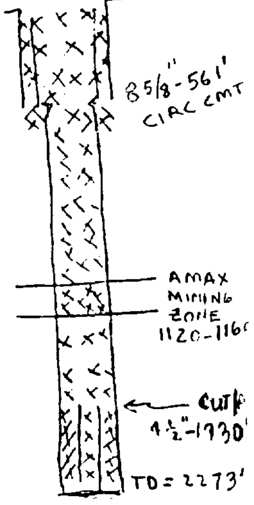
RECEIVED

JUN 13 1980

O. C. D.
ARTESIA, OFFICE

- ✱ 25-SXS. OVER PERFS FROM 2201'-1936'
- ✱ SHOOT-PULL 1730' CSG. (4½")
- ✱ 50-SXS. FROM 1726'-1616' (STUB PLUG)
- ✱ 55-SXS. FROM 1600'-1440'
- ✱ 125-SXS FROM 1430'-1023' (AMAX MINING ZONE 1120-1165')
- ✱ 125-SXS FROM 1015-721'
- ✱ 175-SXS FROM 708'-343' (BASE 8⅝" SURFACE @ 561'-CIRCULATED)
- ✱ 130-SXS FROM 336'-SURFACE (CIRCULATED)
- ✱ INSTALLED MKR. & CLEANED LOCATION PER BLM SPECS

NOTE: ALL PLUGS SPOTTED THRU TBG. & TAGGED & READY FOR INSPECTION



HOLE PLUGGED SOLID WITH CEMENT (68

18. I hereby certify that the foregoing is true and correct

SIGNED: B.N. Muncy
TITLE: Operator
DATE: 4/7/80

(This space for Federal or State office use)

APPROVED BY: [illegible]
TITLE: [illegible]
CONDITIONS OF APPROVAL, IF ANY:

YATES PETROLEUM CORP.
BEFORE THE COMMISSION
NMOCD CASE NOS. 10446-10449
DATE: 09/09/92 DE NOVO
EXHIBIT NO. 37

*See Instructions on Reverse Side

O.C.D. COPY

Form 9-331
(May 1963)

UN[illegible]D STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPL[illegible]E*
(Other instructions on re-
verse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

RECEIVED
APR 8 1980
U.S. GEOLOGICAL SURVEY
ARTESIA, NEW MEXICO

RECEIVED
APR 9 1980
O. C. D.

1. OIL WELL ☒ XX GAS WELL ☐ OTHER
2. NAME OF OPERATOR: C.E. LaRue & B.N. Muncy Jr.
3. ADDRESS OF OPERATOR: Box 196 Artesia, N.M. 88210
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
2310 Feet FNL & 990 Feet FEL
Sec.13-T19S-R30E

5. LEASE DESIGNATION AND SERIAL NO.: NM 025559
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: -
7. UNIT AGREEMENT NAME: -
8. FARM OR LEASE NAME: Culbertson [illegible] Irwin
9. WELL NO.: #1
10. FIELD AND POOL, OR WILDCAT: Benson Yates East
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec. 13-T19S-R30E
12. COUNTY OR PARISH: Eddy
13. STATE: N.M.

14. PERMIT NO.:
15. ELEVATIONS (Show whether DF, RT, GR, etc.): 3410.6' Gr

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:

TEST WATER SHUT-OFF ☐
FRACTURE TREAT ☐
SHOOT OR ACIDIZE ☐
REPAIR WELL ☐
(Other)

PULL OR ALTER CASING ☐
MULTIPLE COMPLETE ☐
ABANDON* ☒ XX
CHANGE PLANS ☐

SUBSEQUENT REPORT OF:

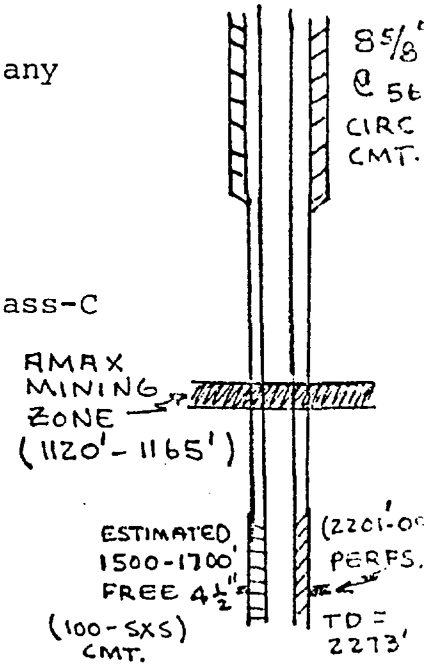
WATER SHUT-OFF ☐
FRACTURE TREATMENT ☐
SHOOTING OR ACIDIZING ☐
REPAIRING WELL ☐
ALTERING CASING ☐
ABANDONMENT* ☐
(Other)

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

P & A WELL NEXT 3-5 DAYS PER THE FOLLOWING:

A. Notify USGS-Artesia before start plus, advise of any deviations in the following procedure.
B. Cement perfs(2201-09') with tbg. (25-sxs Class-C)
C. WOC & Tag Plug
D. Take stretch on 4½"-Estimate 1500-1700' free
E. Shoot/Pull free 4½" csg.
F. Cement hole bottom/top(Stages) completely with Class-C
G. Install marker
H. Restore site per BLM regulations
I. File final report(s)



18. I hereby certify that the foregoing is true and correct

SIGNED ____ TITLE OPERATOR DATE 3-17-80

(This space for Federal or State office use)

APPROVED BY ____ TITLE ____ DATE ____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

C/SF

Form 9-330
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE*
(See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

RECEIVED
SEP 15 1980
O. C. D.
ARTESIA, OFFICE

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

RECEIVED
AUG 25 1980
U.S. GEOLOGICAL SURVEY
ARTESIA, NEW MEXICO

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☐ DRY ☒ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEPEN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: C. E. LaRue & B. N. Muncy, Jr.

3. ADDRESS OF OPERATOR: P. O. Box 196 Artesia, New Mexico 88210

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface: 2310' FNL and 990'FEL, Section 13, T19S, R30E
At top prod. interval reported below
At total depth

5. LEASE DESIGNATION AND SERIAL NO.: NM 025559

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME: Culbertson & Irwin

9. WELL NO.: 1

10. FIELD AND POOL, OR WILDCAT: Benson Yates East

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Section 13 T19S R30E

14. PERMIT NO. | DATE ISSUED

12. COUNTY OR PARISH: Eddy

13. STATE: N.M.

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
6/15/78	6/21/78	7-7-~~80~~ 78	3510.6' GL	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY →	ROTARY TOOLS	CABLE TOOLS
2276'	2276'			X	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 2201' - 2209'

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: BHC Acoustilog

27. WAS WELL CORED: No

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8 5/8"	29#	561'	12 1/4"	225 sacks	Circulated
4 1/2"	10 1/2#	2276'	7 7/8"	120 sacks	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)

31. PERFORATION RECORD (*Interval, size and number*)
2201' - 2209' 2 pr. ft. 1/2"

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
2201' - 2209'	1500 gallons 7½ % Acid
	40,000 gallons gelled water
	45,000# 20-40 sand

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
~~7/9/79~~	~~Swab~~	~~Shut-in~~ P&A 4-4-80

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
~~7/10/79~~	~~24~~			~~2~~	~~TSTM~~	~~15~~	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
			~~2~~	~~TSTM~~	~~15~~	~~31°~~

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED | TITLE Operator | DATE 8/21/80

ACCEPTED FOR RECORD
PWC
AUG 28 1980

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement"*: Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Yates	2201	2209	Slight Oil Cut - Water

38. GEOLOGIC MARKERS

NAME	TOP	
	MEAS. DEPTH	TRUE VERT. DEPTH
Salt	561	
Yates	2201	

O C C Copy

Copy to SF

Form 9-331
(May 1963)

UN ED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIP E*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.
NM025559

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☒ GAS WELL ☐ OTHER

7. UNIT AGREEMENT NAME

RECEIVED
JUL 26 1978
U.S.G.S.
ARTESIA, OFFICE

2. NAME OF OPERATOR
C. E. LaRue and B. N. Muncy, Jr.

8. FARM OR LEASE NAME
Culbertson & Irwin

3. ADDRESS OF OPERATOR
P O Box 196 Artesia, NM 88210

9. WELL NO.
1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*
See also space 17 below.)
At surface
2310' FNL and 990' FEL Section 13, T19S, R30E

10. FIELD AND POOL, OR WILDCAT
Benson Yates East

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Section 13, T19S, R30E

14. PERMIT NO.

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
3410.6 GL

12. COUNTY OR PARISH
Eddy

13. STATE
N M

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other) Change in Elevation	x		
(Other)							

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Surveyor had 100' error in elevation, all previous reports should read 3410.6' instead of 3510.6' as reported.

RECEIVED
U.S. GEOLOGICAL SURVEY
ARTESIA, NEW MEXICO

18. I hereby certify that the foregoing is true and correct

SIGNED ______ TITLE Operator DATE 7/4/78

(This space for Federal or State office use)

APPROVED BY ______ TITLE ACTING DISTRICT ENGINEER DATE JUL 25 1978
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
(May 1963)

N. M. O. C. C. COPY

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.
NM 025559

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☒ GAS WELL ☐ OTHER

RECEIVED
JUN 30 1978
ARTESIA, OFFICE

7. UNIT AGREEMENT NAME

2. NAME OF OPERATOR
C. E. LaRue and B. N. Muncy, Jr. ✓

8. FARM OR LEASE NAME
Culbertson & Irwin

3. ADDRESS OF OPERATOR
P.O. Box 196, Artesia, New Mexico 88210

9. WELL NO.
1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
2310' FNL & 990' FEL, Section 13, T19S, R30E

10. FIELD AND POOL, OR WILDCAT
Benson Yates East

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Section 13, T19S, R30E

14. PERMIT NO.

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
~~3510.6~~ 3410.6 Corrected

12. COUNTY OR PARISH
Eddy

13. STATE
N.M.

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:

TEST WATER SHUT-OFF ☐
FRACTURE TREAT ☐
SHOOT OR ACIDIZE ☐
REPAIR WELL ☐
(Other)
PULL OR ALTER CASING ☐
MULTIPLE COMPLETE ☐
ABANDON* ☐
CHANGE PLANS ☐

SUBSEQUENT REPORT OF:

WATER SHUT-OFF ☐
FRACTURE TREATMENT ☐
SHOOTING OR ACIDIZING ☐
(Other) Oil String ☒
REPAIRING WELL ☐
ALTERING CASING ☐
ABANDONMENT* ☐

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Ran 2276' of 4-1/2" - 10.5# casing and cemented with 120 sacks 6/24/78, cement Not circulated.

18. I hereby certify that the foregoing is true and correct

SIGNED
TITLE Operator
DATE 6/24/78

(This space for Federal or State office use)

APPROVED BY Le T. Lara
TITLE ACTING DISTRICT ENGINEER
DATE JUN 30 1978
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

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Form 9-331
(May 1963)

UN ED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIP E*
(Other instruction re-
verse side)

Form approved.
Budget Bureau No. 42-R1424.

5. LEASE DESIGNATION AND SERIAL NO.
NM025559

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

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JUN 23 1978
O. C. C.
ARTESIA, OFFICE

1. OIL WELL ☒ GAS WELL ☐ OTHER

7. UNIT AGREEMENT NAME

2. NAME OF OPERATOR
C. E. LaRue and B. N. Muncy Jr. ✓

8. FARM OR LEASE NAME
Culbertson & Irwin

3. ADDRESS OF OPERATOR
P O Box 196 Artesia, NM 88210

9. WELL NO.
1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface
2310' FNL and 990' FEL Section 13, T 19 S, R 30 E

10. FIELD AND POOL, OR WILDCAT
Benson Yates East

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Section 13, T19S, R30E

14. PERMIT NO.

15. ELEVATIONS (Show whether DF, RT, GR, etc.)
~~3510.6~~ 3410.6 Corrected

12. COUNTY OR PARISH
Eddy

13. STATE
N M

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:

TEST WATER SHUT-OFF ☐
FRACTURE TREAT ☐
SHOOT OR ACIDIZE ☐
REPAIR WELL ☐
(Other)
PULL OR ALTER CASING ☐
MULTIPLE COMPLETE ☐
ABANDON* ☐
CHANGE PLANS ☐

SUBSEQUENT REPORT OF:

WATER SHUT-OFF ☐
FRACTURE TREATMENT ☐
SHOOTING OR ACIDIZING ☐
(Other) Surface Casing ☒
REPAIRING WELL ☐
ALTERING CASING ☐
ABANDONMENT* ☐

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Spudded well 6/15/78, Ran 561' of 29# Used 8-5/8" Casing and circulated cement with 225 sacks Class C w/2% CaCl. 6/16/78. Tested Casing @ 600# for 30 minutes 6/19/78.

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U. S. GEOLOGICAL SURVEY
ARTESIA, NEW MEXICO

18. I hereby certify that the foregoing is true and correct

SIGNED TITLE Operator DATE 6/19/78

(This space for Federal or State office use)

APPROVED BY TITLE ACTING DISTRICT ENGINEER DATE JUN 22 1978
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

NMOCC COPY

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

30-015-22386

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK
DRILL ☒ DEEPEN ☐ PLUG BACK ☐

b. TYPE OF WELL
OIL WELL ☐ GAS WELL ☐ OTHER SINGLE ZONE ☐ MULTIPLE ZONE ☐

2. NAME OF OPERATOR
C E LaRue and B N Muncy, Jr. ✓

3. ADDRESS OF OPERATOR
P O Box 196 Artesia, NM 88210

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface
2310' FNL and 990' FEL Section 13, T19S, R30E
At proposed prod. zone

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ARTESIA, OFFICE

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*

5. LEASE DESIGNATION AND SERIAL NO.
N M 025559

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME
Culbertson and Irwin

9. WELL NO.
1

10. FIELD AND POOL, OR WILDCAT
✓ Benson Yates East

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Section 13, T19S, R30E

12. COUNTY OR PARISH
Eddy

13. STATE
NM

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any)
990'

16. NO. OF ACRES IN LEASE
320

17. NO. OF ACRES ASSIGNED TO THIS WELL
40

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.

19. PROPOSED DEPTH
2500'

20. ROTARY OR CABLE TOOLS
Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.)

22. APPROX. DATE WORK WILL START*

23.
PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
11"	8-5/8"	29#	550'	130 Sacks Circulated
7-7/8"	5-1/2"	15-1/2#	2500'	150 Sacks

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED ________________ TITLE Operator DATE April 24, 1978

(This space for Federal or State office use)

PERMIT NO. ________________ APPROVAL DATE JUN 15 1978

APPROVED BY Albert R Stall TITLE ACTING DISTRICT ENGINEER DATE

CONDITIONS OF APPROVAL, IF ANY:

THIS APPROVAL IS RESCINDED IF OPERATIONS ARE NOT COMMENCED WITHIN 3 MONTHS
EXPIRES SEP 2[illegible] 1978

*See Instructions On Reverse Side

Form C-102
Supersedes C-128
Effective 1-1-65

N MEXICO OIL CONSERVATION COMMIS
WELL LOCATION AND ACREAGE DEDICATION PLAT

All distances must be from the outer boundaries of the Section

Operator **LaRue & Muncy**	Lease **Culberson & Irwin**		Well No. **1**	
Unit Letter **H**	Section **13**	Township **19 South**	Range **30 East**	County **Eddy**

Actual Footage Location of Well: **2310** feet from the **North** line and **990** feet from the **East** line

Ground Level Elev. ~~3510.6~~ 3510.6	Producing Formation Yates	Pool Benson Yates East	Dedicated Acreage: 40 Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling. etc?

☐ Yes ☐ No If answer is "yes," type of consolidation ____________

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) ____________

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.

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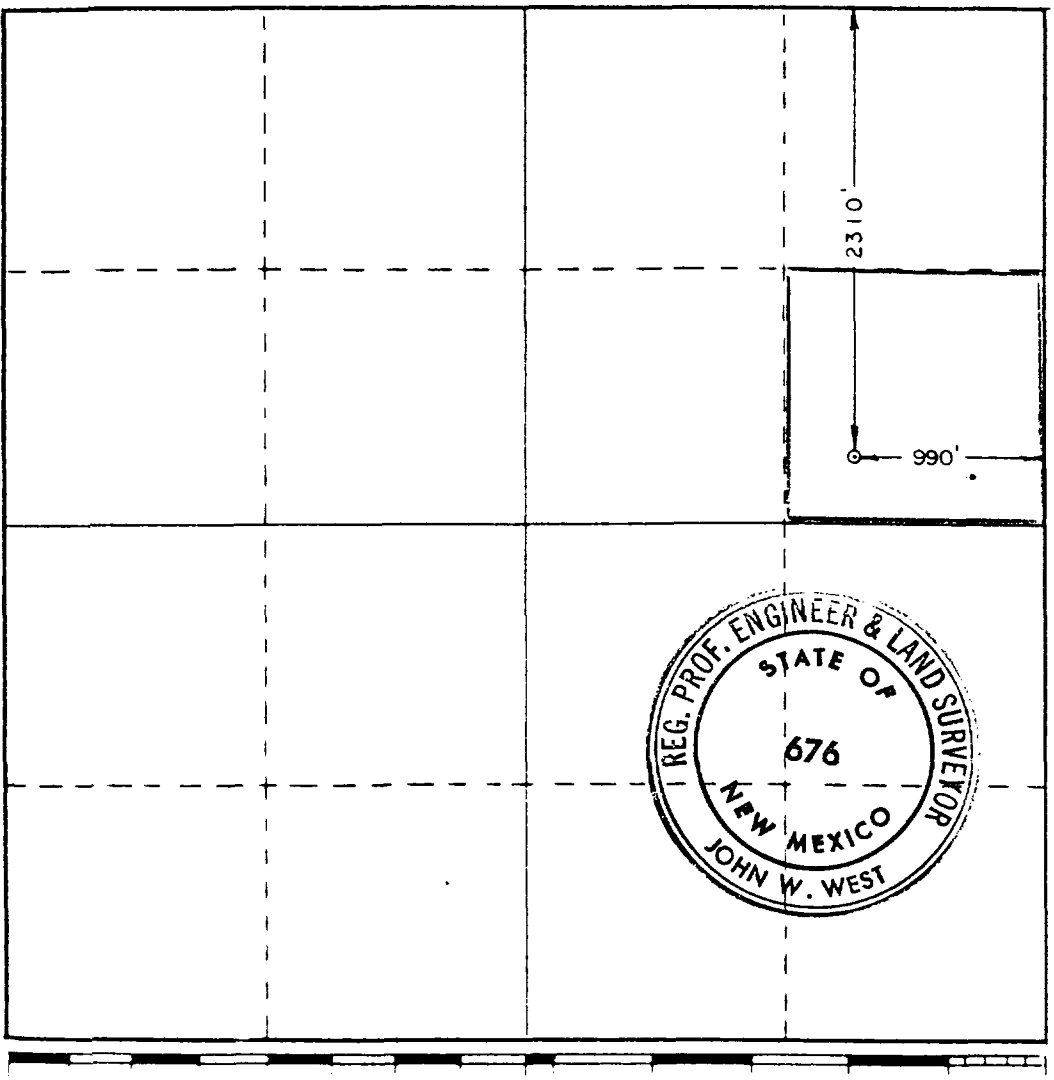
ARTESIA, NEW MEXICO



676
JOHN W. WEST

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name

Position
Operator

Company
C E LaRue and B N Muncy, Jr.

Date
April 28, 1978

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed
5/2/78

Registered Professional Engineer and/or Land Surveyor
John W. West

Certificate No. John W. West 676